

**Methamphetamine in Melbourne:  
Epidemiology of use, related harms  
and barriers and pathways to  
professional support**

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### **Notice 1**

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## Errata and Addendum

p. 27 (table)	Change the percentage for "Unstable" accommodation type ("Yes") to 46 from 76
p. 41	Insert "Comment" section on p. 4 below relating to Respondent-driven sampling
p. 47 para 1, line 5	"comprise" deleted
p. 93 para 1, line 6	Change "older participants and those with longer histories" to "younger participants and those with shorter histories"
p. 93 para 2, last line	Replace "obfuscate" with "outweigh"
p. 93 para 2, last line	Add to the end of the paragraph: "Our findings have a number of important implications for policy and practice. For example, to overcome some of the identified barriers to professional support, services could develop educational tools and train staff about methamphetamine-related issues (e.g., contexts and patterns of use, experience of harm). Such education has been suggested as a means of improving staff attitudes and confidence in treating this population, and can also provide a mechanism for improving user knowledge and perceptions of available treatment options [2, 23, 26]. However, simply aiming to improve service engagement is not an adequate response to the unique needs of all methamphetamine users; a variety of approaches which target the diverse barriers experienced by heterogeneous methamphetamine-using populations is needed. For example, initiatives with a harm reduction focus could reduce harmful use patterns and the incidence of adverse outcomes among individuals (i.e., 'service avoiders') who are not willing to access, or will likely not benefit from accessing, professional support at the current time. Further, given that some participants reported preferring to address problematic methamphetamine use patterns and associated harms without ceasing use entirely, non-abstinence-based approaches need to be explored."
p. 106 para 1, line 4	Change ".use" to "use"
p. 111-112 (table)	Replace table with that included on p. 3 below (numbers and percentages in the BL column have been edited to represent only those participants who were followed-up (n=201). These were the participants whose data were used in the statistical tests outlined in this Chapter and avoids confounding by attrition bias)
p. 113	paragraphs 1 and 2 deleted (duplicates of those on p. 110)
p. 116 para 1, lines 3-5	Change "reporting past-month criminal behaviours; and reporting past-month ecstasy and benzodiazepine use" to "not reporting past-month criminal behaviours; and not reporting past-month ecstasy or benzodiazepine use"
p. 118 para 3, line 6	Add after the sentence concluding "...without professional assistance.": "This finding provides evidence for natural or 'spontaneous' remission from methamphetamine dependence, and suggests that not every methamphetamine user needs professional intervention. Therefore, aiming to improve service engagement among the broader methamphetamine-using populations (e.g., through non-targeted initiatives) might result in an unnecessary or even counter-productive access that may be a burden on drug treatment services. Nonetheless, some form of service engagement could provide opportunities for the delivery of harm reduction education to methamphetamine users and could result in positive outcomes not captured by our survey or experienced after the follow-up period."
p. 141 para 3, line 12	Insert new paragraph for the start of the subsequent sentence ("Maintaining...")
p. 141 para 3, line 15	Move sentence beginning "Further, if treatment cost..." to subsequent section ("Alternative pathways to service engagement"; p. 142, line 6, after sentence ending "...attracting methamphetamine users to services [16, 43, 51]."). Amend beginning of original sentence to: "If treatment cost is prohibitive..."
p. 142 para 3, line 10	Delete sentence beginning "Nevertheless, research is needed..."
	Amend last sentence to: "Consequently, Wright et al. suggested that drug treatment services should adopt clearly defined confidentiality policies to counter concerns related to child protection and thereby optimise treatment engagement among female users; however, this might not be possible under current Australian

	child protection laws.”
p. 143 para 1, line 8	Replace “population” with “community”
p. 145 para 3, line 3	Replace “Western” with “other”
p. 145 para 3, line 14	Move last sentence (“Further research...”) to “Discussion” section (p. 147 para 2, line 11, after sentence ending “...addressing stigma.”). Amend beginning of original sentence to: “Research is needed to assess the efficacy of peer interventions...”
p. 146 para 1, line 17	Move last sentence (“Further research...”) to “Discussion” section (p. 147 para 2, after last sentence). Amend beginning of original sentence to: “Lastly, research is required to examine treatment outcomes...”
p. 147 para 2, line 10	Delete “peer-educator measures,”
p. 147 para 2, line 10	Replace “sigma” with “stigma”
p. 169 para 4, line 3	Delete “(Table 1)”
p. 169 para 4, line 6	Add “(Table 1)” to the end of the sentence
p. 170 (table)	Replace table with that included below (numbers and percentages in the “Ever” and “Current” columns (BL) have been edited to represent only those participants who were followed-up (N=201). This reflects the numbers initially used in the statistical tests outlined in this Chapter and avoids confounding by attrition bias)
p. 189 para 2, line 8	Replace “benefitted” with “benefited”
p. 246	Insert Appendix Three (electronic copies of the baseline and follow-up questionnaires on CD)

p. 170: Table 1: Utilisation of professional support for methamphetamine use and related harms at baseline (BL) and follow-up (FU) among participants who completed both interviews (N=201)

	BL			FU	
	Ever n (%)	Current n (%)	Anytime during FU period* n (%)	Initiated since BL** n (%)	Current n (%)
One-on-one drug counselling	73 (36)	16 (8)	40 (20)	24 (12)	17 (8)
Group counselling	24 (12)	0 (0)	8 (4)	5 (2)	0 (0)
GP	84 (42)	17 (8)	49 (24)	32 (17)	16 (8)
Generalist psychiatric service	49 (24)	12 (6)	27 (13)	15 (8)	11 (5)
Withdrawal/detoxification					
Residential	34 (17)	-	8 (4)	8 (4)	-
Outpatient	2 (1)	0 (0)	0 (0)	-	-
Home/community-based	10 (5)	0 (0)	0 (0)	-	-
Residential rehabilitation	19 (9)	-	3 (1)	3 (1)	-
Hospital***	16 (8)	-	8 (4)	8 (4)	-
Ambulance	19 (9)	-	8 (4)	8 (4)	-
Any	116 (58)	42 (21)	84 (42)	42 (26)	33 (16)

\*Includes contact at baseline

\*\*Not in contact with service/s at baseline

\*\*\*Includes access of emergency department and/or other areas

p. 111: Table 1: Comparison of characteristics, behaviours of participants who completed interviews at both baseline (BL) and follow-up (FU) (N=201)

Variable	BL n (%)	FU n (%)	p- value
<b>Participant demographics, social support and health characteristics</b>			
Unemployed	138 (69)	124 (62)	<b>0.023</b>
Currently enrolled in education	24 (11)	23 (11)	0.819
Homeless last 12 months	62 (31)	29 (15)	<b>0.000</b>
Current accommodation unstable*	84 (42)	39 (19)	<b>0.000</b>
Arrested last 12 months	76 (38)	65 (32)	0.172
Recent** involvement in any*** crime	129 (64)	109 (54)	<b>0.011</b>
ESSI7, median (range)	24.5 (8-34)	26 (8-34)	<b>0.004</b>
K10 (recent** psychological distress)			
Median (range)	24 (10-50)	21 (10-46)	<b>0.000</b>
Very high (score: 30-50)	59 (29)	32 (16)	<b>0.000</b>
Sought professional help for mental health issues last 12 months	125 (62)	122 (61)	0.686
Currently prescribed medications for mental health issues	84 (42)	84 (42)	1.000
<b>Methamphetamine and other drug use, associated risk behaviours and harms</b>			
Main form methamphetamine used	n=200		
Speed	137 (69)	101 (52)	<b>0.000</b>
Crystal methamphetamine	63 (32)	95 (48)	
Frequency of recent** methamphetamine use (days/week), median (range)	2 (0.25-7)	0.5 (0-7)	<b>0.000</b>
Methamphetamine-dependent (SDS $\geq$ 4)	117 (58)	88 (44)	<b>0.000</b>
Main methamphetamine ROA		n=195	
Snort/swallow	40 (20)	33 (16)	0.198
Smoke	36 (18)	40 (20)	0.297
Inject	125 (62)	122 (61)	1.000
Recent** drug injection (any drug)	134 (67)	113 (56)	<b>0.000</b>
Prescribed OST currently	46 (24)	59 (29)	0.106
Recent** substance use			
Methamphetamine	201 (100)	137 (68)	-
Ecstasy	57 (28)	40 (20)	<b>0.017</b>
Alcohol	172 (86)	164 (82)	0.103
Cannabis	155 (77)	146 (73)	0.106
Hallucinogens (LSD, mushrooms)	44 (22)	25 (12)	<b>0.001</b>

Variable	BL n (%)	FU n (%)	p- value
Illicit pharmaceutical stimulants	47 (23)	28 (14)	<b>0.003</b>
Cocaine	26 (13)	20 (10)	0.239
Illicit benzodiazepines	128 (64)	95 (47)	<b>0.000</b>
Tobacco	180 (90)	170 (85)	<b>0.013</b>
Heroin	89 (45)	70 (35)	<b>0.001</b>
Illicit OST <sup>†</sup>	40 (20)	27 (13)	<b>0.020</b>
Recent** illicit drug expenditure (\$/week)	n=200		
Spent money on illicit drugs	194 (97)	174 (87)	<b>0.000</b>
Median (range)	150 (10-2100)	100 (0-8,000)	<b>0.004</b>
(Last 12 months) methamphetamine use resulted in/associated with:			
Injuries to self and/or someone else	33 (16)	25 (12)	0.274
Relationship/social problems (incl. fights)	98 (49)	82 (41)	0.090
Financial problems	132 (66)	40 (20)	<b>0.000</b>
Work/study problems	69 (35)	96 (48)	<b>0.000</b>
Legal problems	31 (15)	26 (13)	0.505
Sought help from family/friends for reducing/ceasing methamphetamine use last 12 months	59 (29)	35 (17)	<b>0.002</b>
Currently accessing professional support <sup>‡</sup> for methamphetamine use and/or related harms	42 (21)	33 (16)	0.189

\*Unstable housing was classified according to the temporary or transitional nature of some accommodation types and included 'no fixed address/homeless', 'boarding house, hostel, shelter or refuge', 'squat' and 'staying with a friend/acquaintance (not paying rent)'

\*\*Past month

\*\*\*Includes self-reported involvement in property, dealing/trafficking, fraud or violent offences, and involvement in unspecified criminal activities as an income source

<sup>†</sup>Methadone, buprenorphine and/or Suboxone (buprenorphine-naloxone)

<sup>‡</sup>Regular contact with a general practitioner, generalist psychiatric service, and/or drug-specialist treatment service, including one-on-one or group counselling, residential, outpatient or home detoxification/withdrawal, and residential rehabilitation



**Comment: Respondent-driven sampling (RDS)**

One issue that emerged in relation to the study concerned the sampling strategy. RDS was chosen as the study's primary recruitment strategy because it has proven to be an effective method of accessing 'hidden populations' overseas, such as those engaging in illegal or stigmatised behaviours (e.g., illicit drug use) and/or those that might be distrustful of researchers (Heckathorn, 1997; Semaan et al., 2002). Further, a review of methods for sampling hidden populations in the HIV field, including targeted, stratified and time-space sampling methods, indicated that RDS controls the biases associated with other chain-referral sampling techniques (e.g., snowballing) resulting in considerably less biased, and more representative, samples (Semaan et al., 2002). RDS has only been applied rarely to recruit drug users in Australian research (Paquette et al., 2011). Therefore, the use of RDS in this study also meant that it could contribute to understanding best-practice sampling methodology in Australian illicit drug research by expanding RDS to methamphetamine users.

However, RDS proved inefficient at recruiting methamphetamine users for this study (only 19 participants were recruited in the first three months of the ten-month recruitment period); consequently, a combination of targeted (e.g., the distribution of study promotional materials via selected street press, relevant websites), street outreach and snowball sampling techniques were adopted for the remainder of the recruitment period. Box 1 details the numbers of participants recruited into the study via each sampling method.

**Box 1: Numbers of regular methamphetamine users recruited according to sampling strategy.**

Recruitment method	n
RDS	139
Advertised materials (e.g., poster at drug and alcohol service)	51
Recruited via service staff or field researchers	34
Snowball sampling	30
<b>TOTAL**</b>	<b>254</b>

\*Recruitment information missing for one participant

Bivariate analyses (chi-square analyses for categorical variables and the Wilcoxon-Mann Whiney test for continuous variables) were conducted to compare the socio-demographic characteristics of participants recruited via RDS (n=139) to the remainder of the sample (n=115). The two groups were similar with respect to age, gender and country of birth, although participants recruited via RDS were significantly ( $p<0.05$ ) less likely to currently be employed (20% vs. 32%). However, there were no differences in self-reported experience of psychological distress during the past month, homelessness during the previous year, and current levels of self-perceived social support.

The recruitment groups were also comparable in relation to methamphetamine and other drug use. There were no significant differences with respect to: main form of methamphetamine used; age of first methamphetamine use; primary route of methamphetamine administration; frequency of methamphetamine use during the previous month; levels of methamphetamine dependence; levels of prescribed pharmacotherapy use; lifetime and recent injection of any drug; and lifetime and 'recent' (past 6 months) use of alcohol, cannabis, heroin, ecstasy, and illicit benzodiazepines, pharmaceutical stimulants and pharmacotherapies. However, participants recruited via methods other than RDS were significantly more likely to have recently used cocaine. There were no differences between the groups with regard to lifetime or current utilisation of drug treatment or health and support services (any) for methamphetamine use and associated harms.

**References**

- Heckathorn, D.D. *Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations*. Social Problems, 1997. 44(2): p. 174-199.
- Paquette D.M., Bryant J., De Wit J. *Use of respondent-driven sampling to enhance understanding of injecting networks: A study of people who inject drugs in Sydney, Australia*. Int J Drug Policy, 2011. 22: p. 267-273.
- Semaan S., Lauby J, Liebman J. *Street and Network Sampling in Evaluation Studies of HIV Risk-Reduction Interventions*. AIDS Rev, 2002. 4: p. 213-223.

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# Abstract

The use of methamphetamine is a significant public health concern. An extensive literature documents the characteristics, consumption patterns, experience of related harms and treatment utilisation trajectories among methamphetamine users recruited from drug treatment programs. However, few studies have examined these issues among out-of-treatment or community-recruited methamphetamine users. Our understanding of the pathways through which people engage with professional support services is therefore limited. The research presented in this thesis was developed to address these gaps. Specifically, this study aimed to: 1) examine the epidemiology of methamphetamine use and methamphetamine-related harms in metropolitan Melbourne, Australia; 2) identify and investigate barriers to professional support (i.e., specialist drug treatment, relevant health/support services) for methamphetamine users; 3) assess drug use, service utilisation and psychosocial changes in a cohort of methamphetamine users over 12 months; and 4) investigate factors associated with, and enablers of, access to professional support among methamphetamine users.

A prospective cohort of regular (at least monthly) methamphetamine users (N=255) was recruited across metropolitan Melbourne during 2010 and administered a structured interview that covered: socio-demographics; drug use patterns and experience of related harms; methamphetamine market characteristics; health status; experience of drug treatment and relevant health/support services for methamphetamine and other drug use; and incarceration history and involvement in criminal behaviours. A cross-sectional analysis of baseline data indicated that the characteristics of the cohort generally mirrored those of studies in other Australian regions; participants were mostly male, unemployed and Australian-born, with high rates of mental health issues and polysubstance use. Participants reported most commonly using speed powder, most mainly injected methamphetamine, and 80% used methamphetamines at least weekly.

A follow-up interview administered to participants during 2011 assessed changes among the cohort (n=201, retention rate: 79%) across the above domains during the 12 months following initial recruitment. Participants generally experienced positive outcomes over the follow-up period, including significantly fewer reports of very high psychological distress, unemployment and homelessness. Use of methamphetamine and other drugs decreased overall. Analyses suggested that some methamphetamine users are able to remit from (i.e., cease) methamphetamine dependence and problematic use patterns without professional support.

Barriers to professional support for methamphetamine users were identified in a literature review and through data supplied by participants at baseline. Barriers included: naivety of available services, accessibility issues (e.g., waiting lists), a preference for self-treating methamphetamine use, and the perception that service staff lacked the appropriate knowledge or experience to meet the needs of participants. In particular, 41% of the sample reported that their methamphetamine use was not sufficiently problematic/harmful to warrant use of professional support. A multivariate logistic regression analysis indicated that this sub-group generally engaged in less risky methamphetamine use patterns and experienced fewer associated harms. However, there were indications of unmet/unrecognised need among this group (e.g., half were classified as methamphetamine-dependent according to the Severity of Dependence Scale).

Factors associated with, and enablers to, professional support among methamphetamine users were examined in another literature review and through analysis of participants' service utilisation patterns over the follow-up period. Overall, access of professional support was associated with service utilisation for other issues (e.g., use of drugs other than methamphetamine), greater experience of methamphetamine-related harms (e.g., relationship/social problems) and riskier use patterns (e.g., injecting).

The findings presented in this thesis highlight the need for targeted initiatives to increase levels of service engagement and thereby reduce the incidence of harms among methamphetamine users in Melbourne. In particular, there is a need for interventions targeting the subset of methamphetamine users who resist engaging with drug treatment and related professional support yet are likely to benefit from service access.

# General declaration

**Monash University**

**Monash Research Graduate School**

## Declaration for thesis based or partially based on conjointly published or unpublished work

In accordance with Monash University Doctorate Regulation 17 Doctor of Philosophy and Master of Philosophy (MPhil) regulations the following declarations are made:

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes one original paper published in a peer-reviewed journal and five unpublished publications. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the candidate, working within the Department of Epidemiology and Preventive Medicine under the supervision of Prof Paul Dietze and Dr Mark Stoové. The inclusion of co-authors reflects the fact that the work came from active collaboration between researchers and acknowledges input into team-based research. I have reformatted published and submitted papers to generate a consistent presentation within the thesis.

In the case of Chapters One to Six my contribution to the work involved the following:

<b>Thesis chapter</b>	<b>Publication title</b>	<b>Publication status</b>	<b>Nature and extent of candidate's contribution</b>
1	Methamphetamine use in Melbourne, Australia: Baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence	Published	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review
2	Literature review: barriers to access of professional support for methamphetamine users	Submitted	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review
3	An exploration of self-perceived non-problematic use and other barriers to professional support for methamphetamine users	Submitted	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review
4	One-year changes in methamphetamine use, dependence and remission in a community-recruited cohort	Submitted	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review
5	Review: professional support access by methamphetamine users: factors associated with, and enablers to, service utilisation	Submitted	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review
6	Factors associated with professional support access among a prospective cohort of methamphetamine users	Submitted	Study design and management, data collection and analysis, results interpretation, manuscript preparation and review

Signed:

Date: 31/10/2012

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Another group of people were integral to this research: the study participants, who shared their time and diverse and meaningful stories with me over the study period. They were asked to provide many intimate details of their lives (on two occasions for most participants); I am immensely appreciative of their understanding and willingness to do so.

This research would also not have been possible without the assistance of Cerissa Papanastasiou, who helped tremendously with participant recruitment and data collection. Cerissa also deserves special mention, along with Bec Winter, for sharing an office with me throughout my candidature. I'm sure my unpredictable moods and increasingly eclectic collection of 'stuff' in the office made their work lives unnecessarily challenging. However, they were nothing but supportive, sympathetic and considerate.

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that from my siblings, Erica and Dominic) will always be appreciated. To my friends – I need to apologise for sometimes being physically, mentally and emotionally unavailable, particularly over the last couple of years. However, I wholeheartedly appreciate their steadfast understanding and encouragement. Sana deserves very special mention for being an invaluable (almost daily) source of support. Also: Ben and Carmen for listening to me even from overseas; Sarah, Mick, May, Col, Caz and Glen for always making sure I was fed; Janet and Brian for their enthusiasm and praise; Merrin for the much-needed coffees and chats; John and Simon for sharing PhD-related advice and frustrations; and Dwayne, Drew, Mark, Shane, Nicole, Megs, Mel, Pete and Thea for providing necessary distractions and making me laugh.

Dr Campbell Aitken of *Express Editing Writing and Research* provided professional editing services in accordance with the Institute of Professional Editors' *Guidelines for editing research theses* (approved by the Deans and Directors of Graduate Studies, 12 November 2010).



# Publications and presentations

A list of oral presentations and written publications (other than those included as chapters in this thesis) from during the PhD candidature is presented below. Those with an asterisk are included as an Appendix.

## Oral presentations

**Quinn, B.**, Dietze, P., Papanastasiou, C. & Stoové, M. *“But I don’t need treatment”: Why Australia’s current treatment options might not be accessed by methamphetamine users.* Contemporary Drug Problems Conference. Prato, Italy, October 2011;

Jenkinson, R., **Quinn, B.** & El-Hayek, C. (2011). *Quantitative research with people who use drugs.* Invited presentation to the Australian Leadership for Development (AusAID) Program, Melbourne, Australia, July 2011.

Jenkinson, R., **Quinn, B.**, Jolley, D. & Dietze, P. (2011). *‘Weekend on the Town’: patterns and correlates of simultaneous alcohol and psychostimulant use among a sample of young socialites.* 37th Annual Alcohol Epidemiology Symposium of the Kettil Bruun Society. Melbourne, Australia, April 2011.

**Quinn, B.**, Stoové, M., Papanastasiou, C. & Dietze, P. *A prospective cohort study of regular methamphetamine users: related harms and population-based complexities.* Australasian Professional Society on Alcohol and Other Drugs Conference. Canberra, Australia, November 2010;

Kirwan, A., Stoové, M., **Quinn, B.** & Winter, R. *Getting out and getting on but not getting services: Social support and mental health service access for ex-prisoners with a history of injecting drug use.* Australasian Professional Society on Alcohol and Other Drugs Conference. Canberra, Australia, November 2010;

Kirwan, A., Winter, R., **Quinn, B.** & Stoové, M. *Stories from the fringe: ex-prisoners and experiences of release.* Anex Conference. Melbourne, Australia, October 2010;

Stoové, M., Winter, R., **Quinn, B.** & Kirwan, A. *Back on the “horse”: injecting drug use in the immediate post-prison release period. Results from a prospective cohort study of ex-prisoners with a history of injecting drug use in Melbourne, Australia.* International Harm Reduction Association Conference. Liverpool, England, April 2010;

**Quinn, B.**, Jenkinson, R. Johnston, J., Hazelwood, P., Winford, S. & Brogan, D. *Sniffer dogs: user perceptions and experiences.* Australasian Professional Society on Alcohol and Other Drugs Conference. Darwin, Australia, November 2009;

Kirwan, A., Winter, R., **Quinn, B.** & Stoové, M. *Hit and Miss: A Study of Post-Release Support.* Anex Conference. Melbourne, Australia, October 2009.

## Peer-reviewed publications

\*Horyniak, D., Reddel, S., **Quinn, B.** & Dietze, P. *The use of alprazolam by people who inject drugs in Melbourne, Australia.* Drug Alcohol Rev. 2012. **31**: p. 585-590. (Included as Appendix One);

\*Degenhardt, L., Roxburgh, A., Dunn, M., Campbell, G., Bruno, R., Kinner, S.A., George, J., **Quinn, B.**, White, N. & Topp, L. *The Epidemiology of Ecstasy Use and Harms in Australia.* Neuropsychobiology. 2009. **60**: p. 176-187. (Included as Appendix Two).

## Posters

**Quinn, B.**, Dietze, P., Stoové, M. & Papanastasiou, C. *A prospective cohort study of regular methamphetamine users in Melbourne: changes over a 12-month period and predictors of remission from dependence.* Monash University Early Career Researcher Biannual Symposium. Melbourne, Australia, June 2012;

Jenkinson, R., **Quinn, B.**, Dietze, P. & Jolley, D. *Fast track to skinny: young women, psychostimulant use and weight management.* Australasian Professional Society on Alcohol and other Drugs Conference. Hobart, Australia, November 2011.

**Quinn, B.**, Dietze, P., Papanastasiou, C. & Stoové, M. *The ‘Un-MET Study’: Exploring the pathways and barriers to utilisation of drug treatment for a prospective cohort of methamphetamine users.* International Harm Reduction Conference. Beirut, Lebanon, April 2011;

**Quinn, B.,** Winter, R., & Stoové, M. & Kirwan, A. *A prospective cohort study of ex-prisoners with a history of injecting drug use in Melbourne, Australia: Findings and recommendations for policy and practice.* International Harm Reduction Conference. Beirut, Lebanon, April 2011;

**Quinn, B.,** Kirwan, A., Winter, R. & Stoové, M. *A prospective cohort study of ex-prisoners with a history of injecting drug use: overlapping methodological and population-based complexities.* Australasian Professional Society on Alcohol and other Drugs Conference. Darwin, Australia, November 2009.

# Abbreviations and acronyms

ACC	Australian Crime Commission
AIHW	Australian Institute of Health and Welfare
AOD	Alcohol and other drug/s
ATS	Amphetamine-type stimulant/s (i.e., meth/amphetamine, excluding ecstasy)
AUDIT	Alcohol Use Disorders Identification Test
BBVI	Blood-borne viral infection
BL	Baseline
CALD	Culturally and linguistically diverse
CIDI	Composite International Diagnostic Interview
DSM	Diagnostic and Statistical Manual (of Mental Disorders)
DUMA	Drug Use Monitoring in Australia
EDRS	Ecstasy and related Drugs Reporting System
ESSI	ENRICH Social Support Inventory
FU	Follow-up
GEE	Generalised estimating equations
GHB	Gamma-hydroxybutyrate
GP	General practitioner
HIV	Human Immunodeficiency Virus
IDRS	Illicit Drug Reporting System
K10	Kessler (10) Psychological Distress Scale
MATES	Methamphetamine Treatment Evaluation Study
MDMA	3,4-methylenedioxymethamphetamine
MSM	Men who have sex with men
NDARC	National Drug and Alcohol Research Centre
NDSHS	National Drug Strategy Household Survey
NSW	New South Wales
OST	Opioid substitution therapy
OTI	Opiate Treatment Index
PWID	Person/people who inject/s drugs
QDS	Questionnaire Design System
RCT	Randomised controlled trial
ROA	Route of administration

RDS	Respondent-driven sampling
SDS	Severity of Dependence Scale
STI	Sexually transmitted infection
UK	United Kingdom
UNODC	United Nations Office on Drugs and Crime
UNSW	University of New South Wales
US	United States (of America)

# Introduction

This thesis focuses on the use of methamphetamine and pathways to professional support (i.e., specialist drug treatment and generalist health and social support services) among methamphetamine users in the Australian city of Melbourne (the capital city of the State of Victoria). A specific emphasis of the thesis is on factors that impede and facilitate professional service access for these people. The data presented here were collected via structured interviews with a prospective cohort of 'regular' (at least monthly) methamphetamine users (N=255). The sample was recruited throughout metropolitan Melbourne during 2010. Twelve-month follow-up interviews were conducted with most (79%) of the cohort in 2011.

This thesis comprises six core chapters: four report on findings from the cohort and two are literature reviews. The following section provides essential background information to these core chapters, including: a general description of methamphetamine (e.g., common effects and forms); global and Australian prevalence of methamphetamine use, including a discussion of recent trends; desired outcomes of, and motivations for, methamphetamine use; adverse consequences of methamphetamine consumption that impact on both users and/or the wider community; and issues related to methamphetamine-using populations' access to professional support. Lastly, the rationale for and significance of this research are discussed. A description of the primary research aims and six core chapters prefaces the remainder of the thesis.

## Methamphetamine: Defining the issue

### What is methamphetamine?

Methamphetamine, a derivative of amphetamine, is an illicit, synthetically-produced psychostimulant that acts on the central nervous system, causing the release of monoamine neurotransmitters including norepinephrine, dopamine and serotonin [1, 2]. Sufficient doses of methamphetamine result in enhanced feelings of euphoria, well-being, self-esteem, alertness/wakefulness, increased libido and reduced appetite [1, 3]. However, methamphetamine consumption also produces a variety of potentially severe adverse effects which include: stomach cramps, increased blood pressure, bruxism (teeth clenching, grinding) [4], restlessness, cardiac arrhythmia, stroke and numerous psychological side-effects such as paranoia, anxiety and insomnia [1, 3]. Other desired and adverse outcomes of methamphetamine use are discussed below.

The form and availability of methamphetamine and amphetamine-type stimulants (ATS) differs around the globe [5-7]. In Australia, amphetamine sulphate was the primary form of illicit amphetamine available during the 1980s [8]. Legislative controls regarding the main precursor chemicals for manufacturing amphetamine sulphate were introduced in the early 1990s [9], forcing amphetamine manufacturers to adopt alternative methods of producing the drug [10]. Consequently, the manufacture, availability and use of methamphetamine increased during the 1990s until methamphetamine comprised the vast majority of amphetamines seized by Australian law enforcement agencies [11-13]. As almost all amphetamines used and seized in Australia are in fact methamphetamine, unless otherwise specified, ‘methamphetamine’ is used to denote both amphetamine and methamphetamine throughout the remainder of this thesis.

Three main forms of methamphetamine exist in Australia: speed powder (generally ranging in colours including white, yellow, brown, pink and orange), methamphetamine base (a waxy, sticky, damp powder), and crystal methamphetamine (or ‘ice’) [13, 14]. Of these, speed powder and crystal methamphetamine are the forms most commonly used and readily available in Australia [12, 15-17]. Crystal methamphetamine is generally believed to be of the highest purity [8, 14]; however, the overall purity of methamphetamine (across the different forms) seized by law enforcement agencies can fluctuate significantly [12]. Regardless, research findings suggest that crystal methamphetamine use is associated with an increased likelihood of experiencing methamphetamine-related harms in comparison to other forms of methamphetamine [18, 19]. For example, in Kinner and Degenhardt’s [20] study of recent (past six months) methamphetamine users, crystal methamphetamine use was associated with higher levels of dependence, in addition to an increased likelihood of engaging in criminal behaviours and experiencing drug-related financial and legal/criminogenic harms.

## **The prevalence of methamphetamine use**

### ***Methamphetamine use across the world***

According to the most recent World Drug Report, the estimated annual global prevalence of ATS (including methamphetamine, amphetamine and methcathinone but excluding ecstasy/3,4-methylenedioxymethamphetamine (MDMA)) use in 2010 was 0.3-1.2% (between 14.3 million and 52.5 million users) [6]. Behind cannabis, ATS are the second most widely used class of illicit drugs worldwide. Oceania (Australia and New Zealand), North America and Central America are the regions with the highest estimated prevalence of ATS use. However, reports of increasingly frequent and large methamphetamine seizures in numerous regions, including some Asian and Transcaucasian countries, have fuelled speculation that ATS use will increase in these areas [6].



However, interpretation of World Drug Report figures requires caution given inconsistent data collection and reporting measures between countries, and the fact that data on ATS in many regions are limited.

### ***The prevalence of methamphetamine use in Australia***

The prevalence of methamphetamine use in Australia reflects global trends, with methamphetamine remaining one of the most commonly used illicit substances throughout the country [12, 15, 21]. The triennial National Drug Strategy Household Survey (NDSHS) is Australia's primary indicator of self-reported drug use prevalence among the general population (aged 14 years and over) [15]. The most recent estimates from the NDSHS suggest that, of illicit substances, methamphetamine had 'ever' (at least once during the lifetime) been used by 7.0% of Australians, behind cannabis (35.4%), ecstasy (10.3%), hallucinogens (8.8%) and cocaine (7.3%). According to the NDSHS an estimated 2.1% of Australians had used methamphetamine in the last 12 months, behind cannabis (10.3%), ecstasy (3.0%), illicit pain-killers/analgesics (3.0%), and equal with cocaine (2.1%).

Research findings suggest that Australia has the highest per capita prevalence of methamphetamine use globally (among countries that collect and provide data on methamphetamine use) [5, 6]. Estimated Australian levels of methamphetamine use are double those seen in other Western countries [5, 6]. For example, the annual prevalence of ATS use in England and Wales for 2010/11 was 1.0%, compared to 2.1% in Australia [22]. Indeed, wastewater analyses in South Australia indicated that levels of methamphetamine consumption in Adelaide were up to 30 times greater than those recorded in European cities such as Milan and London [23].

### ***Recent Australian trends***

Following a peak of 3.7% in 1998 [24], NDSHS estimates of past-year methamphetamine use in the Australian community have gradually decreased, reaching a low of 2.1% in 2010 [15]. Although household surveys can be poor indicators of illicit drug use patterns for numerous reasons (e.g., they under-represent groups who are more likely to engage in drug use, such as homeless and incarcerated individuals [25, 26]), and their findings should therefore be interpreted with caution, other drug monitoring surveys of the general community and sentinel drug-using populations have indicated declines in methamphetamine use over a similar period [27-32]. For example, the Illicit Drug Reporting System (IDRS) consumer survey, an annual, cross-sectional survey of people who inject drugs (PWID) in all of Australia's capital cities, showed an overall decrease in methamphetamine use among participants from 2001 (76%) [10] to 2010 (60%) [31]

(notably, a peak of 79% was recorded in 2006 [33] which corresponded with indications of increased crystal methamphetamine use around this time [13, 20]). Further, in 2009-10 the Drug Use Monitoring in Australia (DUMA) program [30], which collects information on drug use and criminal behaviours among police detainees on a quarterly basis across nine Australian sites (via voluntary self-report and urinalysis), recorded its lowest level of methamphetamine use (15%) since the program's inception in 1999. Importantly, this declining trend in methamphetamine use corresponds with a reduction in the number of treatment episodes related to amphetamine (i.e., meth/amphetamine) during this time [34, 35].

Although these trends suggest an overall reduction in methamphetamine use over the past decade in Australia, potentially influenced by dynamic user and market characteristics (i.e., price, purity, availability) and changing police practices [12, 16, 17, 36], there are numerous indications that methamphetamine use increased among Australian sentinel drug-using populations during 2010-2011 [16, 17, 37-41]. For example, 21% of DUMA participants who submitted to voluntary urinalysis during the first three-quarters of 2011 tested positive to methamphetamine, compared to 16% in 2010 and 13% in 2009 [37]. Continual increases in the number of clandestine methamphetamine labs detected and seized by Australian law enforcement agencies each year [12] are suggestive, at the very least, of ongoing demand for the drug.

### ***The prevalence of 'problematic' methamphetamine use in Australia***

In 2005 McKetin et al. [21] published estimates of the number of regular and dependent methamphetamine users in Australia. Using a multiplier-benchmark method with data on drug treatment utilisation, hospital separations and arrests, these authors estimated that there were more than 70,000 dependent methamphetamine users in Australia at the time. This figure was considerably higher than the estimated number of dependent heroin users (approximately 45,000) [42]. However, due to changes to methamphetamine use and market characteristics in the years since this research was conducted [12, 15-17], there is a lack of current knowledge regarding the extent of dependent and problematic methamphetamine use in Australia. The number of people in Australia engaging in frequent (i.e., weekly or more) methamphetamine use is likely to be small [15-17]; however, frequent use remains a cause for concern given that such users are at high risk of methamphetamine dependence and are likely to experience the majority of methamphetamine-related harms [13, 43-46]. A recent Australian study indicated that nearly half of the participants in the 2007 National Survey of Mental Health and Wellbeing who had ever used psychostimulants on more than five occasions met the criteria for a lifetime stimulant use disorder (e.g., dependence) [47].

## Who uses methamphetamine?

Australian ATS and methamphetamine users recruited into research over the last two decades have demonstrated many consistent characteristics. In general, they have been mostly male, unemployed, aged in their twenties and thirties, Australian-born, from English-speaking backgrounds, non-Indigenous and educationally disadvantaged [e.g., 44, 48, 49-53]. Nevertheless, some heterogeneity also exists within methamphetamine-using samples, which can vary in: ethnicity [54, 55], age [56, 57], sex [58, 59], socioeconomic status [60-62], geographic location [63-66] and sexual and gender identity [67, 68]. Brief descriptions of different methamphetamine-using sub-groups in the following section highlight this heterogeneity. Importantly, the diversity of methamphetamine users suggests a range of treatment programs and harm reduction interventions are required to target multiple user needs [69, 70].

## Motivations for methamphetamine use

People engage in methamphetamine use for a variety of reasons. Newton et al. [71] surveyed methamphetamine-dependent individuals to examine motivations for use and relapse according to five theories of addiction: negative reinforcement ('pain avoidance'); positive reinforcement ('pleasure seeking'); incentive salience ('craving'); stimulus response learning ('habits'); and inhibitory control dysfunction ('impulsivity'). Most participants reported that positive reinforcement/'pleasure seeking' was a primary motivation for methamphetamine use; however, many of these respondents also rated incentive salience/'craving', inhibitory control dysfunction/'impulsivity' and stimulus-response learning/'habits' as important. These findings suggest a complex web of multiple use motivations and resultant consumption patterns among methamphetamine users.

Commonly reported reasons for, and perceived 'benefits' and desired outcomes of, methamphetamine consumption include: to enhance sexual performance and experience (including aphrodisiac effects) [18, 72, 73]; to lose weight [74-76]; to self-medicate for mental health issues [77-79]; for increased wakefulness, alertness and/or energy (e.g., to improve capacity for work or study) [18, 80, 81]; as a substitute for other drugs (e.g., due to the perception methamphetamine is cheaper and/or safer) [72, 77]; to increase sociability [18, 80]; and for increased motivation (e.g., to accomplish specific tasks) [80]. Many of these reasons underscore the use of methamphetamine by different user sub-groups. For example, Brecht et al.'s [82] exploration of gender differences among methamphetamine users indicated that female respondents were more likely to report first using methamphetamine to lose weight or for increased energy. In comparison, males were somewhat more likely to report first using methamphetamine to work more hours (and were also more likely to report experiencing

methamphetamine-related work problems). The perceived sexual benefits of methamphetamine use mean that it is popular among some men who have sex with men (MSM) [73, 83], while increased alertness/wakefulness has motivated use among individuals working lengthy hours, such as long-distance truck drivers [84, 85]. Its effect of increased alertness/wakefulness, in addition to enhanced sociability, has resulted in methamphetamine use being a common aspect of dance/rave/club sub-cultures [86-89]. Importantly, the perceived benefits or desired effects of methamphetamine consumption tend to attenuate with increased tolerance and longer periods of use [90-92].

## **Patterns of methamphetamine use**

### ***Route of methamphetamine administration***

Although methamphetamine can be ingested using a range of methods [e.g., 93, 94-96], the primary reported routes of methamphetamine administration are oral/swallowing, snorting/intranasal, smoking and injection [16, 17, 97, 98]. Some individuals transition between methamphetamine administration routes over the course of their using careers [99]; a transition to more intense modes of administration (e.g., from non-injecting to injecting) is often an indicator of increased tolerance [46]. Different methods of ingestion can be more amenable to certain forms of methamphetamine; crystal methamphetamine is commonly smoked [100-102], whereas speed powder is often snorted by non-injectors in particular [16, 80, 103]. The different routes of methamphetamine administration can be associated with diverse use patterns and experience of associated harms [104-108]. For example, McKetin et al.'s [51] comparison of methamphetamine injectors and smokers indicated that although both groups experienced similar levels of some harms (e.g., mental and physical health consequences), those who injected the drug were more likely to be methamphetamine-dependent (regardless of form injected). In addition, injecting methamphetamine is associated with an increased risk of incurring and transmitting blood-borne viral infections (BBVIs) such as HIV and hepatitis C [25, 109, 110].

### ***Use frequency***

McKetin et al.'s [103] investigation of methamphetamine use and market characteristics in Sydney highlighted the frequency of methamphetamine use that characterises different methamphetamine users and their consumption patterns. Approximately half (49%) of their 'regular' methamphetamine-using sample (N=310) reported using the drug two to four times per week; however, use frequency ranged from daily/almost daily (13%) to less than weekly (18%). McKetin et al. categorised their sample into three broad 'types' of methamphetamine users based, in part, on frequency (but also polysubstance use and route of administration (ROA)): 1) primary methamphetamine injectors who used the drug once or more per week with concurrent high levels

of alcohol and cannabis use and sporadic use of other drugs (e.g., benzodiazepines, ecstasy, cocaine); 2) individuals with a long history of heroin use for whom methamphetamine injection was a component of polydrug use; and 3) younger non-injectors who used ecstasy and methamphetamine recreationally. Although some methamphetamine users can maintain chronic methamphetamine use patterns over long periods of time (e.g., up to ten years) [111], many methamphetamine users do not sustain patterns of high-frequency use; research findings indicate that some individuals remit from methamphetamine dependence and problematic use patterns ‘naturally’ or ‘spontaneously’ (i.e., becoming non-dependent or ceasing/reducing methamphetamine use without professional intervention) [63, 112-116]. For example, among Borders et al.’s cohort of ‘rural stimulant users’ in three US states, use of methamphetamine decreased overall during the study’s two-year period [63]. Methamphetamine use was not associated with participant demographics or social factors, although a greater severity of employment and criminal/legal problems (according to the Addiction Severity Index [117]) reduced the likelihood of cessation of methamphetamine use during follow-up [63].

### ***Polysubstance use***

Polysubstance use is ubiquitous among methamphetamine-using populations [e.g., 49, 62, 118, 119, 120]. For example, other stimulant substances such as ecstasy and cocaine are often used in conjunction with methamphetamine to enhance the drugs’ intended effects and/or achieve a ‘better high’ [121, 122]. In contrast, depressant substances such as benzodiazepines, GHB, heroin and cannabis are commonly used to combat methamphetamine’s ‘comedown’ effects [52, 121, 123]. There is some evidence of primary heroin users switching to methamphetamine as a result of shifting heroin market characteristics (e.g., reduced availability, increased price) [124, 125]. Likewise, research demonstrates that primary methamphetamine users can transition to primary use of other substances, such as heroin [126]. However, the consumption of both stimulant and depressant substances presents the risk of ‘stimulant-depressant cycles’, which have been shown to result in greater harm than use of stimulants or depressants alone [18, 127].

### ***‘Bingeing’ on methamphetamine***

Methamphetamine users commonly engage in ‘binge’ use patterns [20, 128, 129]. Binges are typically defined as the continued consumption of large quantities of methamphetamine over an uninterrupted period of time (usually days) [130-132]. Research findings suggest that some users may binge on methamphetamine to prolong the desired effects of use (e.g., euphoria, sexual benefits) and postpone the experience of comedown effects [131]. However, methamphetamine users engaging in binge use patterns (versus recreational/infrequent users or those engaging in more regular/consistent use patterns) are more likely to experience harms associated with their

methamphetamine use and engage in risky behaviours [129, 133, 134]. For example, of Semple et al.'s [130] sample of HIV-positive MSM, participants who reported being current methamphetamine binge users were more likely to report trading sex for methamphetamine in the previous two months than those who were not classified as current binge users.

## **Methamphetamine-related harms**

Numerous adverse consequences are associated with the use of methamphetamine, particularly as a result of dependent, heavier and riskier use patterns [45, 46, 51, 135, 136]. These harms cover multiple domains and are outlined below. Many harms have a considerable impact on the user and/or the wider community, and some harms are more prevalent and severe among people who use methamphetamine compared to other substances [127, 128, 137-141]. The continued occurrence of methamphetamine-related harms underpins the need for research on methamphetamine-related issues. Such research can assist in developing effective harm reduction interventions for, and optimising treatment engagement among, methamphetamine-using populations with the aim of preventing and reducing methamphetamine-related harms to the individual and wider community.

### ***Harms to the methamphetamine-using individual***

A substantial literature documents the many physical and mental sequelae that individuals experience as a result of methamphetamine consumption. McKetin et al. [45] showed that Australian methamphetamine users are more likely to be physically impaired than the general population. Specific deleterious physical outcomes of methamphetamine use include: poor oral/dental health [4, 142, 143]; adverse skin conditions (e.g., acne, scarring) resulting from formication, injecting practices, and poor hygiene and lifestyle conditions [14, 144-146]; dependence [147, 148]; acute injury/trauma [149]; sexual dysfunction, particularly among males [150, 151]; significant weight loss and malnutrition [74-76]; and cardiovascular and cerebrovascular complications (e.g., hypertension, tachycardia, ischaemic stroke) [148, 152-154]. Although a growing body of research points to the possible development of brain abnormalities and impaired cognitive functioning as a result of methamphetamine use [e.g., 155, 156-158], inconsistent data and a lack of long-term prospective studies mean that the permanence and reversibility of effects are largely unknown [159, 160]. Some researchers have suggested that methamphetamine use increases the risk of developing Parkinson's disease [161-163], but there is currently insufficient evidence to establish a causal relationship [144].

The adverse mental health outcomes associated with methamphetamine use are also well documented [e.g., 135, 148, 164, 165, 166]. Although determining the temporal and possible

causal relationships between methamphetamine consumption and the development of psychological problems is inherently difficult [167], methamphetamine-using populations are typically characterised by a high prevalence of psychological co-morbidity [e.g., 107, 168, 169]. Symptoms of anxiety and depression are particularly common [167, 170]; for example, an investigation of the prevalence of major depression among methamphetamine users entering treatment demonstrated that most had levels of depression that required clinical management [171]. In addition, drug-induced psychosis is one of the most common comorbid psychiatric disorders among methamphetamine users [168]. Psychotic symptoms typically include auditory and/or visual hallucinations, suspiciousness, unusual thought content and persecutory ideation [44, 164], although these usually abate after cessation of methamphetamine use [167]. Methamphetamine users can present with other mental health problems or conditions such as suicidality [119], eating disorders [75], mood disorders [169] and schizophrenia [172]. Research has demonstrated that experience of psychological issues can adversely impact on treatment retention and outcomes among methamphetamine users [115, 173-175].

Methamphetamine users may experience other adverse socio-behavioural consequences which include: relationship/social problems (e.g., relationship breakdown [176]), homelessness [177], criminogenic outcomes (e.g., involvement in criminal behaviours, contact with the criminal justice system) [178, 179], financial problems [132], and reduced school [180], work [60] and 'everyday functional' [181] performance. Lastly, methamphetamine use can be directly or indirectly fatal [153, 182, 183]; however, methamphetamine-related deaths are not as common as those associated with the use of other drugs, such as heroin [184, 185]. A large proportion of methamphetamine-related mortality is not a direct result of its consumption; many deaths associated with methamphetamine use occur due to accidents, violence and suicide [182, 186, 187].

### ***Harms to significant others and the wider community***

In addition to its considerable public health burden [25, 55, 188] underscored by the individual health harms described above, the use of methamphetamine causes several direct harms to the community. For example, methamphetamine use is associated with an increased risk of BBVI and sexually transmitted infection (STI) transmission (e.g., hepatitis C, HIV), particularly as a result of risky injecting practices among injecting sub-groups [109, 128] and unsafe sexual behaviours among MSM [189-191]. Individuals driving motor vehicles while methamphetamine-intoxicated are a risk to the wider community as the drug can impair driving abilities [192-194], while methamphetamine consumption during pregnancy can have detrimental effects on the child (e.g., foetal growth restriction) [195, 196]. The production of methamphetamine via 'meth' or 'clan



labs' can be harmful to the environment [197, 198] and people manufacturing the drug risk burns and other injuries [199, 200].

While criminal behaviours associated with methamphetamine use can be detrimental to the wider community [13, 201], media and public discourse in Australia has also fuelled perceptions of the 'typical' methamphetamine user as a dangerous, violent individual [e.g., 202, 203-209]. Although the literature certainly indicates a high prevalence of violent offending among methamphetamine users (frequent/chronic users in particular) compared to the general community and other primary substance users [82, 210-214], there is limited evidence demonstrating a causal relationship between methamphetamine use and violent behaviours [215]. It is possible that violence among methamphetamine users is symptomatic of co-occurring factors and needs (e.g., psychiatric issues, polydrug use, personality and lifestyle factors) [215].

## **Methamphetamine users' access of professional support**

In light of the numerous public health concerns associated with problematic methamphetamine use outlined above, there is an ongoing need to engage problematic methamphetamine users with appropriate treatment and health and social support services to prevent and reduce the occurrence of resultant harms.

### ***Australian methamphetamine users' involvement in specialist drug treatment***

The Australian Institute of Health and Welfare (AIHW) [34] reports on substance use treatment episodes at drug treatment agencies across the country (although not every Australian drug treatment service provides data for the report; the most recent report for the 2009-10 financial year included data from 671 alcohol and other drug treatment agencies). For 2009-10, 'amphetamines' (i.e., meth/amphetamine) were reported as the principal drug of concern in seven percent of episodes of care (compared to 48% for alcohol, 23% for cannabis, and 10% for heroin) [34]. However, consistent with the polysubstance use identified in most studies of methamphetamine users, when amphetamine use reported in treatment episodes for other principal drugs of concern was included, 19% of all treatment episodes during 2009-10 involved amphetamines. The AIHW report provides limited socio-demographic details for people who access publicly-funded drug treatment agencies. Similar to the predominant characteristics of participants recruited in studies of methamphetamine use in Australia [44, 48, 49, 51-53], treatment episodes for amphetamines during 2009-10 mainly involved non-Indigenous clients (90%) who were male (70%) and aged 20-39 years [34]. However, few details are provided of treatment users' drug use patterns, health status, involvement in associated risk behaviours and experience of related harms, in addition to patterns of other (i.e., non-drug-specialist) health and

social support service utilisation. Consistent with all other primary drugs of concern, counselling services were the main treatment type for episodes related to amphetamine use (51%). Overall, non-residential drug treatment modalities (e.g., outpatient services) were most commonly utilised by amphetamine users (67%), followed by residential options (14%; e.g., residential rehabilitation, withdrawal management/detoxification).

### ***Generalist health and social support services***

Methamphetamine users commonly access professional support and emergency services outside of the specialist drug treatment sector when seeking assistance for, or advice about, methamphetamine use and related harms. These services include: general practitioners [216-219], various hospital services/departments [220, 221], and ambulance/emergency services [39, 218]. Research has demonstrated the significant impact that methamphetamine use and related harms can have on generalist health and social support services. For example, studies in Australia [220, 222] and overseas [65, 223-228] have documented the considerable challenges faced by hospital departments and hospital-based services as a result of ATS-related presentations, including prolonged length of stay, high rates of repeat attendance, and excessive use of pre-hospital, medical and security resources, especially in the case of agitated and aggressive patients requiring sedation [222, 223]. In their study of the impact of methamphetamine use on hospital length of stay and resource utilisation among trauma patients, Tominaga et al. [224] suggested that improving access to drug treatment services for methamphetamine users could relieve the burden experienced by the trauma system resulting from methamphetamine use and associated harms.

### ***Difficulties engaging and retaining methamphetamine users with professional support***

Although methamphetamine remains one of the more commonly used illicit substances in Australia [15, 21], utilisation of drug treatment services by methamphetamine users remains low [34]. For example, 56% of Kelly et al.'s [218] 'regular' methamphetamine-using sample in Sydney were classified as methamphetamine-dependent, but only 10% reported past-year treatment for methamphetamine use, compared to one-third who received treatment for drug use overall. As previously stated, counselling was the most common specialist drug treatment type for treatment episodes related to primary amphetamine use in Australia (51%) [34], which is consistent with other primary drugs of concern. However, unlike treatment episodes related to primary use of drugs such as heroin and benzodiazepines, which most commonly involve counselling and withdrawal/detoxification (excluding pharmacotherapy), the second most common treatment type relating to amphetamine use is 'assessment only' (16%). The relative predominance of 'assessment only' responses to methamphetamine could be the result of barriers to utilisation of certain treatment modalities for methamphetamine users, including

withdrawal/detoxification and rehabilitation services. For example, Pennay and Lee [229] investigated impediments specifically related to withdrawal service access for methamphetamine users through interviews with Australian drug treatment service employees. They identified barriers including: a lack of methamphetamine-specific services or services adequately resourced to address the needs of methamphetamine users; limited understandings among service providers of the most effective methods for treating methamphetamine users; limited accessibility (e.g., significant wait times); and negative staff attitudes towards methamphetamine users. Research in Australia and overseas points to other structural, social and personal barriers to utilisation of drug treatment and health and social support services for methamphetamine users more generally, including: experience of complex clinical symptoms such as significant psychological co-morbidity [59, 174]; low levels of motivation and perceived need to access professional support for methamphetamine use and associated harms [230, 231]; services maintaining a primary focus on the treatment of alcohol and opiate use/problems [25, 232]; and peer influence (e.g., fear of social rejection due to treatment access) [233, 234]. The continued lack of approved pharmacotherapies to treat and manage methamphetamine dependence and withdrawal further limits treatment of this population and opportunities to engage them with appropriate professional support [235-237].

Shortfalls in engaging methamphetamine users with services are compounded by difficulties in treatment program retention [238, 239]. Indeed, ‘ceasing to participate without notifying the service provider’ was the second most common reason (58%) for treatment cessation among Australian clients in treatment for amphetamine use during the 2009-10 financial year [34]. Importantly, more amphetamine-related treatment episodes end this way than those for any other primary drug of concern [34]. This finding accords with research which demonstrates treatment retention among methamphetamine users is typically poorer than for users of other substances [87, 240]. Although few studies have investigated reasons for poorer treatment retention among methamphetamine users, the available research suggests that barriers to treatment completion for methamphetamine users include: cognitive deficits (e.g., reduced memory and problem-solving abilities) [241]; no approved pharmacotherapies for managing/treating methamphetamine dependence and withdrawal [242, 243]; the possible unsuitability of certain treatment modalities for treating methamphetamine users (e.g., long-term residential rehabilitation) [238]; and high rates of craving and relapse [244-246].

## **Thesis rationale**

Despite increasing knowledge of the effectiveness of different approaches in treating and meeting the needs of methamphetamine users [e.g., 236, 247, 248, 249], these people remain difficult to

engage and retain in drug treatment. Some barriers to professional support for methamphetamine users were listed above, and these are considered in more detail in later chapters of this thesis. However, many of these impediments were identified incidentally in the course of research designed to meet other objectives, which prevented the comprehensive examination of such service barriers; few studies have purposefully investigated barriers to service utilisation specifically for methamphetamine users [50, 229, 234, 250]. Identifying and examining current factors impeding drug treatment utilisation and retention for methamphetamine users is therefore important for improving service engagement among this population. Importantly, given low levels of motivation and perceived need for professional support among methamphetamine users [48, 231], combined with the fact that some individuals can remit from problematic and dependent methamphetamine use patterns without professional intervention [111, 116], there is a particular need for research examining whether out-of-treatment methamphetamine users will actually benefit from service utilisation. Specifically, are methamphetamine users not in contact with services experiencing unrecognised or unmet need (i.e., are they engaging in problematic use patterns and experiencing significant methamphetamine-related harms that could be addressed/alleviated through professional intervention)? Further, are methamphetamine users without motivation or perceived need for professional support justified in maintaining this perspective (i.e., are they experiencing fewer methamphetamine-related harms and engaging in less risky methamphetamine use patterns than users who perceive a need for professional support)?

In the context of addressing barriers to professional support utilisation for methamphetamine users, identifying the characteristics of individuals who are least likely to access professional support is vital for developing targeted initiatives to improve service engagement. However, much of the research documenting treatment access by methamphetamine users is cross-sectional in design and/or based largely on samples of treatment entrants [e.g., 140, 251, 252, 253]; this means there is only limited understanding of the characteristics of out-of-treatment or community-recruited methamphetamine users. Further, little is known about trajectories of service utilisation among methamphetamine-using populations, including factors associated with, and enablers of, service access. The longitudinal study presented in this thesis was developed to address these gaps.

### ***Thesis aims***

The specific aims of the research detailed in this thesis were to:

1. examine the epidemiology of methamphetamine use and associated harms in metropolitan Melbourne, Australia;

2. identify and investigate barriers to access of professional support (i.e., drug and alcohol treatment, relevant health and social support services) for methamphetamine users;
3. examine changes to psychosocial characteristics, health indicators, drug use patterns and involvement in risk behaviours among a methamphetamine-using cohort over 12 months; and
4. investigate factors associated with, and enablers to, access of professional support among methamphetamine users.

### *Thesis outline*

The main components of the remainder of this thesis are two literature reviews and four empirical papers which have been published, or submitted for publication, in peer-reviewed scientific journals with the purpose of meeting the overall research aims. The empirical studies present findings from the first cohort study of community-recruited methamphetamine users conducted in metropolitan Melbourne. The cohort was recruited in 2010 and followed-up in 2011. Each of these chapters includes detailed and focused discussions of the relevant literature, methods used, results and the implications of findings.

**Chapter One** explains the recruitment process for obtaining the cohort of regular methamphetamine users. It provides an initial description of the cohort, with participant characteristics and behaviours stratified by methamphetamine dependence measured by the Severity of Dependence Scale (SDS). This publication is an important contribution to the literature given the limited research on methamphetamine use in Melbourne.

**Chapter Two** is a review of current literature relating to barriers to the utilisation of drug treatment and relevant health and social support services by methamphetamine/ATS users. This chapter collates the available knowledge (from relevant studies and expert commentary) in an attempt to synthesise and improve current understandings of the impediments to professional support that exist for methamphetamine users. Knowledge gaps regarding these issues and areas requiring further investigation are identified.

**Chapter Three** explores barriers to the utilisation of professional support identified at baseline by study participants. In particular, this chapter examines the characteristics and behaviours of a key sub-group of the cohort: participants who specified at baseline that their methamphetamine use was not problematic or harmful enough to warrant utilisation of professional support. Other self-reported barriers to service access are investigated in the remainder of the cohort (i.e., those who were not classified as ‘self-perceived non-problematic methamphetamine users’). This research is

a valuable contribution to the literature in two respects. First, it examines the ongoing existence of numerous barriers (identified in previous research) to professional support for methamphetamine users. Second, this is one of very few studies to investigate whether methamphetamine users who report low motivation and/or perceived need to access professional support experience fewer associated harms and engage in less risky methamphetamine use patterns than other users, and examine experience of unrecognised/unmet need among those with self-perceived non-problematic use.

**Chapter Four** examines changes to the cohort over the follow-up period. Specifically, it investigates factors associated with remission from methamphetamine dependence at follow-up among those classified as methamphetamine-dependent at baseline. Using generalised estimating equations, this chapter also examines correlates of past-month abstinence from methamphetamine use at follow-up. This research is an important addition to current literature relating to the natural history of methamphetamine use. It is one of few longitudinal studies examining outcomes among a community-recruited sample of methamphetamine users. In particular, this research explores the potential for natural/spontaneous remission from methamphetamine dependence and problematic use patterns among methamphetamine users.

**Chapter Five** is a review that complements Chapter Two. It reviews relevant literature to investigate enablers of, and factors associated with, use of professional support among methamphetamine users. Potential methods (raised in the literature) of countering barriers to service access for this group are discussed. Again, knowledge gaps regarding these issues and areas that could benefit from further investigation are identified.

**Chapter Six** is the final empirical paper in this thesis. Following on from Chapter Five, the research described in this chapter examined utilisation of specialist drug treatment and relevant health and social support services by the cohort over the follow-up period. Factors associated with initiation of service contact are identified. The findings discussed in this chapter suggest that a considerable proportion of the methamphetamine users in contact with services are those most in need of professional support (this relates directly to concepts of perceived need discussed previously in Chapter Three). However, this research also highlights the potential for interventions targeted towards methamphetamine users who engage in problematic use patterns yet have limited access to, or fail to make use of, professional support.

Lastly, the **Integrated Discussion** summarises the findings presented in this thesis. It highlights the value of this research and its contribution to the literature on methamphetamine use and treatment and other service utilisation. Recommendations for further investigation are discussed.

# Chapter One: Methamphetamine use in Melbourne: Establishing the cohort

## Introduction

There are indications of a significant and diverse methamphetamine-using population in Melbourne [15, 39, 80, 254, 255], the second largest city in Australia [256]. For example, in the most recent survey of Melbourne-based regular ecstasy users for the Victorian arm of the Ecstasy and related Drugs Reporting System (EDRS; N=101) [254], three-quarters reported using methamphetamine during the previous six months, on a median of 12 days (range: 1-180). Behind the Northern Territory (which contributed only 11 participants), Victoria had the second-highest proportion of 'recent' methamphetamine users of the EDRS samples across Australia's eight jurisdictions [16]. Fifty-three percent of the most recent Victorian IDRS sample reported use of any methamphetamine in the previous six months [255] compared to 66% of the national sample [17]. However, besides the annual, cross-sectional EDRS and IDRS studies [254, 255] (which are not specifically designed to measure methamphetamine use; i.e., eligibility is based on recent patterns of ecstasy use or injecting behaviours), there has been little research on methamphetamine use in Melbourne. In contrast, many studies in other areas of Australia have specifically examined methamphetamine use [e.g., 18, 44, 48, 52, 175, 210, 257, 258]. Consequently, the patterns of methamphetamine use, associated risk behaviours and related harms among Melbourne methamphetamine users, and whether these outcomes differs from similar target populations around Australia, are largely unknown. This chapter addresses this knowledge gap and is a fundamental component of the overall project; it contains a comprehensive explanation of the project's baseline methodology and participant recruitment process. Further, it characterises the study's 'regular' (at least monthly) methamphetamine-using sample and their behaviours at baseline, stratified by methamphetamine dependence. The sample was recruited throughout metropolitan Melbourne during 2010.

The information presented in this chapter was published as:

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# Declaration for Thesis: Chapter One

**Monash University**

## Declaration by candidate

In the case of Chapter One, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	70

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Results interpretation, manuscript preparation and review	N/A
Cerissa Papanastasiou	Data collection, manuscript review	N/A
Paul Dietze	Study design, results interpretation, manuscript preparation and review	N/A

Candidate's  
Signature

	Date 29/10/2012
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## Declaration by co-authors

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
- (4) there are no other authors of the publication according to these criteria;
- (5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- (6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

**Location(s)** **Centre for Population Health, Burnet Institute**

<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>
<b>Signature 3</b>		<b>29/10/2012</b>

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# **Methamphetamine use in Melbourne, Australia: Baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence**

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## Abstract

**Background:** Methamphetamine remains one of the most commonly used illicit substances in Australia. Its use is associated with a variety of harms, and consequently represents a significant impact on Australia's treatment and health service sectors. This paper presents baseline findings from the first cohort study of regular methamphetamine users ever conducted in Melbourne.

**Method:** Melbourne-based, regular methamphetamine users were recruited during 2010 and administered a structured questionnaire.

**Results:** 255 individuals were recruited to the study. Most were male and born in Australia with a median age of 30 years. Sixty percent were classified as methamphetamine-dependent using the Severity of Dependence Scale. The socio-demographic characteristics of these participants were generally comparable to non-methamphetamine-dependent participants; however, the final multivariable model showed that methamphetamine dependence was independently associated with experience of high psychological distress during the previous month, current use of prescribed mental health medication, and primarily injecting methamphetamine over other routes of administration. Polysubstance use was universal, with many participants reporting recent use of cannabis (87%) and heroin (55%) in addition to methamphetamine.

**Conclusion:** In spite of fundamentally different recruitment criteria, the socio-demographic characteristics of the community-recruited baseline sample reflect those of methamphetamine-using samples recruited in other Australian jurisdictions since the mid-1990s. Our findings support the established association between methamphetamine consumption and mental health issues. This study provides important up-to-date data on methamphetamine use in Melbourne, and is an important basis for understanding any future changes to patterns of methamphetamine use in this region.

## Background

In recent years the prevalence of methamphetamine use has decreased in sentinel drug-using populations [1-3] and the wider Australian community [4, 5]. Nevertheless, just under seven percent of Australian males aged 20-29 years are estimated to have recently (past year) used any methamphetamine [5], which is high in comparison to other countries [6]. This prevalence of consumption is of concern as methamphetamine use is associated with many personal and interpersonal consequences which cover multiple psychological, physical, social, financial, and legal domains [7-10]. It is therefore not surprising that the continued use of methamphetamine, particularly patterns of dependent and injecting methamphetamine use [11, 12], represents a significant impact on Australia's drug treatment sector [13, 14].

The local contexts of methamphetamine use and associated behaviours in Melbourne are poorly understood. Unlike other Australian jurisdictions [15, e.g., 16, 17-19], few cross-sectional studies have specifically examined methamphetamine use, related harms, and treatment-seeking behaviours in Melbourne [20-23], with most information of methamphetamine use coming from more general studies of people who inject drugs (PWID) and other drug users [e.g., 23, 24, 25, 26], despite research which suggests that Melbourne has a high proportion of methamphetamine use in comparison to other areas of Australia [5, 27]. Limited research designed explicitly to explore methamphetamine use and related concerns has resulted in a paucity of up-to-date research identifying the characteristics and behaviours of methamphetamine users in Melbourne and their experience of associated harms. This is an important oversight given the increasingly dated nature of many key studies commonly used to reference methamphetamine use and related issues in Australia [e.g.: 15, 16, 17, 28-30] and significant changes to methamphetamine market characteristics and patterns of use across the country in recent years [4, 5].

The absence of longitudinal research investigating methamphetamine use also limits our ability to identify and examine factors associated with changes in methamphetamine use patterns, market characteristics, help-seeking behaviours and the incidence of adverse consequences experienced by Melbourne-based methamphetamine users overall, and also among specific methamphetamine-using sub-groups. Such information is important for informing treatment and harm reduction interventions targeting local methamphetamine users, through the examination of exposure and outcome trajectories that would allow the determination of causative relationships not possible in cross-sectional studies. The utility of such information was recently demonstrated through findings from the longitudinal Methamphetamine Treatment Evaluation Study (MATES), which examined the longer-term treatment outcomes of methamphetamine dependence among prospective cohorts of methamphetamine treatment entrants in Brisbane [18] and Sydney [31],

along with a quasi-control group of dependent methamphetamine users from the broader community. However, while MATES provides important information on methamphetamine treatment entrants and dependence, it cannot provide information on the natural history of methamphetamine use. In response, our study was developed to examine drug use and treatment utilisation trajectories of a community-recruited sample of methamphetamine users over time.

The current paper has two main aims. First, we seek to describe the baseline health, social and drug-using characteristics of a sample of community-based methamphetamine users recruited as part of an ongoing prospective cohort study in Melbourne. Second, we examine relationships between these characteristics and methamphetamine dependence, as classified by the Severity of Dependence Scale (SDS; hereafter termed ‘methamphetamine dependence’) [32], as methamphetamine-dependent individuals are more likely to experience the extent of methamphetamine-related harms [12, 33, 34].

## **Method**

### ***Participant recruitment***

Participants were recruited throughout metropolitan Melbourne, the second largest city in Australia, from January-October, 2010. Recruitment initially relied on respondent-driven sampling (RDS) [35], with three pilot interviewees who reported substantial methamphetamine-using networks selected as initial ‘seeds’. RDS proved inefficient; in response, a variety of street outreach, targeted (e.g., advertising through selected street press, relevant websites), and snowball sampling methods were adopted to obtain the remainder of the sample.

All participants were reimbursed AU\$40 for their time and out-of-pocket expenses in accordance with accepted practice [36], while those who recruited peers into the study via RDS were reimbursed an additional \$10 for each peer (to a maximum of three peers).

Eligible participants were aged 18 years or over; had used any methamphetamine (e.g., speed powder, crystalline methamphetamine/‘ice’) at least monthly during the previous six months (via any route of administration (ROA)); and, resided in metropolitan Melbourne at the time of recruitment. Written informed consent was obtained from all respondents prior to participation.

### ***Questionnaire design and administration***

A structured questionnaire was developed that combined validated instruments with tailored questions covering multiple domains: participant socio-demographics; past and current drug use patterns (focusing particularly on patterns of methamphetamine use); methamphetamine market

characteristics; methamphetamine-related harms; motivations for methamphetamine use; mental and physical health; experiences of alcohol and other drug (AOD) treatment and relevant health/support services regarding use of methamphetamine and other substances; involvement in sexual and injecting risk behaviours; and incarceration history and recent (last month) involvement in criminal behaviours, measured using relevant questions from the Opiate Treatment Index (OTI) Crime Scale [37]. The SDS was used to determine methamphetamine dependence, classified as a SDS score of four or greater which corresponds to a DSM-IV diagnosis of dependence [32]. The SDS has previously been validated in samples of methamphetamine users in Australia and England [38], and against user behavioural patterns known to be associated with severity of drug dependence, including: dose, frequency of use and daily use [38]. It has been widely used to classify dependence in Australian samples of methamphetamine users [e.g.:15, 39, 40, 41]. The Kessler 10 (K10) [42] measured participant psychological distress during the month preceding the baseline interview. The K10 has been used widely in Australia and overseas with general and drug-using populations [43]. Participants were categorised as having low or no psychological distress (K10 score: 10-15), moderate (16-29) or high (30-50) psychological distress [ABS, 43]. The three-item Alcohol Use Disorders Identification Test-C (AUDIT-C), a shortened version of the 10-item AUDIT consisting of the initial scale's three consumption items [44], was administered to identify risky alcohol consumption levels among participants.

Participant contact details for prospective follow-up were collected and maintained in a separate, password-protected database to that of the questionnaire.

Researchers administered the questionnaire face-to-face using handheld personal digital assistants, programmed using Questionnaire Design System (QDS) Version 2.6.1 (Nova Research Company, Maryland, USA). Participants were interviewed at times and locations convenient to both participants and researchers (e.g., cafes).

This study was approved by the Monash University Human Research Ethics Committee.

### ***Statistical analysis***

Descriptive statistics were calculated to describe the study sample as a whole, and stratified by methamphetamine dependence (Tables 1 and 2). Univariate logistic regression analyses were conducted to examine associations between socio-demographics, health status, methamphetamine and other drug use patterns and related harms with methamphetamine dependence. The identification of a distinct heroin-using sub-group within the final sample also allowed for

univariate analyses comparing recent (last six months) heroin users to non-heroin-using participants on these domains.

A multivariable logistic regression analysis was conducted to identify adjusted associations between the factors considered above and methamphetamine dependence. Participants' age and sex were included in this analysis on an a-priori basis, along with main form of methamphetamine (i.e., speed, ice) and main (current) ROA, because past research has shown these to be crucially related to dependence [11]. Additional variables with at least a marginal association ( $p < 0.10$ ) with methamphetamine dependence were included in the stepwise backwards-elimination modelling process. These variables included: incarceration history, number of high school years completed, experience of homelessness during the previous 12 months, experience of high psychological distress during the previous month, current use of prescribed mental health medication, duration of methamphetamine use, reporting injecting drugs in the previous month, use of alcohol, heroin and benzodiazepines during the previous six months, and current use of prescribed opioid substitution therapy (OST). Other variables were excluded due to obvious relationships with methamphetamine dependence: current and lifetime access of AOD treatment or other professional support for methamphetamine use, frequency of methamphetamine use, and recent (last six months) experience of methamphetamine-related social, financial, work/study or legal problems. Adequacy of the final model was assessed using the Hosmer-Lemeshow goodness-of-fit test.

All data analyses were conducted using Stata Version 11.1 (Statacorp LP, Texas, USA), with a significance level of  $p < 0.05$ .

## Results

### *Demographics*

A final sample of 255 methamphetamine users was recruited. Most participants were male, with a median age of 30 years, from English-speaking backgrounds, and born in Australia (Table 1). Very few Indigenous Australian participants were recruited. Only a minority had completed secondary education, although 11% were currently studying when first interviewed. Most participants were unemployed, with over half reporting a government 'benefit' (aged or disability pension, unemployment or student allowance) and 11% reporting criminal activity (e.g., dealing, property theft) as their main source of income. Participants reported a median gross weekly income of \$200-399 (range: \$1-199 to \$2,000+) during the previous month from all sources. Participants most commonly resided in share-house accommodation, with smaller numbers reporting living in public housing, a boarding house/shelter/refuge, their parents' home, a squat,



or with others (e.g., non-related adult) free of charge at the time of interview. Over one-third of participants reported being homeless at least once during the previous 12 months, but only three percent reported that they were currently homeless. A significant minority of participants reported being incarcerated at least once during their lifetime, while a similar proportion reported being arrested during the previous 12 months (range: 1-13 times).

The socio-demographic characteristics of methamphetamine-dependent and non-methamphetamine-dependent participants were generally comparable. However, in univariable analyses methamphetamine-dependent participants were significantly more likely to report a history of incarceration and having been arrested during the previous 12 months. Methamphetamine-dependent participants were significantly more likely to report high levels of psychological distress during the previous month, have sought professional help for mental health issues during the previous six months, and currently be prescribed any mental health medication (Table 1).

**Table 1: Participant demographic, health and social characteristics, by methamphetamine dependence (SDS<sub>≥</sub>4)**

Variable	Methamphetamine-dependent			Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
	TOTAL N=255	Yes n=153 n (%)	No n=102 n (%)				
<b>Demographic and social characteristics</b>							
<b>Sex</b>							
Male	163 (64)	95 (62)	68 (67)	0.82 (0.48-1.39)	0.456		
<b>Age</b>							
Median (range)	30 (18-58)	30 (18-48)	29 (18-58)	1.02 (0.99-1.06)	0.150		
<b>Aboriginal and/or Torres Strait Islander</b>							
Country of birth							
Australia	222 (87)	133 (87)	89 (87)	0.97 (0.46-2.05)	0.939		
<b>Employment status</b>							
Unemployed	188 (74)	118 (77)	70 (69)	1.54 (0.88-2.71)	0.131		
<b>Main income source (last month)</b>							
Wage or salary	51 (20)	27 (18)	24 (24)	1	-		
Government pension or benefits	146 (58)	90 (59)	56 (55)	1.42 (0.75-2.72)	0.277		
Other*	56 (22)	35 (23)	21 (21)	1.48 (0.69-3.20)	0.318		
<b>Secondary education</b>							
Median year level completed (range)	11 (6-12)	11 (7-12)	11 (6-12)	0.79 (0.64-0.96)	0.015		
Completed Year 10 or below	110 (43)	74 (48)	36 (35)	1	-		
Completed Year 11 or 12	144 (56)	78 (51)	66 (65)	0.57 (0.34-0.96)	0.035		

Variable	Methamphetamine-dependent			Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
	TOTAL N=255	Yes n=153 n (%)	No n=102 n (%)				
<b>Tertiary education</b>							
Trade/technical	88 (35)	45 (29)	43 (42)	0.57 (0.33-0.98)	0.043		
University	28 (11)	18 (12)	10 (10)	0.98 (0.42-2.29)	0.963		
<b>Homeless last 12 months</b>	91 (36)	61 (40)	30 (29)	1.59 (0.93-2.72)	0.089		
<b>Current accommodation type</b>							
Unstable**	113 (44)	70 (46)	43 (42)	1	-		
Stable	142 (56)	83 (54)	59 (58)	0.86 (0.52-1.43)	0.571		
<b>History of incarceration</b>	96 (38)	65 (42)	31 (30)	1.69 (1.00-2.87)	0.052		
<b>Arrested last 12 months</b>	104 (41)	72 (47)	32 (31)	1.94 (1.15-3.29)	0.013		
<b>Health characteristics</b>							
<b>K10</b>							
Overall score, median (range)	24 (10-50)	27 (10-49)	20 (10-50)	1.11 (1.07-1.15)	0.000		
High (score: 30-50)	77 (30)	63 (41)	14 (14)	4.40 (2.30-8.42)	0.000	3.52 (1.79-6.90)	0.000
<b>Sought professional help for mental health issues last six months?</b>	149 (58)	100 (65)	49 (48)	2.04 (1.22-3.40)	0.006		
<b>Currently prescribed medications for mental health issues?</b>	108 (42)	80 (52)	28 (28)	2.90 (1.69-4.96)	0.000	2.08 (1.70-3.72)	0.013
<b>Ever screened for sexually transmitted infections (STIs)?</b>	191 (75)	121 (80)	70 (69)	1.79 (1.00-3.20)	0.051		
<b>Have health insurance?</b>	34 (13)	16 (11)	18 (18)	0.55 (0.27-1.14)	0.106		

\*Hosmer-Lemeshow goodness-of-fit test p=0.996

\*\*Unstable housing was classified according to the temporary or transitional nature of some accommodation types and included: 'no fixed address/homeless', 'boarding house, hostel, shelter or refuge', 'squat', and 'staying with a friend or acquaintance (not paying rent).'

### ***Patterns of methamphetamine and other drug use, related harms***

Methamphetamine was most commonly nominated as participants' drug of choice (42%), followed by heroin (18%) and cannabis (13%). The primary form of methamphetamine currently used by most participants was speed powder, and participants mainly injected methamphetamine during the previous six months (Table 2). Most participants used methamphetamine at least weekly. Participants most commonly reported last using methamphetamine in a private house (60%) with friends (64%). A minority of participants last used methamphetamine alone (15%).

Polysubstance use was universally reported, with alcohol, cannabis, illicit benzodiazepines, heroin, and ecstasy most commonly nominated as substances used in addition to methamphetamine during the previous six months. Participants commonly reported using central nervous system depressants, including cannabis, benzodiazepines and heroin, during the 'comedown' period post-methamphetamine consumption. Cannabis use was particularly common, with those who had used it during the previous month (n=206) reporting use on a median of seven days per week (range: 0.25-7).

Just under half of participants (n=117) reported using heroin during the preceding month, on a median of two days per week (range: 0.27-7). In univariable analyses, recent heroin-using participants were significantly more likely to be methamphetamine-dependent than non-heroin users, use methamphetamine more frequently (29% vs. 9% daily/almost daily users), and mainly inject methamphetamine (85% vs. 34%). Heroin-using participants were also significantly more likely to be unemployed (83% vs. 62%), report being homeless at least once during the previous 12 months (45% vs. 24%), report high levels of psychological distress (37% vs. 22%), and have experienced methamphetamine-related social (56% vs. 40%), financial (75% vs. 53%) and legal (24% vs. 10%) problems during the previous six months.

Most participants reported accessing health and support services or specialised AOD treatment for methamphetamine use at least once during their lifetime, although less than one-quarter were currently in regular contact with any service regarding methamphetamine use.

In univariable analyses, methamphetamine-dependent participants were significantly more likely to inject methamphetamine, use methamphetamine more frequently, be prescribed OST, have lifetime or current experience accessing professional support for methamphetamine use, and have accessed professional support more frequently. While methamphetamine-dependent participants were significantly less likely to have used alcohol during the preceding six months, there were no significant differences between methamphetamine-dependent and non-dependent participants with

regard to risky drinking levels. Methamphetamine-dependent individuals were significantly more likely to have experienced methamphetamine-related social, financial work/study and legal problems during the previous six months (Table 2).

**Table 2: Drug use characteristics, patterns and behaviours, by methamphetamine dependence (SDS<sub>≥</sub>4)**

Variable	Methamphetamine-dependent			Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
	TOTAL N=255	Yes n=153 n (%)	No n=102 n (%)				
<b>Main form methamphetamine used</b>							
Speed	159 (63)	89 (58)	70 (69)	1.00	-		
Crystal meth/ice	94 (37)	62 (41)	32 (31)	1.52 (0.90-2.59)	0.119		
<b>Methamphetamine SDS score</b>							
Median (range)	5 (0-14)	7 (4-14)	1 (0-3)	-	-		
<b>Duration of methamphetamine use (years)</b>							
Median (range)	12 (0-39)	13 (0-33)	11 (1-39)	1.04 (1.00-1.07)	0.039		
<b>Main route of methamphetamine administration</b>							
Snort or swallow	44 (17)	16 (10)	28 (27)	1.00	-	1.00	-
Smoke	54 (21)	33 (22)	21 (21)	2.75 (1.21-6.26)	0.016	2.23 (0.94-5.31)	0.069
Inject	157 (62)	104 (68)	53 (52)	3.43 (1.70-6.90)	0.001	2.57 (1.23-5.37)	0.012
<b>Ever injected any drug</b>	192 (75)	125 (82)	67 (66)	2.33 (1.31-4.16)	0.004		
<b>Current drug injection (≤ once last month)</b>	171 (67)	112 (73)	59 (58)	1.99 (1.17-3.39)	0.011		
<b>Frequency of methamphetamine use past month</b>							
Median days per week, range	2 (0.25-7)	2 (0.25-7)	1.25 (0.25-7)	1.39 (1.18-1.65)	0.000		
Less than weekly	51 (20)	17 (11)	34 (33)	1.00	-		
Weekly	41 (16)	26 (17)	15 (15)	3.47 (1.46-8.20)	0.005		
More than weekly	112 (44)	69 (45)	43 (42)	3.21 (1.60-6.43)	0.001		
Daily/almost daily (4+)	51 (20)	41 (27)	10 (10)	8.20 (3.32-20.24)	0.000		

Variable	Methamphetamine-dependent			Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
	TOTAL N=255	Yes n=153 n (%)	No n=102 n (%)				
<b>AUDIT-C**</b>	n=226	n=129	n=97				
Overall score, median (range)	8 (1-12)	8 (1-12)	8 (1-12)	0.94 (0.87-1.03)	0.192		
<b>Prescribed OST currently</b>	59 (23)	45 (30)	14 (14)	2.65 (1.36-5.16)	0.004		
<b>Other drugs used past 6 months</b>							
Ecstasy	129 (51)	72 (47)	57 (56)	0.70 (0.42-1.16)	0.168		
Alcohol	227 (89)	130 (85)	97 (95)	0.29 (0.11-0.79)	0.016		
Cannabis	222 (87)	131 (86)	91 (89)	0.72 (0.33-1.56)	0.402		
Hallucinogens (LSD, mushrooms)	87 (34)	44 (29)	43 (42)	0.55 (0.33-0.94)	0.028		
Illicit pharmaceutical stimulants	95 (37)	55 (36)	40 (39)	0.97 (0.52-1.46)	0.597		
Cocaine	89 (35)	55 (36)	34 (33)	1.12 (0.66-1.90)	0.668		
Illicit benzodiazepines	201 (79)	127 (83)	74 (73)	1.84 (1.01-3.39)	0.047		
Tobacco	235 (92)	143 (93)	92 (90)	1.55 (0.62-3.88)	0.345		
Heroin	139 (55)	94 (61)	45 (44)	2.02 (1.21-3.36)	0.007		
<b>Expenditure on illicit drugs (av. per week, \$)</b>							
Median (range)	155 (0-3,500)	200 (0-2,100)	120 (0-3,500)	1.00 (1.00-1.00)	0.111		
<b>Ever accessed health/support service or AOD treatment for methamphetamine use</b>	153 (60)	115 (75)	38 (38)	5.10 (2.96-8.78)	0.000		
Median number of times (range)***	3 (1-50)	4 (1-50)	1 (1-10)	1.22 (1.03-1.45)	0.020		
<b>Currently accessing health/support service or AOD treatment for methamphetamine use</b>	56 (22)	44 (29)	12 (12)	3.03 (1.51-6.08)	0.002		
<b>Ever accessed health/support service or AOD treatment for other drugs</b>	185 (73)	127 (83)	58 (57)	3.71 (2.08-6.59)	0.000		

Variable	Methamphetamine-dependent			Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
	TOTAL N=255	Yes n=153 n (%)	No n=102 n (%)				
Ever overdosed/dropped on methamphetamine	41 (16)	29 (19)	12 (12)	1.75 (0.85-3.62)	0.129		
Methamphetamine-related social problems last 6 months	124 (49)	98 (64)	26 (25)	5.21 (2.99-9.07)	0.000		
Methamphetamine-related financial problems (6 months)	166 (65)	125 (82)	41 (40)	6.64 (3.76-11.74)	0.000		
Methamphetamine-related work/study problems (6 months)	77 (31)	64 (42)	13 (14)	4.64 (2.37-9.05)	0.000		
Methamphetamine-related legal problems (6 months)	45 (18)	40 (26)	5 (5)	6.87 (2.61-18.09)	0.000		

\*Hosmer-Lemeshow goodness-of-fit test p=0.996

\*\*Scores shown are only for those participants who had consumed alcohol in the last six months, excluding missing data for one respondent.

\*\*\*Of those who had ever accessed at health/support service or AOD treatment for methamphetamine use (n=153).



### ***Multivariable correlates of methamphetamine dependence***

While a range of univariable associations were evident, the final multivariable model showed that only experience of high psychological distress during the previous month, current use of prescribed mental health medication, and primarily injecting methamphetamine remained associated with methamphetamine dependence, after adjusting for other variables included in the model (Tables 1 and 2).

## **Discussion**

This paper presents baseline findings from the first cohort study of regular methamphetamine users ever conducted in Melbourne. The socio-demographic characteristics of this sample were similar to those of other cross-sectional [11, 15, 16, 19, 30] methamphetamine- and amphetamine-type stimulant (ATS)-using samples recruited throughout Australia since the mid-1990s. Further, in spite of the fundamental sampling differences between this sample and those recruited for the MATES cohorts in Sydney and Brisbane [18, 31], the groups were comparable across a number of domains, including socio-demographics and methamphetamine use patterns. The extent of similarities between this sample and others was unanticipated, given the amount of time between this study and some of those conducted more than a decade previously [e.g.: 15, 30], and the documented changes to patterns of methamphetamine use and market characteristics in more recent years, such as increased use of crystal methamphetamine among sentinel drug-using populations and increased importation and local manufacture of methamphetamine [2-4, 45, 46].

As expected, polysubstance use was universal throughout the sample, which is consistent with other Australian [40, 47, 48] and international [49-52] research involving methamphetamine and ATS users. Frequent and risky use of some substances (e.g., cannabis, alcohol), and a high proportion of heroin use, suggests that some participants may experience harms associated with the use of substances in addition to methamphetamine. This is highlighted by findings regarding a distinct sub-group of the sample which comprised recent (last six months) heroin users. These individuals were generally more disaffected than non-heroin using participants: they were more likely to be unemployed, report at least one period of homelessness during the previous year, and have experienced social, financial and legal problems as a result of methamphetamine use during the previous six months.

High levels of heroin use among other Australian methamphetamine-using samples [19, 28] have led some researchers to suggest a need for interventions designed to simultaneously treat individuals engaging in problematic methamphetamine and heroin use (as opposed to treating each drug separately). However, McKetin and Kelly [39] found that participants who nominated

heroin as their main drug of concern were unlikely to have ever received treatment regarding their methamphetamine dependence, possibly as a result of the belief (either theirs or that of their treatment/healthcare provider) that their heroin use was more problematic than their methamphetamine use. Our findings highlight the importance of drug treatment and harm reduction professionals to acknowledge the interaction of concurrent heroin and methamphetamine use; for example, many participants reported using heroin to combat the comedown effects following methamphetamine consumption.

While the socio-demographic characteristics of methamphetamine-dependent and non-methamphetamine-dependent participants did not differ greatly, methamphetamine dependence was independently associated with two indicators of mental health: experience of high psychological distress during the previous month and current use of prescribed mental health medication. These findings are consistent with the well-established association between methamphetamine consumption and mental health issues, which are often more prevalent and severe in comparison to the use of other substances [8]. In addition, given that the main focus of the SDS is on respondents' feelings of control regarding their drug use and preoccupation and anxieties regarding drug consumption at the time of interview [38], it is likely that individuals currently experiencing high psychological distress might be more concerned about their patterns of methamphetamine use than those currently experiencing low-moderate psychological distress (and consequently score higher on the SDS). Regardless, these findings support those of previous research which demonstrate a greater prevalence of mental health issues among methamphetamine-dependent individuals [34, 53].

Injecting methamphetamine (as opposed to smoking, snorting or swallowing the drug) was also independently associated with methamphetamine dependence, a finding consistent with those of previous studies conducted elsewhere in Australia [11, 40]. As opposed to previous research, however, we did not find an association between methamphetamine dependence and primary consumption of a specific form of methamphetamine. This contrasts with McKetin et al.'s [11] work in Sydney, which demonstrated that individuals who reported use of crystal methamphetamine/ice in the previous year were more likely to be methamphetamine-dependent than those who primarily consumed speed powder or methamphetamine base. This finding is possibly the result of an overall decrease in methamphetamine purity in Melbourne in recent years [27].

Our findings point to a degree of unmet need among participants. Although methamphetamine-dependent participants frequently reported lifetime experience of professional support (general and/or AOD-specific) regarding their methamphetamine use and related harms, which reflects the

results of previous research [30, 54], only 29% of those who were classified as methamphetamine-dependent reported current, regular contact with any service regarding their use. As noted in previous studies [19, 30, 54], such a finding suggests the presence of significant barriers to service access for methamphetamine users. This issue will be explored more thoroughly in future research with the cohort.

### **Limitations**

Due to the moderate success of RDS and the subsequent adoption of street outreach sampling (among other recruitment methods), it is possible that PWID and concurrent heroin users were over-sampled, as the street outreach sampling generally occurred in low socioeconomic areas of Melbourne with high rates of injecting drug use (IDU). The researchers attempted to counter any selection bias by targeting other methamphetamine-using subgroups, including recreational and ecstasy and related drug (ERD) users, through advertisements in street press and relevant online forums, as per the usual recruitment method of the Victorian arm of the annual Ecstasy and Related Drug Reporting System [25], which generally comprises only a minority of injecting ERD users.

Further, while the SDS was used to classify methamphetamine dependence among participants due to its brevity and ease of administration [55] and wide use among other Australian methamphetamine-using samples, this screening device does not yield the sensitivity or specificity of methamphetamine dependence classification achieved through a diagnostic tool such as the DSM. Nevertheless, a SDS score of four or more has been shown to yield a sensitivity of 71% and specificity of 77% against a DSM-III-R diagnosis of severe methamphetamine dependence derived using the Composite International Diagnostic Interview [32].

### **Conclusion**

Our sample of regular methamphetamine users is a heterogeneous group but generally resembles methamphetamine-using samples examined in other Australian jurisdictions and overseas. This population is comprised of distinct user sub-groups who engage in varying patterns of methamphetamine and other drug consumption, which can impact on treatment utilisation and result in the experience of various harms. Our study provides valuable data regarding the use of methamphetamine in Melbourne, highlighting fundamental relationships between dependence and mental health issues and IDU in the Melbourne context.

### ***Author declaration***

The authors declare that: they have no competing interests; the material has not been published elsewhere; the paper is not currently being considered for publication elsewhere; all authors have been personally and substantially involved in the work leading to the paper, and will hold themselves jointly and individually responsible for its content; and, relevant ethical safeguards have been met in relation to the confidentiality and consent of the participants involved in the research.

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## References

1. Gaffney, A., Jones, W., Sweeney, J., and Payne, J. *Drug use monitoring in Australia: 2008 annual report on drug use among police detainees*. 2010. Australian Institute of Criminology. Canberra.
2. Sindicich, N. and Burns, L. *Australian Trends in Ecstasy and related Drug Markets 2010: Findings from the Ecstasy and Related Drugs Reporting System (EDRS)*. Australian Drug Trend Series No. 64. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
3. Stafford, J. and Burns, L. *Australian Drug Trends 2010: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trend Series No. 55. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
4. Degenhardt, L., Roxburgh, A., Black, E., Bruno, R., Campbell, G., Kinner, S., and Fetherston, J. *The epidemiology of methamphetamine use and harm in Australia*. Drug Alcohol Rev, 2008. **27**: p. 243-252.
5. Australian Institute of Health and Welfare. *2010 National Drug Strategy Household Survey report*. Drug statistics series no. 25. Cat. no. PHE 145. 2011. AIHW. Canberra.
6. United Nations Office on Drugs and Crime. *Amphetamines and Ecstasy: 2011 Global ATS Assessment*. 2011. UNODC. Vienna, Austria.
7. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. Australian Psychologist, 2005. **40**(2): p. 88-95.
8. Darke, S., Kaye, S., McKetin, R., and Duflou, J. *Major physical and psychological harms of methamphetamine use*. Drug Alcohol Rev, 2008. **27**(3): p. 253-262.
9. Greenwell, L. and Brecht, M. *Self-Reported Health Status Among Treated Methamphetamine Users*. American Journal of Drug and Alcohol Abuse, 2003. **29**(1): p. 75-104.
10. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., and Wodak, A. *The global epidemiology of methamphetamine injection: A review of the evidence on use and associations with HIV and other harm*. 2007. National Drug and Alcohol Research Centre, UNSW. Sydney.
11. McKetin, R., Kelly, E., and McLaren, J. *The relationship between crystalline methamphetamine use and methamphetamine dependence*. Drug Alcohol Depend, 2006. **85**(3): p. 198-204.
12. McKetin, R., Kelly, E., McLaren, J., and Proudfoot, H. *Impaired physical health among methamphetamine users in comparison with the general population: the role of*

- methamphetamine dependence and opioid use*. Drug Alcohol Rev, 2008. **27**(5): p. 482-489.
13. Degenhardt, L., Baker, A., and Maher, L. *Methamphetamine: geographic areas and populations at risk, and emerging evidence for effective interventions (Editorial)*. Drug Alcohol Rev, 2008. **27**(3): p. 217-219.
  14. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2008-09: report on the National Minimum Data Set*. Drug treatment series no. 10. Cat no. HSE 92. 2010. AIHW. Canberra.
  15. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
  16. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. Drug Alcohol Rev, 2001. **20**: p. 49-56.
  17. McKetin, R., McLaren, J., and Kelly, E. *The dynamics of the Sydney methamphetamine market: an overview of supply, use patterns, harms and social consequences*. National Drug Law Enforcement Research Fund Monograph Series No. 13. 2005. Australasian Centre for Policing Research. Adelaide.
  18. Cogger, S., McKetin, R., Ross, J., and Najman, J. *Methamphetamine Treatment Evaluation Study (MATES): Findings from the Brisbane Site*. Technical Report No. 295. 2008. National Drug and Alcohol Research Centre. Sydney.
  19. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia*. Drug Alcohol Rev, 2009. **28**: p. 592-599.
  20. Ross, J. and Miller, S., *Hidden use of amphetamine in metropolitan Melbourne*, in *Proceedings of the 1994 autumn school of studies on alcohol and drugs*, R. Godding and G. Whelan, Editors. 1994, Department of Drug and Alcohol Studies, St Vincent's Hospital: Melbourne. p. 49-52.
  21. Johnston, J., Laslett, A.-M., Miller, P., Jenkinson, R., Fry, C., and Dietze, P. *Victorian Psychostimulant Monitoring Project: Trialling Enhanced Drug Trend Monitoring of Melbourne Psychostimulant Markets (Final Report)*. 2004. Turning Point Alcohol & Drug Centre. Fitzroy.
  22. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
  23. Reddel, S.E., Horyniak, D., Dietze, P., and McElwee, P. *Victorian Drug Trends 2010: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trends Series

- No. 58. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
24. Aitken, C., Brough, R., and Crofts, N. *Injecting drug use and blood-borne viruses: a comparison of rural and urban Victoria, 1990-95*. Drug Alcohol Rev, 1999. **18**: p. 47-52.
  25. Feigin, A., Dietze, P., and Lloyd, B. *Victorian Trends in Ecstasy and Related Drug Markets 2010: Findings from the Ecstasy and related Drugs Reporting System (EDRS)*. Australian Drug Trends Series No. 67. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
  26. Victorian Government Department of Health. *The Victorian Drug Statistics Handbook: Patterns of drug use and related harm in Victoria for the period July 2008 to June 2009*. Report Number 12. 2011. Mental Health, Drugs and Regions Division, Victorian Government Department of Health. Melbourne.
  27. Australian Crime Commission. *Illicit Drug Data Report: 2009-10*. 2011. ACC. Canberra.
  28. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
  29. McKetin, R., McLaren, J., Kelly, E., Hall, W., and Hickman, M. *Estimating the number of regular and dependent methamphetamine users in Australia*. Technical Report No. 230. 2005. National Drug and Alcohol Research Centre, UNSW. Sydney.
  30. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. Drug Alcohol Depend, 1997. **46**: p. 105-113.
  31. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
  32. Topp, L. and Mattick, R.P. *Choosing a cutoff on the Severity of Dependence Scale (SDS) for amphetamine users*. Addiction, 1997. **92**(7): p. 839-845.
  33. McKetin, R., McLaren, J., and Kelly, E. *The Sydney methamphetamine market: patterns of supply, use, personal harms and social consequences*. NDLERF Monograph Series No. 13. 2005. National Drug and Alcohol Research Centre, University of NSW. Sydney.
  34. McKetin, R., McLaren, J., Lubman, D.I., and Hides, L. *The prevalence of psychotic symptoms among methamphetamine users*. Addiction, 2006. **101**(10): p. 1473-1478.
  35. Heckathorn, D.D. *Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations*. Social Problems, 1997. **44**(2): p. 174-199.
  36. Fry, C.L., Hall, W., Ritter, A., and Jenkinson, R. *The ethics of paying drug users who participate in research: A review and practical recommendations*. Journal of Empirical Research on Human Research Ethics, 2006. **1**(4): p. 21-36.

37. Darke, S., Hall, W., Wodak, A., Heather, N., and Ward, J. *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index*. British Journal of Addiction, 1992. **87**: p. 733-742.
38. Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., and Strang, J. *The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users*. Addiction, 1995. **90**(5): p. 607-614.
39. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
40. McKetin, R., Ross, J., Kelly, E., Baker, A., Lee, N., Lubman, D.I., and Mattick, R. *Characteristics and harms associated with injecting versus smoking methamphetamine among methamphetamine treatment entrants*. Drug Alcohol Rev, 2008. **27**(3): p. 277-285.
41. Baker, A., Boggs, T.G., and Lewin, T.J. *Randomized controlled trial of brief cognitive-behavioural interventions among regular users of amphetamine*. Addiction, 2001. **96**(9): p. 1279-1287.
42. Kessler, R.C. *Kessler Psychological Distress Scale (K10)*. 1996. Harvard Medical School. Boston, MA.
43. Australian Bureau of Statistics. *Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, Australia*. 2001. ABS. Canberra.
44. Bush, K., Kivlahan, D.R., McDonnell, M.B., Fihn, S.D., and Bradley, K.A. *The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking*. Archives of Internal Medicine, 1998. **158**: p. 1789-1795.
45. Australian Crime Commission. *Illicit Drug Data Report: 2008-09*. 2010. ACC. Canberra.
46. Macgregor, S. and Payne, J. *Findings from the DUMA program: Increase in use of methamphetamine*. Research in Practice No. 22. 2011. Australian Institute of Criminology. Canberra.
47. Hayatbakhsh, M.R., Najman, J.M., Bor, W., and Williams, G.M. *Predictors of young adults' amphetamine use and disorders: a prospective study*. Drug Alcohol Rev, 2009. **28**(3): p. 275-283.
48. Darke, S. and Hall, W. *Levels and correlates of polydrug use among heroin users and regular amphetamine users*. Drug Alcohol Depend, 1995. **39**(3): p. 231-235.
49. Wright, S. and Klee, H. *A Profile of Amphetamine Users Who Present to Treatment Services and Do Not Return*. Drugs: education, prevention and policy, 1999. **6**(2): p. 227-241.
50. Christian, D.R., Huber, A., Brecht, M.L., McCann, M.J., Marinelli-Casey, P., Lord, R.H., Reiber, C., Lu, T.H., Project, T.M.T., and Galloway, G.P. *Methamphetamine Users*



- Entering Treatment: Characteristics of the Methamphetamine Treatment Project Sample.* Subst Use Misuse, 2007. **42**(14): p. 2207-2222.
51. Klee, H., Wright, S., and Morris, J. *Amphetamine Users in Treatment: Factors Associated with Sustained Abstinence from Street Drugs.* Addiction Research, 1999. **7**(3): p. 239-265.
  52. Brecht, M.L., O'Brien, A., von Mayrhauser, C., and Anglin, M.D. *Methamphetamine use behaviors and gender differences.* Addictive Behaviors, 2004. **29**(1): p. 89-106.
  53. Zweben, J.E., Cohen, J.B., Christian, D., Galloway, G.P., Salinardi, M., Parent, D., and Iguchi, M. *Psychiatric Symptoms in Methamphetamine Users.* American Journal on Addictions, 2004. **13**(2): p. 181-190.
  54. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction.* Drugs: education, prevention and policy, 1994. **1**(3): p. 289-297.
  55. Deady, M. *A Review of Screening, Assessment and Outcome Measures for Drug and Alcohol Settings.* 2009. Network of Alcohol & other Drug Agencies (NADA).

# Chapter Two: Identified barriers to use of professional support for methamphetamine users

## Introduction

### *Respondent-driven sampling (RDS)*

One issue that emerged in relation to the study concerned the sampling strategy. RDS was chosen as the study's primary recruitment strategy because it has proven to be an effective method of accessing 'hidden populations' overseas, such as those engaging in illegal or stigmatised behaviours (e.g., illicit drug use) and/or those that might be distrustful of researchers [271, 283]. Further, a review of methods for sampling hidden populations in the HIV field, including targeted, stratified and time-space sampling methods, indicated that RDS controls the biases associated with other chain-referral sampling techniques (e.g., snowballing) resulting in considerably less biased, and more representative, samples [283]. RDS has only been applied rarely to recruit drug users in Australian research [284]. Therefore, the use of RDS in this study also meant that it could contribute to understanding best-practice sampling methodology in Australian illicit drug research by expanding RDS to methamphetamine users.

However, RDS proved inefficient at recruiting methamphetamine users for this study (only 19 participants were recruited in the first three months of the ten-month recruitment period); consequently, a combination of targeted (e.g., the distribution of study promotional materials via selected street press, relevant websites), street outreach and snowball sampling techniques were adopted for the remainder of the recruitment period. Box 1 details the numbers of participants recruited into the study via each sampling method.

**Box 1: Numbers of regular methamphetamine users recruited according to sampling strategy.**

Recruitment method	n
RDS	139
Advertised materials (e.g., poster at drug and alcohol service)	51
Recruited via service staff or field researchers	34
Snowball sampling	30
<b>TOTAL**</b>	<b>254</b>

\*Recruitment information missing for one participant

Bivariate analyses (chi-square analyses for categorical variables and the Wilcoxon-Mann Whitney test for continuous variables) were conducted to compare the socio-demographic characteristics of participants recruited via RDS (n=139) to the remainder of the sample (n=115). The two groups were similar with respect to age, gender and country of birth, although participants recruited via RDS were significantly ( $p<0.05$ ) less likely to currently be employed (20% vs. 32%). However, there were no differences in self-reported experience of psychological distress during the past month, homelessness during the previous year, and current levels of self-perceived social support.

The recruitment groups were also comparable in relation to methamphetamine and other drug use. There were no significant differences with respect to: main form of methamphetamine used; age of first methamphetamine use; primary route of methamphetamine administration; frequency of methamphetamine use during the previous month; levels of methamphetamine dependence; levels of prescribed pharmacotherapy use; lifetime and recent injection of any drug; and lifetime and 'recent' (past 6 months) use of alcohol, cannabis, heroin, ecstasy, and illicit benzodiazepines, pharmaceutical stimulants and pharmacotherapies. However, participants recruited via methods other than RDS were significantly more likely to have recently used cocaine. There were no differences between the groups with regard to lifetime or current utilisation of drug treatment or health and support services (any) for methamphetamine use and associated harms.

## ***Chapter Two***

The findings presented in Chapter One indicate that many of this study's sample had accessed drug treatment and/or relevant health and social support services for methamphetamine and other drug use at least once during their lives. However, although most (60%) of the sample were classified as methamphetamine-dependent according to the SDS at baseline and more likely than non-dependent users to be engaging in harmful use patterns, less than one-third (29%) of dependent participants were currently in contact with any professional support for their methamphetamine use when interviewed. This low rate of current treatment involvement among dependent methamphetamine users engaging in harmful patterns of use is consistent with previous Australian studies [e.g., 44, 46, 217, 218, 251], and suggests that some study participants were not in contact with professional support because of barriers to service access. To explore this issue, participants were surveyed about impediments to service access for methamphetamine use and/or related harms (the focus of Chapter Three). To contextualise these findings of self-reported service barriers, Chapter Two presents a review of Australian and international literature of the barriers to accessing specialist drug treatment and other health/support services for ATS- and methamphetamine-using populations. This chapter collates the available literature and provides a

comprehensive summary of reported impediments to accessing professional support for methamphetamine users. No other reviews of this nature have been published.

The information presented in this chapter represents the following submitted manuscript:

**Quinn, B.**, Stoové, M., & Dietze, P. *Literature review: barriers to access of professional support for methamphetamine users*. Drug Alcohol Rev. Submitted: 9<sup>th</sup> October 2012.

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## Declaration for Thesis: Chapter Two

**Monash University**

### Declaration by candidate

In the case of Chapter Two, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	80

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Manuscript preparation and review	N/A
Paul Dietze	Study design, results interpretation, manuscript preparation and review	N/A

Candidate's  
Signature

	Date 29/10/2012
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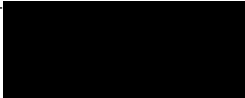

### Declaration by co-authors

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
- (4) there are no other authors of the publication according to these criteria;
- (5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- (6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

**Location(s)** **Centre for Population Health, Burnet Institute**

<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>

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# **Literature review: Barriers to access of professional support for methamphetamine users**

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## Abstract

**Issues:** Research suggests that methamphetamine users can be difficult to engage and retain with drug treatment services. A narrative review of literature relating to the utilisation of drug treatment and relevant professional support modalities (e.g., general practitioners) by methamphetamine users was conducted. The aims were to synthesise the available research, identify knowledge gaps and thereby improve current understandings of impediments to professional support for methamphetamine users.

**Approach:** Electronic databases (e.g., Cochrane Library, Medline) were searched using specified keywords for English-language publications relating to service utilisation by methamphetamine users and similar populations (e.g., amphetamine-type stimulant users). Additional publications (e.g., grey literature) were sourced using reference lists and Google Scholar. Studies were selected if they described/researched factors impacting on service utilisation by methamphetamine users.

**Key findings:** Numerous barriers to access of professional support by methamphetamine users were identified. Many reflected impediments to service utilisation for substance users more generally (e.g., stigma and accessibility issues). However, challenges specific to methamphetamine users were identified, including low levels of perceived need and/or motivation for professional support, a service focus on drugs other than methamphetamine and barriers specific to methamphetamine-using sub-populations, such as culturally and linguistically diverse users.

**Conclusion:** Although few studies have purposefully investigated barriers to accessing professional support for methamphetamine use and associated harms, a number of impediments to service utilisation exist for methamphetamine users. Further work is needed to determine the best mechanisms for engaging and retaining methamphetamine users with professional support.



## Introduction

The widespread use of methamphetamine in Australia [15, 21], and the corresponding prevalence of significant related harms [13, 47], underpins the importance of ensuring that sufficient support is available and accessible to people who use the drug. However, addressing problematic methamphetamine use and related harms through professional intervention has proven difficult. People who use methamphetamine comprise are commonly portrayed as presenting with severe clinical symptoms (e.g., psychological morbidity [171, 260]) and low motivation to access professional support [217, 230]. Engaging and retaining methamphetamine users in treatment can therefore be challenging, and relapse among those who do access treatment is common [244, 245, 285].

Although the Australian National Council on Drugs' *Methamphetamines: Position Paper* [286] identified a need for research of the barriers to service utilisation that exist for methamphetamine users, there is little local research published identifying and examining such barriers. In this paper we review relevant literature in an attempt to synthesise the available knowledge and improve current understandings of the personal, social and structural impediments to professional support that exist for methamphetamine users, and identify knowledge gaps regarding these issues.

## Method

Relevant literature was identified through: electronic databases (including PubMed, Medline, the Cochrane Library); reference lists of key papers/studies; and grey literature (i.e., non-commercial literature, such as government reports). Google Scholar was used primarily to search for grey literature and publications not identified through other search strategies. The search focused on publications concerning the use of professional support (i.e., drug-specialist treatment and appropriate/relevant health and support services) by methamphetamine and amphetamine-type stimulant (ATS) users, and factors influencing service access and outcomes for the target population.

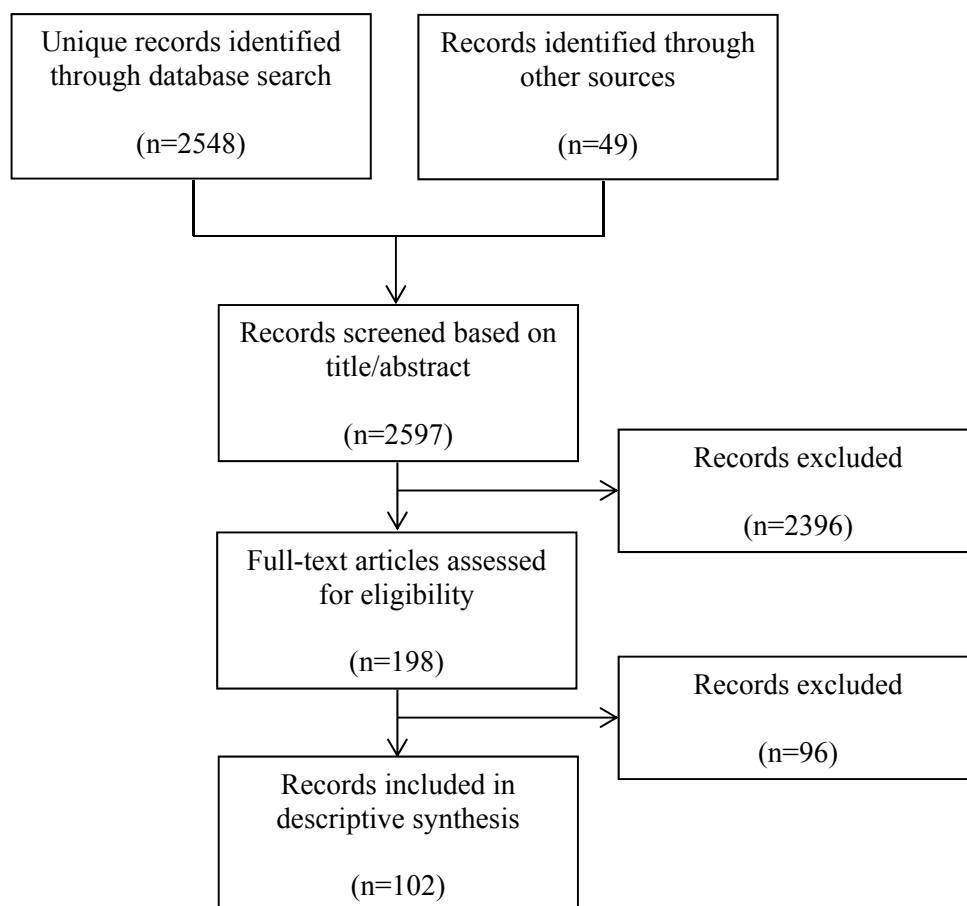
The primary search terms (and variations) included:

1. Methamphetamine or amphetamine or psychostimulant; AND
2. Treatment or service; AND
3. Barrier or use/utilisation/utilization or retention or outcomes.

Eligible articles were in English, specifically involved human research and were selected according to relevance to the research aims (Figure 1). Various study types were included in the review, including: cross-sectional designs; randomised controlled trials (RCTs); cohort studies;

evaluations; systematic and other reviews, in addition to expert opinion and commentary. These study design characteristics are described in text below.

**Figure 1: Literature review search strategy**



## Results

The documented personal, social and structural barriers to service utilisation that exist for alcohol and other drug users generally include: gender-related issues [287]; complex personal issues (e.g., poor physical health, unstable accommodation, legal problems) [288, 289]; stigma and negative staff attitudes towards substance-using populations [288-291]; a lack of holistic services targeting multiple user needs [288]; issues related to service accessibility and availability (e.g., relating to geographical location, cost of treatment, the burden of appointments and restrictive entry/eligibility criteria) [288, 289, 292, 293]; limited resources within drug treatment settings [288]; and naivety of available/appropriate treatment options [290, 293]. Not surprisingly, our review has identified that many of these issues also apply to methamphetamine users; we consider these below in the specific context of methamphetamine use, in addition to other barriers that are pertinent to methamphetamine users.

### *Low motivation and perceived need*

Methamphetamine users have been characterised as having low levels of motivation or readiness to change problematic use patterns and/or access professional support [48, 217, 230, 239, 294]. This is an obvious impediment to treatment-seeking behaviour. One reason for low motivation for drug treatment among methamphetamine users is potentially a lack of perceived need. Research findings continue to identify low levels of perceived need to alter problematic use patterns and/or access professional support among methamphetamine users [e.g., 50, 231, 234, 258, 295]. However, there is limited research investigating reasons for this. To address perceived need as a potential barrier to service utilisation (and, consequently, low motivation and levels of service engagement) among individuals likely to benefit from professional intervention [296], there is a need to understand why some methamphetamine users perceive a need for treatment while others do not. Previous research with ATS users suggests that a lack of perceived need for treatment could be indicative of a lack of actual need. ATS users with perceived need have shown to be more impaired, or experiencing more harms associated with their methamphetamine use, than those without perceived need [216, 231, 297]. For example, Vincent et al. [216] found a positive association among dependent amphetamine users in South Australia between increased perceived need for treatment and greater psychological morbidity, which is consistent with other research [296, 297]. The fact that some methamphetamine users will naturally (i.e., without professional support) remit from methamphetamine dependence and harmful use patterns over time [63, 111-113] further suggests that some methamphetamine users might not benefit from drug treatment. Nevertheless, the limited available research suggests that some methamphetamine users without perceived need still experience significant methamphetamine-related harms and could therefore benefit from professional intervention [50, 231]. Further investigation of this area is needed to

explore whether avoidance of treatment utilisation by methamphetamine users without perceived need/motivation is warranted; i.e., we need to clearly understand whether these users engage in less risky patterns of use and experience fewer methamphetamine-related harms than those who perceive a need for access of professional support.

## **Gender**

Some female methamphetamine users have been shown to engage in different use patterns and experience a greater degree of methamphetamine-related harms than male users [82], with a greater prevalence of depressive and psychotic symptoms detected in some studies [298-301]. However, some research findings suggest that female methamphetamine users are less likely to access treatment than males [217, 251]. Despite this, few studies have specifically investigated gender as a treatment barrier for methamphetamine users and there is little evidence to explain the apparent divergence between harms and service utilisation. Boeri et al. [250] investigated barriers to drug treatment using in-depth interviews with 31 marginalised, suburban, methamphetamine-using women in southern US. Identified barriers included: limited availability of gender-specific services for female versus male users, particularly for women with children, and restrictive eligibility requirements (e.g., withdrawal services were not available specifically for the purposes of methamphetamine detoxification; alcohol and/or benzodiazepines were required in the bloodstream to be considered for treatment). Such barriers reportedly resulted in increased risk and experience of drug-related harms, with some women resorting to drug use as a means of self-medication [250].

Wright et al.'s [302] matched case-control study examined factors associated with treatment access among amphetamine-using females in England. Findings demonstrated the greater impact of personal relationships on treatment utilisation and outcomes among females, who were more likely to be living with children than males. Although the well-being of their children was a strong motivator towards abstinence, having children was also identified as a treatment barrier, primarily due to a fear of children being removed as a result of drug treatment access [302, 303]. Other issues that may affect treatment outcomes among methamphetamine-using women include limited resources for employability or close family support, and a history of abuse and violence [298, 300, 304]. Further, research has demonstrated that pregnant methamphetamine-using women are less easily retained in treatment compared to pregnant users of other substances [305]. The findings of these studies highlight the unique service barriers experienced by female methamphetamine users, particularly in relation to parenting responsibilities that may not be as common among male users. Given the excess harm experienced by female methamphetamine users and their reduced likelihood of accessing professional support, research is required to

investigate methods of improving levels of service engagement among women who use methamphetamine.

### ***Methamphetamine-using sub-groups***

Methamphetamine users are not a homogenous population [13, 48]; therefore, treatment barriers relevant to one sub-population may not apply to others [70]. For example, poor levels of treatment engagement are evident among gay male methamphetamine users [239], a group characterised by involvement in risky sexual behaviours associated with HIV transmission that have shown to be related to methamphetamine use [189]. Barriers to treatment for this group reportedly include a lack of sensitivity towards, or awareness of, the specific needs of methamphetamine-using men who have sex with men (MSM) [306], and experience of health issues such as HIV [189]. Further, given the complex interaction between methamphetamine use by MSM and social, environmental and sexual behaviours [307], some MSM may not access treatment programs that involve discussions with mixed user groups that include heterosexuals [306].

Other research suggests that drug treatment services are not readily accessible to culturally and linguistically diverse populations [54, 238, 263, 308, 309]. For example, McKetin et al. [238, 251] investigated socio-demographic factors associated with treatment utilisation and provision among methamphetamine-dependent individuals in Sydney. They found that individuals born outside Australia were nearly 80% less likely to have accessed treatment for their methamphetamine use than Australian-born participants. McKetin and colleagues also identified another subgroup of methamphetamine users who were less likely to access drug treatment: those in full-time employment. The authors noted that although it is tempting to suggest that employed users may have been engaging in ‘functional’ methamphetamine use [310], reduced service utilisation among this group may have been a result of the restrictive hours of publicly-funded drug treatment services which might not be amenable to the schedules of full-time workers [238].

### ***Methamphetamine use patterns and relapse***

Methamphetamine users exhibit various characteristics and behaviours that differ from other substance users [136, 137, 139]. For example, chronic and dependent methamphetamine users can be characterised by significant craving [311] and sporadic use patterns [119], with binges and periods of abstinence. These patterns can adversely affect treatment engagement, provision and retention [246, 312], particularly when treatment is managed by services better oriented to treat primary alcohol and opiate use [229, 313]. The nature of methamphetamine withdrawal and relapse is also different to other drugs. Many dependent methamphetamine users experience withdrawal symptoms multiple times as use fluctuates between heavy, regular and binge use

patterns [313]. High rates of relapse among methamphetamine users represent a significant barrier to achieving optimal treatment outcomes [241, 244-246, 285]. Further, the nature of some of the adverse health consequences of methamphetamine use, including exhaustion and paranoia during the so-called ‘comedown’ period, can preclude engagement with services [234].

Other research indicates that heavier and riskier methamphetamine use patterns are associated with poorer treatment engagement, retention and outcomes [314-316]. For example, Hillhouse et al.’s [316] examination of in-treatment performance and post-treatment outcomes among methamphetamine users indicated that greater frequency of methamphetamine use in the week prior to treatment entry was associated with shorter length of treatment duration. Further, Rawson et al.’s [314] research with methamphetamine users in US outpatient treatment services indicated that methamphetamine injectors demonstrated poorer treatment engagement, outcomes and retention than individuals who administered the drug intranasally or via smoking. This does contrast with the Australian research which suggests a higher level of treatment access among methamphetamine injectors [251]; however, this is possibly a result of greater service coverage for PWID in Australia [317, 318].

### ***Complex clinical symptoms and personal disadvantage***

Various clinical symptoms associated with methamphetamine use, in particular psychological comorbidity [260], can adversely impact on treatment utilisation and outcomes among methamphetamine users [59, 115, 174, 319-321]. For example, research in Australia [175] and the US [57, 173] suggests that methamphetamine users with depression and anxiety experience poorer treatment outcomes than individuals without these diagnoses. Baker and Dawe [260] noted that the difficulties inherent in diagnosing comorbid conditions can complicate the process of identifying the best treatment approach for methamphetamine users. In their review, Rawson et al. [239] asserted that some services lack the expertise and resources to implement methamphetamine treatment strategies, as the severe psychiatric symptomatology of methamphetamine users is beyond the clinical experience of many frontline workers who may have more experience managing alcohol and opiate users. Compounding this issue is a lack of research examining the outcomes of treatment programs which target comorbid methamphetamine use and experience of clinical symptoms. This represents a significant knowledge gap, given the well-documented association between psychostimulant use and psychological problems [260] and evidence of poorer treatment outcomes among methamphetamine users experiencing mental health issues [57].

Indicators of personal disadvantage, including unstable accommodation and involvement with the criminal justice system, are also detrimental to service access and treatment outcomes among substance users generally [322, 323]. Such issues are particularly relevant to methamphetamine users, who can present with more prevalent and severe clinical symptoms and personal disadvantage than other primary substance users [61, 138, 140].

### *Stigma*

Semple et al.'s [295] study of 292 heterosexual, HIV-negative, Californian methamphetamine users appears to be the only published research that purposefully examines the relationship between stigma and treatment utilisation by methamphetamine users. Their findings indicated that the likelihood of lifetime treatment access for methamphetamine use decreased in accordance with increased expectations of rejection (anticipating being rejected, devalued and perceived as less worthy due to a characteristic such as drug use or mental illness) and use of stigma-coping strategies (e.g., being secretive, selectively disclosing information about methamphetamine use). The authors hypothesised that the stigma associated with treatment access could result from factors other than methamphetamine's illicit drug status, including involvement in associated stigmatised behaviours (e.g., criminality) and experience of related clinical symptoms.

Studies of amphetamine users in Australia [50, 324] and the UK [230, 281, 325] have also identified stigma as a barrier to service access. For example, interviews with English amphetamine users indicated a reluctance to access professional assistance out of a need to protect the self-image and avoid stigmatisation associated with the negative 'drug addict' label [281, 295], a term reportedly more synonymous with heroin use [325].

### *Peer influence*

Boshears et al. [64] recently interviewed 100 current and former methamphetamine users in suburban communities of Atlanta, US. The social and relational aspects of drug use careers were examined from user perspectives, including drug initiation, progression, cessation and relapse. Entire drug use trajectories intertwined with, and were influenced by, social factors for most participants. Participants highlighted the difficulties experienced from breaking social ties with methamphetamine-using peers that impeded efforts to discontinue their own use. Others have indicated strong peer relationships and a fear of social rejection as a factor preventing some individuals from reducing or ceasing methamphetamine use or accessing professional help [233, 234, 326-328]. Additional research involving Australian [324] and English [303] ATS users indicated that some individuals avoid accessing drug-specialist services due to the fear that interacting with other service clients would result in further use.

### *Pharmacological treatments*

The continued lack of approved pharmacotherapies for addressing methamphetamine dependence and withdrawal, and preventing relapse, limits treatment options for methamphetamine users [235, 237, 243, 329-332]. The few RCTs that have examined the effectiveness of pharmaceuticals (e.g., dexamphetamine, amineptine, mirtazapine) in treating methamphetamine withdrawal and dependence [333-338], have produced inconsistent findings [236]. For example, Shoptaw et al. [337] reviewed relevant studies to assess the effectiveness of various pharmaceuticals as potential withdrawal agents. Although one study suggested that mirtazapine may reduce some negative symptoms associated with amphetamine withdrawal (e.g., hyperarousal, anxiety), another found no benefit of mirtazapine over placebo on amphetamine withdrawal symptoms or retention. This lack of consistent evidence is problematic given the potential of pharmacotherapies to improve general service engagement, attract users to alternative treatment modalities, and improve treatment retention among methamphetamine users [335, 339]. Further controlled trials with sufficient sample sizes and length of follow-up are required to address this significant gap in treatment provision for methamphetamine users [335, 338].

### *Withdrawal services*

Australian methamphetamine users access withdrawal services at a lower rate than other treatment modalities [263]. Investigation of barriers to withdrawal treatment for methamphetamine users [229] and a review of methamphetamine withdrawal literature [243] by Pennay and Lee identified several barriers to withdrawal treatment utilisation and provision for methamphetamine users. These included: insufficient knowledge among service providers about the nature of methamphetamine withdrawal and associated behaviours; a paucity of research investigating effective treatment of methamphetamine withdrawal; inconsistent treatment between services; and, general pessimism and a lack of confidence among service providers regarding treatment of methamphetamine users, possibly resulting from a high prevalence of challenging behaviours and co-morbidity among this group.

### *Service fit*

As indicated, most drug treatment services are oriented to opiate and alcohol users [230, 281, 308, 313]. Although some researchers have criticised methamphetamine-specific programs for being too costly, lengthy and labour-intensive [340], others have suggested that a lack of methamphetamine-oriented services prevents some individuals from accessing treatment [229, 339, 341, 342]. Indeed, Gerada [343] noted that, particularly without pharmacotherapies to treat withdrawal and dependence, primary psychostimulant users generally receive less ‘developed’



services than other substance users. This contention accords with research demonstrating that some methamphetamine users believe existing drug treatment services to be generally inappropriate for addressing their needs. Hando et al.'s [217] survey of regular Sydney-based amphetamine users, for example, indicated that a minority of participants who wanted to moderate their amphetamine use but did not seek help, perceived current treatment options to be inadequate. Although this paper is not a review of the effectiveness of treatment available to methamphetamine users (others have examined this issue in more detail [e.g., 236, 339]), the perceived suitability of services in meeting methamphetamine users' needs represents a service barrier for some individuals. However, a growing body of research suggests that generalist drug treatment options can produce positive outcomes among methamphetamine users [e.g., 236, 315, 339, 344, 345-348].

### ***Accessibility and availability***

Long wait times remain a key barrier to treatment access by methamphetamine users [50, 324]. For example, wait times of up to three months to even be screened by services have been noted for methamphetamine users seeking treatment in Melbourne [349]. In the context of transient patterns of heavy use and high rates of relapse among methamphetamine users [119, 241], lengthy wait-times are problematic because optimal treatment utilisation by methamphetamine users is often associated with immediate availability and early engagement [229, 313]. Naivety of available treatment options also prevents service utilisation among some methamphetamine users [217, 324].

Issues of treatment accessibility and availability are particularly relevant to non-metropolitan methamphetamine users [70, 234, 308, 350]. As few studies have examined methamphetamine use outside of Australian metropolitan areas [52, 231, 238], the characteristics of regional and rural methamphetamine users remain largely unknown. This knowledge gap is concerning given that research points to high demand for treatment of methamphetamine use in non-metropolitan areas [238]. Wallace et al.'s [231] survey of regular methamphetamine users in rural and regional areas of NSW identified numerous barriers to professional support for such individuals, including: concerns regarding confidentiality (a problem especially in small communities and demonstrated in other research with amphetamine users [216, 302, 303, 351]); naivety of available service options; limited available treatment; and barriers resulting from transport or financial limitations.

### ***General healthcare providers***

General practitioners (GPs) and other publicly available health services (e.g., hospitals) are commonly accessed by methamphetamine users due to high accessibility/availability and

aforementioned barriers to specialist drug treatment [216, 218, 250, 352]. However, general healthcare providers can be ineffective in responding to methamphetamine users' needs [281, 343, 351]. For example, Klee et al [230] interviewed 58 individuals in treatment for amphetamine use and found that previous experiences of GPs when seeking help had often been 'unrewarding'. The authors hypothesised that this reflected the service sector's 'preoccupation' with heroin, and commented that GPs could be inconsistent in the level of counselling they were able or prepared to provide to users, with a lack of knowledge, skills, sympathy and/or time being detrimental to service clients. Other research suggests that previous refusal by GPs to assist with ATS-related problems can reduce the likelihood of subsequent service access and evoke feelings of marginalisation [303, 343].

In the late 1990s, Hando et al.'s [217] findings from surveying 200 Sydney amphetamine users indicated that Australian health practitioners were largely unfamiliar with ATS-related problems and education was required to improve treatment provision for this group. More recent evidence suggests that this problem persists [353]. For example, Saltman et al. [219] investigated GPs' experiences managing problematic crystal methamphetamine use and associated mental health problems among gay men and HIV-positive men, through semi-structured interviews with 16 GPs in NSW and South Australia. Findings indicated variability in GPs' knowledge of, and response to, complex problems of marginalised crystal methamphetamine-using patients. There was scope to improve GPs' understanding of crystal methamphetamine use contexts and how to address problematic use and related harms. Saltman et al. noted that an enhanced understanding of methamphetamine-related issues among GPs could minimise stigma towards methamphetamine users and improve the capacity of GPs to intervene earlier and reduce the impact of methamphetamine use on patient health. There are Australian guidelines available to assist GPs in managing patients with psychostimulant problems [354]; however, Saltman et al. [219] suggested that these guidelines need to be developed to address issues specific to methamphetamine-using sub-groups, including gay men and HIV-positive men.

## Discussion

Methamphetamine remains one of the more commonly used illicit substances in Australia's general community [15] and sentinel drug-using populations [31, 32]. Given low treatment utilisation rates among methamphetamine users and apparent difficulties in accessing and retaining such individuals [34, 87, 315], identifying impediments to drug treatment and health and support services for methamphetamine users is an important step towards improving treatment engagement and reducing harms among this group. A number of personal, social and structural issues were identified that reflect barriers to service utilisation for substance users more generally.

These include: stigma [291, 295]; issues relating to treatment accessibility and availability, such as waiting lists [229, 293]; gender-related issues [250, 287]; and naivety of available treatment options [290, 324]. However, there are specific challenges for methamphetamine users that are evident from this review, including: low levels of motivation and/or perceived need to access professional support [231]; experience of complex clinical symptoms such as significant mental health issues [175]; limited service provider knowledge and experience in addressing methamphetamine users' needs [219]; a lack of approved pharmacotherapies to treat dependence and withdrawal [236]; and barriers to certain methamphetamine-using subgroups, such as MSM [306].

Further investigations are required to address a number of significant knowledge gaps. For example, research examining low levels of motivation and perceived need for drug treatment among methamphetamine users could examine whether such perceptions legitimise the avoidance of professional support (i.e., are these individuals engaging in less problematic use patterns and experiencing less methamphetamine-related harms than users with perceived need?). In addition, research is warranted to identify effective methods of addressing low rates of treatment access among various methamphetamine-using subgroups (e.g., methamphetamine smokers, females, full-time workers and MSM), and engaging methamphetamine users characterised by greater levels of disadvantage and more severe use patterns. The implementation of methamphetamine-specific services could enhance access to professional support among methamphetamine users. However, modifying current drug treatment and health/support services to improve their utility in treating and meeting the needs of methamphetamine users could be a cheaper and less resource-intensive approach. In this context, education of service providers could increase awareness of methamphetamine use contexts, harms and related issues, which would potentially improve staff attitudes towards this population and reduce the stigma associated with drug treatment access. Education of methamphetamine users about available services and the benefits of accessing generalist drug-specialist services could also improve levels of treatment uptake.

## **Conclusion**

This review examined barriers to drug treatment and health and support service utilisation for methamphetamine users outlined in the existing literature. Further research is warranted to overcome the identified barriers to improve service provision, retention and outcomes among methamphetamine users. In this context, research is required to examine whether methamphetamine users not in contact with services for methamphetamine use and related harms would actually benefit from professional intervention. Such work will contribute to improving

levels of service engagement among methamphetamine users and reducing the occurrence of harms associated with methamphetamine use.

### ***Author declaration***

The authors declare that: they have no competing interests; the material has not been published elsewhere; the paper is not currently being considered for publication elsewhere; all authors have been personally and substantially involved in the work leading to the paper, and will hold themselves jointly and individually responsible for its content; and, relevant ethical safeguards have been met in relation to the confidentiality and consent of the participants involved in the research.

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## References

1. McKetin, R., McLaren, J., Kelly, E., Hall, W., and Hickman, M. *Estimating the number of regular and dependent methamphetamine users in Australia*. Technical Report No. 230. 2005. National Drug and Alcohol Research Centre, UNSW. Sydney.
2. Australian Institute of Health and Welfare. *2010 National Drug Strategy Household Survey report*. Drug statistics series no. 25. Cat. no. PHE 145. 2011. AIHW. Canberra.
3. Sara, G.E., Burgess, P.M., Harris, M.G., Malhi, G.S., and Whitefords, H.A. *Stimulant use and stimulant use disorders in Australia: findings from the National Survey of Mental Health and Wellbeing*. Med J Aust, 2011. **195**(10): p. 607-610.
4. Degenhardt, L., Roxburgh, A., Black, E., Bruno, R., Campbell, G., Kinner, S., and Fetherston, J. *The epidemiology of methamphetamine use and harm in Australia*. Drug Alcohol Rev, 2008. **27**(3): p. 243-252.
5. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. Australian Psychologist, 2005. **40**(2): p. 88-95.
6. McKetin, R., Lubman, D.I., Lee, N.M., Ross, J.E., and Slade, T.N. *Major depression among methamphetamine users entering drug treatment programs*. Med J Aust, 2011. **195**(3): p. S51-5.
7. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. Drug Alcohol Depend, 1997. **46**: p. 105-113.
8. Klee, H., Wright, S., and Morris, J. *Amphetamine Users in Treatment: Factors Associated with Sustained Abstinence from Street Drugs*. Addiction Research, 1999. **7**(3): p. 239-265.
9. Cretzmeyer, M., Vaughan Sarrazin, M., Huber, D.L., Block, R.I., and Hall, J.A. *Treatment of methamphetamine abuse: research findings and clinical directions*. J Subst Abuse Treat, 2003. **24**: p. 267-277.
10. Brecht, M.L., von Mayrhauser, C., and Anglin, M.D. *Predictors of Relapse After Treatment for Methamphetamine Use*. J Psychoactive Drugs, 2000. **32**(2): p. 211-220.
11. Hartz, D.T., Frederick-Osborne, S.L., and Galloway, G.P. *Craving predicts use during treatment for methamphetamine dependence: a prospective, repeated-measures, within-subject analysis*. Drug Alcohol Depend, 2001. **63**(3): p. 269-76.
12. Australian National Council on Drugs. *Methamphetamines: Position Paper*. 2007. ANCD. Canberra.

13. Greenfield, S.F., Brooks, A.J., Gordon, S.M., Green, C.A., Kropp, F., McHugh, R.K., Lincoln, M., Hien, D., and Miele, G.M. *Substance abuse treatment entry, retention, and outcome in women: A review of the literature*. Drug Alcohol Depend, 2007. **86**: p. 1-21.
14. Holt, M., Treloar, C., McMillan, K., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users with Mental Health Comorbidities and Complex Vulnerabilities*. Monograph Series No. 61. 2007. Australian Government Department of Health and Ageing. Canberra.
15. Neale, J., Tompkins, C., and Sheard, L. *Barriers to accessing generic health and social care services: a qualitative study of injecting drug users*. Health and Social Care in the Community, 2008. **16**(2): p. 147-154.
16. Wisdom, J.P., Cavaleri, M., Gogel, L., and Nacht, M. *Barriers and facilitators to adolescent drug treatment: Youth, family, and staff reports*. Addiction Research and Theory, 2011. **19**(2): p. 179-188.
17. Butler, R. and Sheridan, J. *Innocent parties or devious drug users: the views of primary healthcare practitioners with respect to those who misuse prescription drugs*. Harm Reduction Journal, 2010. **7**(21): p. 1-11.
18. Dietze, P., Richards, J., Rumbold, G., Aitken, C., Day, C., McGregor, C., and Ritter, A. *Treatment utilisation by heroin-dependent persons in Australia: Implications for treatment service systems*. 2003. Turning Point Alcohol and Drug Centre. Fitzroy.
19. Treloar, C., Abelson, J., Cao, W., Brener, L., Kippax, S., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users*. 2004. Australian Government Department of Health and Ageing. Canberra.
20. Farrell, M., Howes, S., Griffiths, P., Williamson, S., and Taylor, C. *Stimulant Needs Assessment Project*. Report to the Department of Health. 1998. National Addiction Centre. London.
21. Rawson, R.A., Gonzales, R., and Brethen, P. *Treatment of methamphetamine use disorders: an update*. J Subst Abuse Treat, 2002. **23**: p. 145-150.
22. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. Drug Alcohol Rev, 2001. **20**: p. 49-56.
23. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia*. Drug Alcohol Rev, 2009. **28**: p. 592-599.
24. Semple, S.J., Grant, I., and Patterson, T.L. *Utilization of Drug Treatment Programs by Methamphetamine Users: The Role of Social Stigma*. Am J Addict, 2005. **14**(4): p. 367-380.

25. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
26. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Barriers to formal drug abuse treatment in the rural south: a preliminary ethnographic assessment*. J Psychoactive Drugs, 2008. **40**(2): p. 121-129.
27. Baker, A., Boggs, T.G., and Lewin, T.J. *Randomized controlled trial of brief cognitive-behavioural interventions among regular users of amphetamine*. Addiction, 2001. **96**(9): p. 1279-1287.
28. Edlund, M.J., Unutzer, J., and Curran, G.M. *Perceived need for alcohol, drug, and mental health treatment*. Social psychiatry and psychiatric epidemiology, 2006. **41**: p. 480-487.
29. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
30. Falck, R.S., Wang, J., Carlson, R.G., Krishnan, L.L., Leukefeld, C., and Booth, B.M. *Perceived need for substance abuse treatment among illicit stimulant drug users in rural areas of Ohio, Arkansas, and Kentucky*. Drug Alcohol Depend, 2007. **91**: p. 107-114.
31. Borders, T.F., Booth, B.M., Han, X., Wright, P., Leukefeld, C., Falck, R.S., and Carlson, R.G. *Longitudinal changes in methamphetamine and cocaine use in untreated rural stimulant users: racial differences and the impact of methamphetamine legislation*. Addiction, 2008. **103**(5): p. 800-808.
32. Cunningham, J.A. *Untreated remissions from drug use: the predominant pathway*. Addict Behav, 1999. **24**(2): p. 267-270.
33. Hser, Y.I., Huang, D., Brecht, M.L., Li, L., and Evans, E. *Contrasting trajectories of heroin, cocaine, and methamphetamine use*. J Addict Dis, 2008. **27**(3): p. 13-21.
34. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Trajectories of Methamphetamine Use in the Rural South: A Longitudinal Qualitative Study*. Human Organization, 2008. **67**(2): p. 181-193.
35. Brecht, M.L., O'Brien, A., von Mayrhauser, C., and Anglin, M.D. *Methamphetamine use behaviors and gender differences*. Addictive Behaviors, 2004. **29**(1): p. 89-106.
36. Hser, Y.-I., Evans, E., and Huang, Y.C. *Treatment outcomes among women and men methamphetamine abusers in California*. J Subst Abuse Treat, 2005. **28**(1): p. 77-85.
37. Mahoney, J.J., Hawkins, R.Y., De La Garza, R., Kalenchstein, A.D., and Newton, T.F. *Relationship between gender and psychotic symptoms in cocaine-dependent and methamphetamine-dependent participants*. Gender Medicine, 2010. **7**(5): p. 414-421.
38. Cohen, J.B., Dickow, A., Homer, K., Zweben, J.E., Balabis, J., Vandersloot, D., and Reiber, C. *Abuse and Violence History of Men and Women in Treatment for*



- Methamphetamine Dependence*. The American Journal on Addictions, 2003. **12**: p. 377-385.
39. Dluzen, D.E. and Liu, B. *Gender differences in methamphetamine use and responses: a review*. Gend Med, 2008. **5**(1): p. 24-35.
  40. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
  41. Boeri, M.W., Tyndall, B.D., and Woodall, D.R. *Suburban Poverty: Barriers to Services and Injury Prevention among Marginalized Women who Use Methamphetamine*. Western Journal of Emergency Medicine, 2011. **12**(3): p. 284-292.
  42. Wright, S. and Klee, H. *Developing drug services for amphetamine users: taking account of gender-specific factors*. Journal of Substance Use, 2000. **5**: p. 122-130.
  43. Wright, S., Klee, H., and Reid, P. *Attitudes of Amphetamine Users Towards Treatment Services*. Drugs: education, prevention and policy, 1999. **6**(1): p. 71-86.
  44. Cohen, J.B., Greenberg, R., Uri, J., Halpin, M., and Zweben, J.E. *Women with methamphetamine dependence: research on etiology and treatment*. J Psychoactive Drugs, 2007. **Suppl 4**: p. 347-351.
  45. Lindsay, B., Albrecht, J., and Terplan, M. *Against professional advice: treatment attrition among pregnant methamphetamine users*. Substance Abuse and Rehabilitation, 2011. **2**(1): p. 189-195.
  46. Freese, T.E., Obert, J., Dickow, A., Cohen, J., and Lord, R.H. *Methamphetamine abuse: issues for special populations*. J Psychoactive Drugs, 2000. **32**(2): p. 177-182.
  47. Rajasingham, R., Mimiaga, M.J., White, J.M., Pinkston, M.M., Baden, R.P., and Mitty, J.A. *A Systematic Review of Behavioral and Treatment Outcome Studies Among HIV-Infected Men Who Have Sex with Men Who Abuse Crystal Methamphetamine*. AIDS Patient Care STDS, 2012. **26**(1): p. 36-52.
  48. Leonard, W., Dowsett, G., Slavin, S., Mitchell, A., and Pitts, M. *Crystal Clear: The social determinants of gay men's use of crystal methamphetamine in Victoria*. Monograph Series Number 67. 2008. La Trobe University, The Australian Research Centre in Sex, Health & Society. Melbourne.
  49. Halkitis, P.N., Green, K.A., and Mourgues, P. *Longitudinal investigation of methamphetamine use among gay and bisexual men in New York City: findings from Project BUMPS*. J Urban Health, 2005. **82**(1 Suppl 1): p. i18-25.
  50. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2008-09: report on the National Minimum Data Set*. Drug treatment series no. 10. Cat no. HSE 92. 2010. AIHW. Canberra.

51. Drugs and Crime Prevention Committee. *Inquiry into Amphetamine and 'Party Drug' Use in Victoria - Final Report*. 2004. DCPC, Parliament of Victoria. Melbourne.
52. McKetin, R., Kelly, E., and Indig, D. *Characteristics of treatment provided for amphetamine use in New South Wales, Australia*. Drug Alcohol Rev, 2005. **24**(5): p. 433-436.
53. Niv, N. and Hser, Y.I. *Drug treatment service utilization and outcomes for Hispanic and white methamphetamine abusers*. Health Serv Res, 2006. **41**(4 Pt 1): p. 1242-1257.
54. Dickerson, D.L., Spear, S., Marinelli-Casey, P., Rawson, R., Li, L., and Hser, Y.I. *American indians/alaska natives and substance abuse treatment outcomes: positive signs and continuing challenges*. J Addict Dis, 2011. **30**(1): p. 63-74.
55. Lende, D.H., Leonard, T., Sterk, C.E., and Elifson, K. *Functional methamphetamine use: The insider's perspective*. Addiction Research & Theory, 2007. **15**(5): p. 465-477.
56. Copeland, A.L. and Sorensen, J.L. *Differences between methamphetamine users and cocaine users in treatment*. Drug Alcohol Depend, 2001. **62**: p. 91-95.
57. Huber, A., Ling, W., Shoptaw, S., Gulati, V., Brethen, P., and Rawson, R. *Integrating Treatments for Methamphetamine Abuse: A Psychosocial Perspective*. J Addict Dis, 1997. **16**(4): p. 41-50.
58. Mahoney, J.J., 3rd, Kalechstein, A.D., De La Garza, R., 2nd, and Newton, T.F. *Presence and persistence of psychotic symptoms in cocaine- versus methamphetamine-dependent participants*. Am J Addict, 2008. **17**(2): p. 83-98.
59. Bruehl, A.M., Lende, D.H., Schwartz, M., Sterk, C.E., and Elifson, K. *Craving and control: methamphetamine users' narratives*. J Psychoactive Drugs, 2006. **Suppl 3**: p. 385-392.
60. Christian, D.R., Huber, A., Brecht, M.L., McCann, M.J., Marinelli-Casey, P., Lord, R.H., Reiber, C., Lu, T.H., Project, T.M.T., and Galloway, G.P. *Methamphetamine Users Entering Treatment: Characteristics of the Methamphetamine Treatment Project Sample*. Subst Use Misuse, 2007. **42**(14): p. 2207-2222.
61. Maglione, M., Chao, B., and Anglin, M.D. *Correlates of outpatient drug treatment drop-out among methamphetamine users*. J Psychoactive Drugs, 2000. **32**(2): p. 221-228.
62. Zorick, T., Sugar, C.A., Hellemann, G., Shoptaw, S., and London, E.D. *Poor response to sertraline in methamphetamine dependence is associated with sustained craving for methamphetamine*. Drug Alcohol Depend, 2011. **118**(2-3): p. 500-503.
63. Lee, N., Johns, L., Jenkinson, R., Johnston, J., Connolly, K., Hall, K., and Cash, R. *Clinical treatment guidelines for alcohol and drug clinicians. No. 14: Methamphetamine dependence and treatment*. 2007. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.

64. Pennay, A.E. and Lee, N.K. *Barriers to methamphetamine withdrawal treatment in Australia: findings from a survey of AOD service providers*. Drug Alcohol Rev, 2009. **28**(6): p. 636-640.
65. Simon, S.L., Dacey, J., Glynn, S., Rawson, R., and Ling, W. *The effect of relapse on cognition in abstinent methamphetamine abusers*. J Subst Abuse Treat, 2004. **27**(1): p. 59-66.
66. Rawson, R.A., Gonzales, R., Marinelli-Casey, P., and Ang, A. *Methamphetamine dependence: a closer look at treatment response and clinical characteristics associated with route of administration in outpatient treatment*. Am J Addict, 2007. **16**(4): p. 291-299.
67. Brecht, M., Greenwell, L., and Anglin, M.D. *Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002)*. J Subst Abuse Treat, 2005. **29**: p. 295-306.
68. Hillhouse, M.P., Marinelli-Casey, P., Gonzales, R., Ang, A., Rawson, R.A., and Authors, T.M.T.P.C. *Predicting in-treatment performance and post-treatment outcomes in methamphetamine users*. Addiction, 2007. **102**(Suppl. 1): p. 84-95.
69. Wodak, A. and Cooney, A. *Do needle syringe programs reduce HIV infection among injecting drug users: a comprehensive review of the international evidence*. Subst Use Misuse, 2006. **41**(6-7): p. 777-813.
70. Victorian Department of Human Services. *National Needle and Syringe Programs Strategic Framework 2010-2014*. 2010. Victorian DHS. Melbourne.
71. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
72. Joe, G.W., Rowan-Szal, G.A., Greener, J.M., Simpson, D.D., and Vance, J. *Male methamphetamine-user inmates in prison treatment: during-treatment outcomes*. J Subst Abuse Treat, 2010. **38**(2): p. 141-152.
73. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R., and Methamphetamine Treatment Project Corporate, A. *Clinical course and outcomes of methamphetamine-dependent adults with psychosis*. J Subst Abuse Treat, 2008. **35**(4): p. 445-450.
74. Akiyama, K. *Longitudinal clinical course following pharmacological treatment of methamphetamine psychosis which persists after long-term abstinence*. Ann N Y Acad Sci, 2006. **1074**: p. 125-134.

75. Kresina, T.F., Normand, J., Khalsa, J., Mitty, J., Flanigan, T., and Francis, H. *Addressing the need for treatment paradigms for drug-abusing patients with multiple morbidities*. Clin Infect Dis, 2004. **38 Suppl 5**: p. S398-401.
76. Reback, C.J., Peck, J.A., Fletcher, J.B., Nuno, M., and Dierst-Davies, R. *Lifetime substance use and HIV sexual risk behaviors predict treatment response to contingency management among homeless, substance-dependent MSM*. J Psychoactive Drugs, 2012. **44**(2): p. 166-172.
77. Kay-Lambkin, F.J., Baker, A.L., Lee, N.M., Jenner, L., and Lewin, T.J. *The influence of depression on treatment for methamphetamine use*. Med J Aust, 2011. **195**(3): p. S38-43.
78. Glasner-Edwards, S., Marinelli-Casey, P., Hillhouse, M., Ang, A., Mooney, L.J., Rawson, R., and Methamphetamine Treatment Project Corporate, A. *Depression among methamphetamine users: association with outcomes from the Methamphetamine Treatment Project at 3-year follow-up*. J Nerv Ment Dis, 2009. **197**(4): p. 225-231.
79. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., and Rawson, R. *Anxiety disorders among methamphetamine dependent adults: association with post-treatment functioning*. Am J Addict, 2010. **19**(5): p. 385-390.
80. Scott, C.K., Foss, M.A., and Dennis, M.L. *Factors influencing initial and longer-term responses to substance abuse treatment: a path analysis*. Evaluation and Program Planning, 2003. **26**: p. 287-295.
81. Hser, Y.-I., Maglione, M.A., Joshi, V., and Chao, B. *Effects of Treatment Program and Client Characteristics on Client Treatment Retention*. 1998. Center for Substance Abuse Treatment, National Evaluation Data and Technical Assistance Center. Los Angeles, California.
82. Hadland, S.E., Marshall, B.D.L., Kerr, T., Qi, J., Montaner, J.S., and Wood, E. *Depressive Symptoms and Patterns of Drug Use Among Street Youth*. J Adolesc Health, 2011. **48**: p. 585-590.
83. Rawson, R.A., Gonzales, R., Obert, J.L., McCann, M.J., and Brethen, P. *Methamphetamine use among treatment-seeking adolescents in Southern California: Participant characteristics and treatment response*. J Subst Abuse Treat, 2005. **29**: p. 67-74.
84. Rawson, R., Huber, A., Brethen, P., Obert, J., Gulati, V., Shoptaw, S., and Ling, W. *Methamphetamine and Cocaine Users: Differences in Characteristics and Treatment Retention*. J Psychoactive Drugs, 2000. **32**(2): p. 233-238.
85. Pennay, A., Ferris, J., Reed, M., Devaney, M., and Lee, N. *Evaluation of 'Access Point' Specialist Methamphetamine Clinic*. 2010. Turning Point Alcohol and Drug Centre. Fitzroy, Melbourne.

86. Klee, H., Carnwath, T., Merrill, J., and Morris, J. *Amphetamine misuse and treatment: an exploration of individual and policy impediments to effective service delivery*. 1995. Centre for Social Research on Health and Substance Abuse, Manchester Metropolitan University. Manchester, UK.
87. Wright, S. and Klee, H. *A Profile of Amphetamine Users Who Present to Treatment Services and Do Not Return*. *Drugs: education, prevention and policy*, 1999. **6**(2): p. 227-241.
88. Boshears, P., Boeri, M., and Harbry, L. *Addiction and sociality: Perspectives from methamphetamine users in suburban USA*. *Addict Res Theory*, 2011. **19**(4): p. 289-301.
89. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction*. *Drugs: education, prevention and policy*, 1994. **1**(3): p. 289-297.
90. Morgan, P., Beck, J., Joe, K., McDonnell, D., and Guitierrez, R. *Ice and Other Methamphetamine Use. Final Report to the National Institute on Drug Abuse*. 1994. National Institute of Health. Rockville, MD.
91. Sun, A.P. *Relapse among substance-abusing women: components and processes*. *Subst Use Misuse*, 2007. **42**(1): p. 1-21.
92. Yen, C.F. and Chang, Y.P. *Relapse antecedents for methamphetamine use and related factors in Taiwanese adolescents*. *Psychiatry Clin Neurosci*, 2005. **59**(1): p. 77-82.
93. Lintzeris, N., Holgate, F., and Dunlop, A. *Addressing dependent amphetamine use: a place for prescription*. *Drug Alcohol Rev*, 1996. **15**: p. 189-195.
94. Shearer, J. and Gowing, L.R. *Pharmacotherapies for problematic psychostimulant use: a review of current research*. *Drug Alcohol Rev*, 2004. **23**: p. 203-211.
95. Pennay, A.E. and Lee, N.K. *Putting the call out for more research: the poor evidence base for treating methamphetamine withdrawal*. *Drug Alcohol Rev*, 2011. **30**(2): p. 216-222.
96. Karila, L., Weinstein, A., Aubin, H.J., Benyamina, A., Reynaud, M., and Batki, S.L. *Pharmacological approaches to methamphetamine dependence: a focused review*. *Br J Clin Pharmacol*, 2010. **69**(6): p. 578-592.
97. Elkashef, A., Vocci, F., Hanson, G., White, J., Wickes, W., and Tiihonen, J. *Pharmacotherapy of methamphetamine addiction: an update*. *Subst Abus*, 2008. **29**(3): p. 31-49.
98. Brackins, T., Brahm, N.C., and Kissack, J.C. *Treatments for methamphetamine abuse: a literature review for the clinician*. *J Pharm Pract*, 2011. **24**(6): p. 541-550.
99. Moeller, F.G., Schmitz, J.M., Herin, D., and Kjome, K.L. *Use of stimulants to treat cocaine and methamphetamine abuse*. *Curr Psychiatry Rep*, 2008. **10**(5): p. 385-391.

100. Merrill, J., McBride, A., Pates, R., Peters, L., Tetlow, A., Roberts, C., Arnole, K., Crean, J., Lomax, S., and Deakin, B. *Dexamphetamine Substitution as a Treatment of Amphetamine Dependence: a Two-Centre Randomised Controlled Trial: Executive Summary*. 2004. UK Department of Health Drug Misuse Research Initiative.
101. Longo, M., Wickes, W., Smout, M., Harrison, S., Cahill, S., and White, J.M. *Randomized controlled trial of dexamphetamine maintenance for the treatment of methamphetamine dependence*. *Addiction*, 2009. **105**: p. 146-154.
102. Shearer, J., Wodak, A., Mattick, R.P., Van Beek, I., Lewis, J., Hall, W., and Dolan, K. *Pilot randomized controlled study of dexamphetamine substitution for amphetamine dependence*. *Addiction*, 2001. **96**: p. 1289-1296.
103. Srisurapanont, M., Jarusuraisin, N., and Kittirattanapaiboon, P. *Treatment for amphetamine dependence and abuse*. *Cochrane Database of Systematic Reviews*, 2001(4): p. CD003022.
104. Shoptaw, S.J., Kao, U., Heinzerling, K., and Ling, W. *Treatment for amphetamine withdrawal*. *Cochrane Database Syst Rev*, 2009(2): p. CD003021.
105. Lee, N., Pennay, A., Hester, R., McKetin, R., Nielsen, S., and Ferris, J. *A pilot randomised controlled trial of modafinil during acute methamphetamine withdrawal: Feasibility, tolerability and clinical outcomes*. *Drug Alcohol Rev*, 2012.
106. Ciketic, S., Hayatbakhsh, M.R., Doran, C.M., Najman, J.M., and McKetin, R. *A review of psychological and pharmacological treatment options for methamphetamine dependence*. *Journal of Substance Use*, 2012. **17**(4): p. 363-383.
107. Baker, A. and Lee, N.K. *A review of psychosocial interventions for amphetamine use*. *Drug Alcohol Rev*, 2003. **22**: p. 323-335.
108. Smout, M.F., Longo, M., Harrison, S., Minniti, R., Cahill, S., Wickes, W., and White, J.M. *The Psychostimulant Check-Up: A pilot study of a brief intervention to reduce illicit stimulant use*. *Drug Alcohol Rev*, 2010. **29**: p. 169-176.
109. Shearer, J., Wodak, A., Mattick, R.P., Van Beek, I., Lewis, J., Hall, W., and Dolan, K. *A randomised controlled trial of the feasibility of monitoring controlled prescribing of dexamphetamine*. NDARC Technical Report No. 75. 1999. National Drug and Alcohol Research Centre, UNSW. Sydney.
110. Smith, T.L., Volpe, F.R., Hashima, J.N., and Schuckit, M.A. *Impact of a stimulant-focused enhanced program on the outcome of alcohol- and/or stimulant-dependent men*. *Alcohol Clin Exp Res*, 1999. **23**(11): p. 1772-1779.
111. Gerada, C. *Drug misuse: a review of treatments*. *Clinical Medicine*, 2005. **5**(1): p. 69-73.
112. Brecht, M.L., Greenwell, L., von Mayrhauser, C., and Anglin, M.D. *Two-year outcomes of treatment for methamphetamine use*. *J Psychoactive Drugs*, 2006. **Suppl 3**: p. 415-426.

113. Lee, N.K. and Rawson, R.A. *A systematic review of cognitive and behavioural therapies for methamphetamine dependence*. Drug Alcohol Rev, 2008. **27**: p. 309-317.
114. Gossop, M., Marsden, J., and Stewart, D. *Treatment outcomes of stimulant misusers: one year follow-up results from the National Treatment Outcome Research Study (NTORS)*. Addict Behav, 2000. **25**(4): p. 509-522.
115. Rawson, R.A., Marinelli-Casey, P., Anglin, M.D., Dickow, A., Frazier, Y., Gallagher, C., Galloway, G.P., Herrell, J., Huber, A., McCann, M.J., Obert, J., Pennell, S., Reiber, C., Vandersloot, D., Zweben, J., and Methamphetamine Treatment Project Corporate Authors. *A multi-site comparison of psychosocial approaches for the treatment of methamphetamine dependence*. Addiction, 2004. **99**(6): p. 708-717.
116. Knapp, W.P., Soares, B.G., Farrel, M., and Lima, M.S. *Psychosocial interventions for cocaine and psychostimulant amphetamines related disorders*. Cochrane Database Syst Rev, 2007. **3**(CD003023).
117. Victorian Government Department of Human Services. *Victorian amphetamine-type stimulant (ATS) and related drugs strategy 2009-2012*. 2008. State Government of Victoria. Melbourne.
118. Kay-Lambkin, F. *Technology and innovation in the psychosocial treatment of amphetamine use, risk and dependence*. Drug Alcohol Rev, 2008. **27**: p. 318-325.
119. Lynch, M., Kemp, R., Krenske, L., Conroy, A., and Webster, J. *Patterns of amphetamine use. Initial findings from the amphetamines in Queensland research project 2003*. 2003. Crime and Misconduct Commission. Brisbane.
120. Walley, A.Y., Phillips, K.A., and Gordon, A.J. *The patients in recovery (PIR) perspective: teaching physicians about methamphetamine*. Subst Abus, 2008. **29**(4): p. 61-64.
121. Shearer, J., *Treatment Responses to Problematic Methamphetamine Use: The Australian Experience*, in *Interventions for Amphetamine Misuse*, R. Pates and D. Riley, Editors. 2010, Blackwell Publishing Ltd. p. 115-128.
122. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
123. Pearson, D.D.R. *Victorian Auditor-General's Report: Managing Drug and Alcohol Prevention and Treatment Services*. 2011. Victorian Auditor-General's Office. Melbourne.
124. Saltman, D.C., Newman, C.E., Mao, L., Kippax, S.C., and Kidd, M.R. *Experiences in managing problematic crystal methamphetamine use and associated depression in gay men and HIV positive men: in-depth interviews with general practitioners in Sydney, Australia*. BMC Family Practice, 2008. **9**(45): p. 1-7.

125. Australian General Practice Network. *Management of patients with psychostimulant use problems: Guidelines for general practitioners*. 2007. Australian Government Department of Health and Ageing. Canberra.
126. Sindicich, N. and Burns, L. *Australian Trends in Ecstasy and related Drug Markets 2010: Findings from the Ecstasy and Related Drugs Reporting System (EDRS)*. Australian Drug Trend Series No. 64. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
127. Stafford, J. and Burns, L. *Australian Drug Trends 2010: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trend Series No. 55. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
128. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2009–2010: report on the National Minimum Data Set*. Drug treatment series no. 14. Cat. no. HSE 114. 2011. AIHW. Canberra.
129. Maxwell, J.C. and Spence, R.T. *Profiles of club drug users in treatment*. Subst Use Misuse, 2005. **40**(9-10): p. 1409-1426.



# **Chapter Three: Self-reported barriers to use of professional support among methamphetamine users in Melbourne**

## **Introduction**

A variety of barriers to professional support for methamphetamine users were identified in the literature review in Chapter Two, and some studies have purposefully explored self-reported impediments to service utilisation for methamphetamine users [50, 229, 231, 234, 250]; however, the findings of these studies are limited. For example, they focus on barriers among certain methamphetamine-using sub-groups (e.g., females [250]) or specific service types (e.g., withdrawal/detoxification treatment [229]). Other research has incidentally identified barriers to professional support through research undertaken to meet other objectives [e.g., 238, 260, 319] (which precluded comprehensive investigations of impediments to service access). The research presented in Chapter Three addresses these limitations, examining self-reported barriers to accessing six methamphetamine treatment modalities available in Melbourne within the specialist drug treatment sector: one-on-one drug counselling; group counselling; residential, outpatient and home withdrawal/detoxification services; and residential rehabilitation. This chapter also explores barriers to two generalist health/support service types – psychiatric services and GPs – due to the well-documented association between methamphetamine use and mental health issues [260] and research which indicates that GPs are commonly accessed by methamphetamine users [216, 218].

A key feature of Chapter Three is an investigation of perceptions of ‘non-problematic’ methamphetamine use among a sub-group of the sample and how these perceptions impact on use of professional support. Specifically, cross-sectional analyses of the study’s baseline data were conducted to examine the characteristics and behaviours of participants who reported that their self-perceived non-problematic methamphetamine use did not warrant service access. The aim was to determine whether participants who reported non-problematic use were engaging in less risky methamphetamine use behaviours and experiencing fewer methamphetamine-related harms than the remainder of the sample. This is important because drug treatment policy and practice should not assume that all users are in need of treatment. There is a need to understand individual-level factors that relate to low service utilisation, such as actual harm and perceived need, as

opposed to systemic and structural factors that are genuine barriers to service access among methamphetamine users with actual and perceived needs.

The information presented in this chapter represents the following submitted manuscript:

**Quinn, B.**, Stoové, M., Papanastasiou, C., & Dietze, P. *An exploration of self-perceived non-problematic use and other barriers to professional support for methamphetamine users*. Int J Drug Policy. Submitted: 26<sup>th</sup> September 2012.

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## Declaration for Thesis: Chapter Three

**Monash University**

### Declaration by candidate

In the case of Chapter Three, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	70

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Results interpretation, manuscript preparation and review	N/A
Cerissa Papanastasiou	Manuscript preparation and review	N/A
Paul Dietze	Study design, results interpretation, manuscript preparation and review	N/A

Candidate's  
Signature

	Date 29/10/2012
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### Declaration by co-authors

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
- (4) there are no other authors of the publication according to these criteria;
- (5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- (6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

**Location(s)** **Centre for Population Health, Burnet Institute**

<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>
<b>Signature 3</b>		<b>29/10/2012</b>

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# **An exploration of self-perceived non-problematic use and other barriers to professional support for methamphetamine users**

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## Abstract

**Background:** Research suggests that methamphetamine users are difficult to engage and retain with drug treatment. However, few studies have purposefully examined barriers to access of professional support (i.e., drug treatment and relevant health/support services) for methamphetamine users. Further, despite low levels of motivation and perceived need for utilisation of professional support among methamphetamine users, there is a lack of research examining whether self-perceptions of non-problematic use translate to less risky methamphetamine use patterns and experience of associated harms.

**Method:** Regular methamphetamine users (N=255) were recruited in metropolitan Melbourne, Australia, during 2010 and administered a structured questionnaire.

**Results:** Forty-one percent of participants reported their use as not problematic or harmful enough to warrant access of professional support. In multivariate logistic regression analyses these self-perceived non-problematic users were generally engaging in less risky methamphetamine use patterns, experienced less associated harms and were more likely to be employed than the remainder of the sample. However, half of these 'non-problematic' participants were classified as methamphetamine-dependent and most reported recently experiencing significant methamphetamine-related harms, suggesting a degree of unrecognised need among this group. In comparison, 'problematic' users reported other barriers to service utilisation that included: stigma; accessibility issues (e.g., waiting lists); naivety of available services; the perception that service staff did not possess the appropriate skills or knowledge to address the needs of methamphetamine users; and a preference for self-treating methamphetamine use.

**Conclusion:** A number of the reported barriers reflect those identified in previous research with users of amphetamine-type stimulants; however, our findings highlight the sustaining of such barriers over time and geographical locations and emphasise the distinction between barriers determined by individuals' relative self-perceptions of service need. Our findings also highlight the continued importance of addressing the service needs of methamphetamine using populations. Recommendations for further research are provided.

## Introduction

Methamphetamine use, particularly heavy or dependent use [13, 45], has been associated with numerous harms, including psychological and physical morbidity [148, 260] and adverse social, financial and legal consequences [217, 315, 355]. Although methamphetamine use therefore represents a significant public health concern [188], rates of treatment utilisation and retention among primary methamphetamine users remain low in comparison to other drugs [Australian Institute of Health and Welfare (AIHW), 34, 285, 315]. For example, although the most recent estimates of dependent methamphetamine users in Australia (over 70,000) [21] were substantially higher than comparative estimates of dependent heroin users (approximately 45,000) [42], a much greater number of heroin users were in treatment around that time [AIHW, 356]. This discrepancy suggests a considerably lower rate of methamphetamine treatment coverage in comparison to opioid treatment coverage [21], potentially underpinned by factors such as treatment availability, utilisation thresholds and self-perceptions of treatment need.

There is a considerable amount of literature broadly documenting the barriers to drug treatment and relevant health and support service utilisation for substance users in general. These barriers include: few holistic services targeting multiple needs [288]; restrictive entry or eligibility requirements [288, 293]; stigma and negative staff attitudes towards illicit drug users [289, 290]; and limited treatment accessibility and availability [292, 293]. Research also points to barriers to accessing professional support (i.e., specialist drug treatment and relevant health and support services) specifically for people who use methamphetamine, including: the poor orientation of services to meet the unique needs of methamphetamine users [281, 339]; experience of complex clinical symptoms [115, 173]; and a lack of approved pharmacotherapies to manage and/or treat methamphetamine dependence and withdrawal [243]. However, these impediments have largely been identified in the course of research developed to meet other objectives. Very few studies have purposefully and comprehensively explored the barriers that exist to service utilisation specifically for methamphetamine users [50, 229, 231, 234, 250].

One key barrier to service utilisation among methamphetamine users could be low levels of motivation and perceived need for professional support, a common characteristic of participants recruited into studies of methamphetamine use [e.g., 217, 230, 239, 297]. However, there is only a limited understanding of whether perceived need is a meaningful barrier to methamphetamine treatment utilisation and how perceived need interacts with other potential barriers to treatment utilisation. We need to understand whether user perceptions of their less problematic (i.e., less harmful) methamphetamine use correspond with actual patterns of use and reduced experience of associated harms. This will aid in determining whether such perceptions legitimise the avoidance

of professional support by methamphetamine users. Vincent, Shoobridge, Ask, Allsop, & Ali [216] touched on this issue in the late 1990s, comparing dependent South Australian amphetamine users who expressed a need for treatment to those who did not. Although participants who expressed a need for treatment showed comparable demographic and drug use characteristics, they were more likely to report mental health problems (e.g., depression) since commencing amphetamine use. Further work is needed to characterise users experiencing unmet or unrecognised need who are not in contact with professional support, and improve knowledge of barriers to treatment for this population.

In the context of limited information on barriers to access of professional support among methamphetamine users, we first sought to describe patterns of service utilisation (lifetime and current) for a sample of methamphetamine users. We then examine the characteristics and behaviours of a sub-set of the sample who specified that their use was not problematic or harmful enough to warrant access of professional support; the aim here was to determine whether such individuals were somewhat justified in their self-perception and engaging in less risky methamphetamine use patterns and experiencing fewer related harms than ‘problematic’ users. Lastly, self-reported barriers to professional support are examined for the ‘problematic’ users who had not accessed drug treatment and relevant health and support services for methamphetamine use.

## **Method**

### ***Sample***

Participants were recruited during 2010 as part of a prospective cohort study designed to investigate the epidemiology of methamphetamine use in Melbourne, Australia, and issues related to service utilisation by methamphetamine users. The study’s broad methods and measures have been described in detail elsewhere [357]. Briefly, methamphetamine users were recruited by a variety of respondent-driven, street outreach, targeted and snowball sampling methods. Recruitment via drug treatment organisations was avoided to reduce systematic bias associated with sampling treatment users. Eligible participants: were aged 18 years or over; used methamphetamine at least monthly during the previous six months; and resided in metropolitan Melbourne. Written informed consent was obtained from all respondents prior to participation. The Monash University Human Research Ethics Committee approved the study.

### ***Interview administration and measures***

Participants were administered a structured questionnaire that collected information on: socio-demographics; drug use patterns; methamphetamine-related harms and use motivations; mental



and physical health; experiences of drug treatment and relevant health/support services; personal methods of ceasing/reducing methamphetamine use; involvement in risk behaviours; incarceration history; and recent involvement in criminal behaviours. Validated instruments administered to participants included: the Kessler 10 [K10 – 275]; the Severity of Dependence Scale [SDS – 270]; the Alcohol Use Disorders Identification Test-C [AUDIT-C – 277]; the ENRICH Social Support Inventory [ESSI – 358]; and select questions from the Opiate Treatment Index (OTI) Crime Scale [273]. Interviews were administered face-to-face via personal digital assistants at mutually convenient times and locations (average length: 44 minutes; range: 24-128 minutes).

Participants were asked whether they had ever accessed six treatment modalities (one-on-one drug counselling; group counselling; residential, outpatient and home detoxification/withdrawal services; and residential rehabilitation) or two non-drug-specialist health and support service types (general practitioners (GPs) and generalist psychiatric services) specifically for their methamphetamine use. GPs were included because they are a common entry-point to the drug service sector and source of assistance for methamphetamine users [216, 218]. Generalist psychiatric services were included due to the strong link between methamphetamine use and mental health problems [148, 260]. To identify barriers to professional support, if participants had not accessed the aforementioned service types an open-ended follow-up question was asked to elicit reasons for not doing so (e.g., “Why have you never accessed residential rehabilitation for methamphetamine use?”). While the electronic survey was programmed with pre-coded responses to this follow-up question (see Box 1), a text-input option (limited to approximately 240 characters) enabled identification of unanticipated barriers. This allowed us to capture qualitative data and verbatim responses regarding self-reported reasons for not accessing professional support. Participants could nominate multiple barriers to service utilisation.

**Box 1: Pre-coded survey responses/reasons for why participants had not accessed services for methamphetamine use**

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Do not know of any relevant/appropriate services to contact

Service/s too expensive, don't have enough money to engage with service/s

Service/s not in my area/too far away

Haven't had time but would like to access in the future

Couldn't be bothered

Service/s closed when I tried to access (e.g., after hours, weekend)

Experienced difficulties getting appointments at convenient times/days

Embarrassed/uncomfortable about accessing service/s for methamphetamine use

I don't think I'm entitled to this type of professional support (e.g., withdrawal/detoxification)

I know/have heard that waiting lists are too long

Other (*specify*) \_\_\_\_\_

---

### ***Design and analysis***

We first used descriptive statistics to examine service engagement history across the entire sample (Table 1). Participants were then divided into two groups on the basis of their responses to questions regarding their use of the aforementioned services. The first group, designated ‘service-avoiders’ for the purposes of this paper, were those without perceived need for service utilisation. These participants specified that they believed their use of methamphetamine was not problematic/harmful/severe enough to warrant access of at least one form of professional support. Typical responses by these participants were:

“I don’t find I have a problem with [methamphetamine]...I’m not picking at imaginary things on my skin, I don’t have festering sores” *Rob, 34-year-old male*

“I don’t think it’s a problem...I don’t feel I’m addicted to it and it’s not affecting my life in a bad way” *Elise, 24-year-old female*

The comparison group, designated ‘service-inclined’, comprised participants who did not indicate that their use of methamphetamine was non-problematic. These participants were designated ‘service-inclined’ due to the absence of a non-problematic use specification.

The second analysis aimed to identify factors associated with ‘service-avoider’ group membership (i.e. correlates of self-perceived non-problematic use). Bivariate logistic regression was used to identify associations between key participant characteristics (i.e., socio-demographic factors, health status, methamphetamine and other drug use patterns, experience of related harms; see Table 2 for details) and service-avoidance. Significant ( $p < 0.05$ ) factors in bivariate analyses were entered into multivariate logistic regression models in a forward stepwise procedure, adjusted for participant age and sex. Adequacy of the final model was assessed using the Hosmer-Lemeshow goodness-of-fit test [359]. Lastly, barriers to professional support other than participants’ perceptions of non-problematic use were examined using the self-reported, open-ended responses provided by the sub-group of the service-inclined participants who had never accessed the services detailed above (Table 3). All quantitative data analyses were conducted using Stata Version 11.1 (Statacorp LP, Texas, USA). Further, all quotes from open-ended responses use pseudonyms.

## **Results**

The socio-demographic characteristics of this sample have been discussed elsewhere in greater detail [357]. Participants (N=255) was mostly male, from English-speaking backgrounds and

Australian-born (Table 2). A minority had completed secondary education, most were unemployed and mental health issues were prevalent. These findings mirror those from other methamphetamine-using samples recruited throughout Australia [e.g., 48, 115, 216].

### *Service use*

Over half of the entire sample reported having accessed a specialist drug treatment program, GP or psychiatric service for their methamphetamine use at least once during their lives (Table 1). GPs were the service type most commonly accessed by participants, followed by one-on-one drug counselling and a generalist psychiatrist/psychologist. Only small numbers of participants reported accessing withdrawal and rehabilitation services. Approximately one-fifth (21%) of the sample were in contact with any professional support for their methamphetamine use when interviewed. Of the methamphetamine-dependent participants (n=153; Table 2), less than one-third (29%) were currently accessing services for their methamphetamine use.

**Table 1: Lifetime and current access of specialist drug treatment and relevant health/support services for methamphetamine use (entire sample; N=255)**

<b>Treatment/service type</b>	<b>Ever accessed n (%)</b>	<b>Currently in regular contact with n (%)</b>
<b>One-on-one drug counselling</b>	93 (36)	21 (8)
<b>Group counselling</b>	35 (14)	1 (<1)
<b>GP</b>	111 (44)	24 (9)
<b>Generalist psychiatrist/psychologist</b>	62 (24)	18 (7)
<b>Withdrawal/detoxification</b>		
<i>Residential</i>	44 (17)	-
<i>Outpatient</i>	4 (2)	0 (0)
<i>Home/community-based</i>	15 (6)	0 (0)
<b>Residential rehabilitation</b>	27 (11)	-
<b>Any hospital service/department</b>	23 (9)	-
<b>Ambulance</b>	28 (11)	-
<b>Any (excl. ambulance)</b>	149 (58)	53 (21)

### ***Predictors of service-avoidance***

Service-avoiders (n=105) were comparable to the service-inclined (n=150) across most socio-demographic variables and indicators of mental health and social support (Table 2). However, service-avoidance was independently associated with: current employment; less frequently regretting decisions made while methamphetamine-intoxicated in the last six months (e.g., driving, risky sexual activities); a decreased likelihood of incurring/causing methamphetamine-related injuries; a lower frequency of recent methamphetamine use; and engaging in riskier alcohol consumption patterns.

### ***Methamphetamine-related problems among service-avoiders***

While the service-avoiders differed from service-inclined participants on key variables suggestive of fewer adverse methamphetamine-related consequences, there were indications of significant methamphetamine-related problems among some service-avoiders. Half were classified as methamphetamine-dependent according to the SDS, many were engaging in risky methamphetamine use patterns (half mainly injected the drug), and just under half reported using methamphetamine at least weekly during the last month (Table 2). The majority of service-avoiders had experienced significant methamphetamine-related harms in the six months prior to interview, most commonly financial problems (e.g., limited/no money for food and rent) and relationship/social problems (e.g., ending a relationship).

Table 2: Participant characteristics and methamphetamine use patterns, by ‘service-avoider’ (SA) and ‘service-inclined’ (SI) group membership

Variable	TOTAL N=255	SA n=105 n (%)	SI n=150 n (%)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
<b>Participant demographics, social support &amp; health characteristics</b>							
Male	163 (64)	67 (64)	96 (64)	0.99 (0.59-1.67)	0.975		
Age, median (range)	30 (18-58)	28 (18-58)	31 (18-48)	0.96 (0.93-1.00)	0.025		
Australian-born	222 (87)	91 (87)	131 (87)	0.94 (0.45-1.98)	0.876		
Unemployed	188 (74)	67 (64)	121 (81)	0.42 (0.24-0.75)	0.003	0.50 (0.27-0.93)	0.028
Secondary education							
Completed ≤ Year 10	110 (43)	33 (32)	77 (51)	1	-		
Completed Year 11 or 12	144 (56)	71 (68)	73 (49)	2.27 (1.35-3.82)	0.002		
Currently enrolled in education	27 (11)	16 (15)	11 (7)	2.27 (1.01-5.12)	0.048		
Homeless last 12 months	91 (36)	31 (30)	60 (40)	0.63 (0.37-1.07)	0.087		
Current accommodation unstable**	113 (44)	50 (48)	63 (42)	1.26 (0.76-2.07)	0.374		
History of incarceration	96 (38)	27 (26)	69 (46)	0.41 (0.24-0.70)	0.001		
Arrested last 12 months	104 (41)	38 (36)	66 (44)	0.72 (0.43-1.20)	0.212		
Committed any*** recent <sup>a</sup> crime	172 (67)	69 (66)	103 (69)	0.87 (0.51-1.49)	0.621		
ESSI (social support; median=24)	n=251 <sup>†</sup>	n=104	n=147				
≤24	126 (50)	49 (47)	77 (52)	-			
>24	125 (50)	55 (53)	70 (48)	1.23 (0.75-2.04)	0.411		
Current relationship status							
Married/defacto	57 (22)	17 (16)	40 (27)	1	-		
Stable relationship, not living together	49 (19)	22 (21)	27 (18)	1.92 (0.86-4.26)	0.110		
Single/no stable relationship	149 (58)	66 (63)	83 (55)	1.87 (0.97-3.59)	0.060		
Have any children?	79 (31)	22 (21)	57 (38)	0.43 (0.24-0.77)	0.004		

Variable	TOTAL N=255	SA n=105 n (%)	SI n=150 n (%)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
K10 very high (score: 30-50)	77 (30)	28 (27)	49 (33)	0.75 (0.43-1.30)	0.305		
Sought professional help for mental health issues last six months	149 (58)	61 (58)	88 (59)	0.98 (0.59-1.62)	0.927		
<b>Methamphetamine &amp; other drug use, associated risk behaviours &amp; harms</b>							
<b>Main form methamphetamine used</b>							
<i>Speed</i>	159 (63)	65 (62)	94 (63)	1	-		
<i>Crystal meth/ice</i>	94 (37)	39 (37)	55 (37)	1.03 (0.61-1.72)	0.924		
Methamphetamine-dependent (SDS <sub>≥</sub> 4)	153 (60)	52 (50)	101 (67)	0.48 (0.29-0.79)	0.005		
<b>Duration of methamphetamine use (years; median=12)</b>							
<i>≤12</i>	133 (52)	66 (63)	67 (45)	1	-		
<i>&gt;12</i>	122 (48)	39 (37)	83 (55)	0.48 (0.29-0.79)	0.004		
<b>Main route of methamphetamine administration</b>							
<i>Snort or swallow</i>	44 (17)	25 (24)	19 (13)	1	-		
<i>Smoke</i>	54 (21)	27 (26)	27 (18)	0.76 (0.34-1.69)	0.501		
<i>Inject</i>	157 (62)	53 (50)	104 (69)	0.39 (0.20-0.77)	0.006		
Ever injected any drug	192 (75)	35 (33)	70 (67)	0.46 (0.26-0.82)	0.008		
Recent <sup>a</sup> methamphetamine use frequency >weekly (vs. ≤ weekly)	163 (64)	48 (46)	115 (77)	0.56 (0.15-0.44)	0.000	0.31 (0.17-0.55)	0.000
<b>AUDIT-C (median=7)</b>							
<i>Score ≤7</i>	129 (51)	41 (39)	88 (59)	1	-	-	-
<i>Score &gt;7</i>	126 (49)	64 (61)	62 (41)	2.22 (1.33-3.69)	0.002	2.17 (1.24-3.80)	0.007



Variable	TOTAL N=255	SA n=105 n (%)	SI n=150 n (%)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
<b>Drug of choice</b>							
<i>Opioids</i>	51 (20)	24 (23)	27 (18)	1	-		
<i>Methamphetamine (any)</i>	108 (42)	33 (31)	75 (50)	0.50 (0.25-0.98)	0.044		
<i>Cannabis</i>	34 (13)	17 (16)	17 (11)	1.13 (0.47-2.68)	0.790		
<i>Other</i>	62 (24)	31 (30)	31 (21)	1.13 (0.54-2.36)	0.756		
<b>Recent<sup>a</sup> use of other substances</b>							
<i>Ecstasy</i>	73 (29)	38 (36)	35 (23)	1.86 (1.08-3.23)	0.026		
<i>Alcohol</i>	217 (94)	94 (90)	123 (82)	1.88 (0.89-3.97)	0.101		
<i>Cannabis</i>	206 (81)	83 (79)	123 (82)	0.83 (0.44-1.55)	0.556		
<i>Hallucinogens (LSD, mushrooms)</i>	54 (21)	26 (25)	28 (19)	1.43 (0.78-2.62)	0.242		
<i>Illicit pharmaceutical stimulants</i>	53 (21)	22 (21)	31 (21)	1.02 (0.55-1.88)	0.956		
<i>Cocaine</i>	36 (14)	12 (11)	24 (16)	0.68 (0.32-1.42)	0.304		
<i>Illicit benzodiazepines</i>	167 (65)	63 (60)	104 (69)	0.66 (0.39-1.12)	0.124		
<i>Tobacco</i>	232 (91)	94 (90)	138 (92)	0.74 (0.31-1.75)	0.498		
<i>Heroin</i>	117 (46)	39 (37)	78 (52)	0.55 (0.33-0.92)	0.023		
<b>Currently prescribed opioid substitution therapy</b>	59 (23)	22 (21)	37 (25)	0.80 (0.44-1.47)	0.474		
<b>Recent<sup>a</sup> illicit drug expenditure (\$/week; median=155)</b>	n=254 <sup>‡</sup>	n=127	n=127				
<i>≤155</i>	127 (50)	66 (63)	61 (41)	1	-		
<i>&gt;155</i>	127 (50)	38 (37)	89 (59)	0.39 (0.23-0.65)	0.000		
<b>Ever accessed professional support for other drugs</b>	185 (73)	69 (66)	116 (77)	0.56 (0.32-0.98)	0.042		
<b>Ever attempted to reduce/cease methamphetamine use without help***</b>	155 (61)	54 (51)	101 (67)	0.51 (0.31-0.86)	0.011		

Variable	TOTAL N=255	SA n=105 n (%)	SI n=150 n (%)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)*	p-value
<b>Gone to family or friends to help reduce/cease methamphetamine use last 12 months</b>	77 (30)	30 (29)	47 (31)	0.88 (0.51-1.51)	0.636		
<b>Ever overdosed/dropped on methamphetamine</b>	41 (16)	15 (14)	26 (17)	0.79 (0.40-1.59)	0.515		
<b>Regret decisions made while intoxicated on methamphetamine:</b>							
<i>Never/minority of the time</i>	170 (67)	81 (77)	89 (59)	1	-	-	-
<i>Half to all the time</i>	85 (33)	24 (23)	61 (41)	0.43 (0.25-0.76)	0.003	0.47 (0.26-0.86)	0.015
<b>(Last six months) methamphetamine use resulted in/associated with:</b>							
<i>Injuries to self &amp;/or someone else</i>	43 (17)	9 (9)	34 (23)	0.32 (0.15-0.70)	0.004		
<i>Relationship/social problems (incl. fights)</i>	144 (56)	46 (44)	98 (65)	0.41 (0.25-0.69)	0.001		
<i>Financial problems</i>	169 (66)	65 (62)	104 (69)	0.72 (0.42-1.21)	0.217	0.34 (0.14-0.78)	0.012
<i>Work/study problems</i>	87 (34)	37 (35)	50 (33)	1.05 (0.62-1.79)	0.846		
<i>Legal problems</i>	46 (18)	9 (9)	37 (25)	0.29 (0.13-0.62)	0.002		

\*Hosmer-Lemeshow goodness-of-fit test p=0.406

\*\*Unstable accommodation was classified according to the temporary/transitional nature of some accommodation types and included: 'no fixed address/homeless'; 'boarding house/hostel/shelter/refuge'; 'squat'; and 'staying with friend/acquaintance (not paying rent)'

\*\*\*Includes self-reported involvement in property, dealing/trafficking, fraud or violent offences, and involvement in unspecified criminal activities as an income source

†Missing data for four respondents

‡ Missing data for one respondent

<sup>a</sup>Past month

### ***Barriers to accessing professional support***

Of the service-inclined participants (n=150), 45 (30%) reported no lifetime experience of professional support for methamphetamine use (Table 3). Specifically, 79 (53%) had never accessed counselling or psychiatric services, 38 (25%) had never accessed a GP, and 126 (84%) had never accessed any withdrawal/detoxification or rehabilitation services. These participants commonly reported preferring to address their use without professional support (the most common reason for not accessing withdrawal or rehabilitation services (22%)). Accordingly, the majority (61%) of the overall sample had attempted to reduce/cease their methamphetamine use ‘without anyone else’s help’ at least once during their lives (Table 2). This viewpoint stemmed from numerous motivations, including a desire to maintain pride or dignity, or to accept responsibility for one’s current situation:

“[I] want to stand on my own two feet” *Ben, 37-year-old male*

“I got myself into this pickle...should be up to me to get out of it” *Rossana, 24-year-old female*

Others reported that they preferred to address their use without professional support because they possessed the appropriate skills and knowledge to address their methamphetamine use. This resulted from previous successful attempts at ceasing other drug use without professional intervention, in addition to past experiences of drug treatment which had fostered coping skills and eliminated the need for subsequent service access.

Being embarrassed or uncomfortable about accessing professional support was a significant service barrier. This was the most common reason for not accessing counselling/psychiatric services (19%) and GPs (21%) (Table 3). Respondents noted that simply talking about their use and associated issues with health professionals was inherently difficult:

“It freaks me out, it’s weird opening up to people” *Dwayne, 31-year-old male*

“It’s embarrassing to go to your doctor about stuff like this” *Nicole, 24-year-old female*

Staff turnover and the need to access multiple services for different problems reportedly deterred some participants from seeking assistance:

“[They only] help with one thing, not the whole spectrum” *Merrin, 41-year-old female*

“They always move...you’re always repeating yourself like a bloody record” *Simon, 26-year-old male*

**Table 3: Self-reported reasons for not accessing various forms of professional support among service-inclined participants (n=150), by service type (%)\***

<b>Self-reported reasons for lack of service access</b>	<b>Any professional support* n=45</b>	<b>Counselling, psychiatric services** n=79</b>	<b>General practitioner n=38</b>	<b>Withdrawal, rehabilitation services*** n=126</b>
Can or prefer to reduce/cease use on own	22	14	5	22
Embarrassed/uncomfortable about accessing professional support	18	19	21	6
General fear/distrust of services	16	9	13	6
Belief that services would not be effective/beneficial/worthwhile	11	6	13	17
No desire/not ready to access support; use is enjoyable/beneficial/practical	11	9	5	18
Adverse previous experience/s deter from subsequent service access	7	3	5	2
Unaware of appropriate services to contact	7	10	11	11
Have enough or prefer support from family/friends/peers	7	3	3	7
Inadequate staff skills/knowledge/rapport/support	7	1	16	2
Limited accessibility: expense, difficulties getting appointments, waiting lists, ineligibility	2	8	3	7
Couldn't be bothered to access service/s, and/or difficulty keeping appointments	2	5	0	3
Lack of time/resources to access service/s	2	3	0	6
Currently receiving adequate professional support elsewhere	1	3	3	2
Fear that associating with other users would encourage use	0	0	0	4
Other (e.g., not offered/referred, prevented/dissuaded from family/friends)	0	4	0	2

\*Figures might not sum to 100% due to participants being able to nominate multiple barriers/reasons for not accessing different service types

\*\*Includes one-on-one drug counselling, group counselling, and non-drug-specialist, community-based psychiatric services

\*\*\*Includes residential, outpatient and home/community-based detoxification/withdrawal services and residential rehabilitation

Group treatment environments (e.g., those involved in group counselling and residential services) were particularly unattractive. Participants talked about preferring one-on-one treatment options as opposed to group forums, in addition to expressing concerns about potential adverse impacts on their use due to interacting with other users:

“I really hate the group thing...I think I’m a bit shy. If I was going to do it, it would be one-on-one” *Dwayne, 31-year-old male*

“I don’t want to hook up with other users, it would just give me more contacts” *Adam, 39-year-old male*

“I wouldn’t want to talk to a bunch of junkies and strangers” *Doug, 29-year-old male*

Distrust of services stemmed from concerns regarding potential breaches of confidentiality and associated consequences and fears regarding stigma, judgement and labelling:

“I don’t like psychs, they send the cops after you for saying the wrong thing” *Drew, 33-year-old male*

“They’re just going to look at me like I’m another addict, treat me like a number” *Mel, 25-year-old female*

“They don’t take you in if you’re using speed, ‘cause they think you’ll be violent” *Mick, 28-year-old male*

For some participants this fear and/or distrust related specifically to adverse past experiences with services. Such experiences influenced current perceptions of professional support and reduced the likelihood of subsequent service utilisation:

“The last time I dealt with a psych was nine or 10 years ago, and he told me to come back and see him when I was clean...once we’ve been shat in the face it takes a lot of courage for us to go back and do it again” *Sarah, 39-year-old female*

The perception that services were ineffective for addressing methamphetamine use and associated harms was the third most common reason (17%) for not accessing withdrawal and rehabilitation options. It could result from certain service processes/attributes, the knowledge that treatment had been ineffective for other users, and a general lack of methamphetamine-specific services:

“[I] didn’t think speaking to someone about it would help my addiction” *Isobel, 23-year-old female*

“[My] brother did it, came out ok, took him about a month and then he got back into it again” *Brian, 34-year-old male*

“[Unlike heroin] there’s nothing out there that helps with speed” *Shane, 29-year-old male*

This overlapped with the perception that staff skills, knowledge and rapport could be inadequate when working with substance users:

“I feel I’m wasting my breath, I don’t feel [a one-on-one drug counsellor is] the right person to be speaking to due to inexperience on their behalf...they’re a lot younger than me and they’re textbook people, they haven’t walked the walk” *Colette, 41-year-old female*

A common theme particularly among participants who had not accessed withdrawal or rehabilitation services (18%) was the lack of desire to alter current methamphetamine use patterns because it was enjoyable or served a purpose. For these respondents the benefits of use often outweighed the harms; therefore, professional intervention was not desired. For example, methamphetamine was reportedly used for self-medicative or escapist effects, or to assist with socially desired outcomes, such as weight loss/management or facilitation of social interaction:

“I don’t want to be straight, I hate reality” *Thea, 30-year-old female*

“[Methamphetamine] gets me talking” *Samir, 32-year-old male*

Small proportions of participants reported not having the time or resources to access professional support, particularly in relation to intensive residential services. For example, methamphetamine-using mothers’ concerns centred on not being able to leave their children, while some employed participants were unable or unwilling to take leave from work. Accessibility issues also impacted on service utilisation, in the form of restrictive entry criteria, prohibitive costs and waiting lists, which were particularly problematic for users who desired immediate support:

“It took too long to organise” *Isobel, 23-year-old female*

Lastly, some participants were simply naïve about where to go to access professional support for their methamphetamine use:

“[I] don’t know where to go, how much it would cost, who to ask” *Bella, 21-year-old female*

## Discussion

This study examined the characteristics and experience of associated harms of methamphetamine users who self-perceived their methamphetamine use as not problematic or harmful enough to warrant utilisation of professional support ('service-avoiders'). Further, personal, social and structural barriers to drug treatment and health and support services were identified among participants comprising a comparison group, designated 'service-inclined', who had not accessed various service types for their methamphetamine use.

The service-avoiders generally reported less risky patterns of methamphetamine use, with less frequent use of methamphetamine overall and fewer reports of methamphetamine injection. This accords with research which suggests that heavier drug use patterns are generally perceived to be more problematic by users [360] and are associated with an increased likelihood of experiencing methamphetamine-related harms [18, 166]. Identifying as a non-problematic methamphetamine user was, accordingly, independently associated with a reduced likelihood of incurring or causing methamphetamine-related injuries in the past six months, and less frequently regretting decisions made while methamphetamine-intoxicated. However, service-avoiders were more likely to engage in riskier alcohol consumption patterns. While methamphetamine users are typically polysubstance users [280], a smaller proportion of service avoiders nominated methamphetamine as their drug of choice; it is possible that the focus of their drug use was less on methamphetamine than the service-inclined and they were engaging in more diverse polysubstance use patterns. These findings highlight the need for treatment that addresses the use of other drugs in addition to methamphetamine [48, 361]. Current employment increased the likelihood that participants perceived their use to be non-problematic. Employment perhaps indicates greater social connectedness, 'functionality' and stability and was therefore not an attribute of perceived 'problematic' user/'addict' stereotypes [362]. This accords with research which suggests that some methamphetamine users believe that they are able to moderate their drug use and fulfill employment-related (and other) responsibilities [363]. Overall, our findings highlight potential reasons for low levels of motivation and perceived need for professional support among some methamphetamine users. They suggest some individuals who self-classify their use as 'non-problematic' might not benefit from drug treatment. These participants showed less risky patterns of use, greater 'functionality' and social connectedness, and reduced experience of methamphetamine-related harms than others in our sample. Improved treatment coverage targeted at this group may be of little benefit, and could reduce the resources available to those with greater need [296, 364].

However, our findings also pointed to experience of substantial methamphetamine-related problems among some participants who self-classified their methamphetamine use as non-problematic. These people may have a significant unrecognised need for services from which they may benefit. For example, half were classified as methamphetamine-dependent – a concern given that individuals classified as methamphetamine-dependent are more likely to experience related harms [45, 103]. Given this and our findings that younger participants and those with shorter histories of methamphetamine use were significantly (but at a bivariate level only) less likely to report non-problematic use, initiatives to prevent the transition to riskier patterns of methamphetamine use should be the core focus of service provision to these groups of methamphetamine users to avoid long-term adverse outcomes. Such initiatives should consider the possibility that constructs of ‘functionality’ and social connectedness may distort an individual’s perception or awareness of problematic drug use patterns. Prospective research of sufficient follow-up duration involving methamphetamine users is needed to better understand methamphetamine use trajectories among self-perceived non-problematic users, including transitions between levels of use, remission from dependence (with and without professional support) and states of social functioning that precipitate and emerge from different levels of use. Such research will improve current understandings of methamphetamine users’ long-term experiences, outcomes and treatment needs, and potentially inform targeted strategies to prevent transitions into more harmful patterns of drug use.

Service-inclined participants reported a number of barriers to professional support that reflect some issues identified in previous research of both methamphetamine-using and broader drug-using populations. These include: stigma [291, 295]; accessibility problems (e.g., waiting lists) [292, 324]; confidentiality concerns [302, 365]; concerns that interaction with other users would adversely influence one’s own drug use behaviours [303, 324]; and adverse past experiences reducing the likelihood of subsequent service access [303, 343]. Identified barriers that related specifically to the use of methamphetamine included: the perception that staff lacked appropriate knowledge/skills to meet the needs of methamphetamine users [217, 239], and a lack of services with a methamphetamine-specific focus [229, 342]. Our findings highlight the ongoing existence of numerous service barriers for methamphetamine users across different time periods and geographical locations. In addition to the ongoing need for approaches that overcome such barriers, our findings highlight the importance of addressing user reluctance to access professional assistance due to embarrassment or being uncomfortable about service access. They also demonstrate that some individuals will not access services due to purposeful methamphetamine use (i.e., it can be enjoyable, practical, etc.); again this suggests that the perceived benefits of methamphetamine use may outweigh harmful use patterns and perceived service need. Our findings have a number of important implications for policy and practice. For example, to



overcome some of the identified barriers to professional support, services could develop educational tools and train staff about methamphetamine-related issues (e.g., contexts and patterns of use, experience of harm). Such education has been suggested as a means of improving staff attitudes and confidence in treating this population, and can also provide a mechanism for improving user knowledge and perceptions of available treatment options [2, 23, 26]. However, simply aiming to improve service engagement is not an adequate response to the unique needs of all methamphetamine users; a variety of approaches which target the diverse barriers experienced by heterogeneous methamphetamine-using populations is needed. For example, initiatives with a harm reduction focus could reduce harmful use patterns and the incidence of adverse outcomes among individuals (i.e., ‘service avoiders’) who are not willing to access, or will likely not benefit from accessing, professional support at the current time. Further, given that some participants reported preferring to address problematic methamphetamine use patterns and associated harms without ceasing use entirely, non-abstinence-based approaches need to be explored.

### **Limitations**

At the time of interview we sought to clarify the degree to which participants perceived their own methamphetamine use to be ‘problematic’ or ‘harmful’ and how these perceptions impacted on service utilisation. There is limited research investigating perceived need among methamphetamine users and attempts to measure this construct and its impact on treatment utilisation by methamphetamine-using populations; we therefore provide a more nuanced analysis than many other examinations of treatment barriers. Nevertheless, retrospectively categorising participants according to these limited responses may have led to misclassification bias. However, our findings did show that service-avoiders were generally engaging in less risky methamphetamine use behaviours and experiencing less associated harms, which provides some confidence in the categorisation process.

We did not ask questions about barriers that may have been specific to important sub-populations of methamphetamine users such as men who have sex with men and people from culturally and linguistically diverse backgrounds. Future research should explore this issue, as previous studies have pointed to the existence of unique barriers to service utilisation for these specific methamphetamine-using populations [251, 306].

### **Conclusion**

More than two-fifths of our sample of regular methamphetamine users reported that their use was not problematic or harmful enough to warrant utilisation of professional support. Analysis indicated that this group generally engaged in less risky patterns of methamphetamine use

(primarily reduced frequency of use) and experienced less methamphetamine-related harms. However, findings also pointed to significant methamphetamine-related problems among some of this group. Therefore, while many of those who perceived their use as non-problematic might not benefit from professional intervention, others may due to their experience of substantial harms associated with their methamphetamine use and the risk of progressing to more harmful methamphetamine use patterns. Our study adds to current understandings of low levels of service motivation and perceived need among methamphetamine users and highlights the distinction between perceived service barriers determined by individuals' relative self-perception of service need. The sub-set of participants designated 'service-inclined' reported reasons for not accessing various forms of professional support. Some of the reported barriers to service utilisation could be addressed through appropriate education of both methamphetamine users and service providers, with the aim of improving current perceptions and understandings of methamphetamine-using populations and the qualities and benefits of available services.

### ***Author declaration***

The authors declare that: they have no competing interests; the material has not been published elsewhere in whole or in part; the paper is not currently being considered for publication elsewhere; all authors have been personally and actively involved in substantive work leading to the paper, and will hold themselves jointly and individually responsible for its content; and all relevant ethical safeguards have been met in relation to the confidentiality and consent of the participants involved in the research.

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## References

1. McKetin, R., Kelly, E., McLaren, J., and Proudfoot, H. *Impaired physical health among methamphetamine users in comparison with the general population: the role of methamphetamine dependence and opioid use*. Drug Alcohol Rev, 2008. **27**(5): p. 482-489.
2. Degenhardt, L., Roxburgh, A., Black, E., Bruno, R., Campbell, G., Kinner, S., and Fetherston, J. *The epidemiology of methamphetamine use and harm in Australia*. Drug Alcohol Rev, 2008. **27**(3): p. 243-252.
3. Darke, S., Kaye, S., McKetin, R., and Duflou, J. *Major physical and psychological harms of methamphetamine use*. Drug Alcohol Rev, 2008. **27**(3): p. 253-262.
4. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. Australian Psychologist, 2005. **40**(2): p. 88-95.
5. Torok, M., Darke, S., Kaye, S., Ross, J., and McKetin, R. *Comparative rates of violent crime amongst methamphetamine and opioid users: Victimisation and offending*. Monograph Series No. 32. 2008. National Drug Law Enforcement Research Fund (NDLERF). Hobart, Tasmania.
6. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. Drug Alcohol Depend, 1997. **46**: p. 105-113.
7. Brecht, M., Greenwell, L., and Anglin, M.D. *Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002)*. J Subst Abuse Treat, 2005. **29**: p. 295-306.
8. McKetin, R. and Lubman, D.I. *Heavy stimulant use remains a significant health concern for Australia (Editorial)*. Med J Aust, 2011. **195**(10): p. 565-566.
9. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2009–2010: report on the National Minimum Data Set*. Drug treatment series no. 14. Cat. no. HSE 114. 2011. AIHW. Canberra.
10. Cretzmeyer, M., Vaughan Sarrazin, M., Huber, D.L., Block, R.I., and Hall, J.A. *Treatment of methamphetamine abuse: research findings and clinical directions*. J Subst Abuse Treat, 2003. **24**: p. 267-277.
11. McKetin, R., McLaren, J., Kelly, E., Hall, W., and Hickman, M. *Estimating the number of regular and dependent methamphetamine users in Australia*. Technical Report No. 230. 2005. National Drug and Alcohol Research Centre, UNSW. Sydney.

12. Degenhardt, L., Rendle, V., Hall, W., Gilmour, S., and Law, M. *Estimating the number of current regular heroin users in NSW and Australia 1997-2002*. NDARC Technical Report No. 198. 2004. National Drug and Alcohol Research Centre, UNSW. Sydney.
13. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2004–05: report on the National Minimum Data Set*. Drug Treatment Series no. 5. AIHW cat. no. HSE 43. 2006. AIHW. Canberra.
14. Holt, M., Treloar, C., McMillan, K., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users with Mental Health Comorbidities and Complex Vulnerabilities*. Monograph Series No. 61. 2007. Australian Government Department of Health and Ageing. Canberra.
15. Treloar, C., Abelson, J., Cao, W., Brener, L., Kippax, S., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users*. 2004. Australian Government Department of Health and Ageing. Canberra.
16. Neale, J., Tompkins, C., and Sheard, L. *Barriers to accessing generic health and social care services: a qualitative study of injecting drug users*. Health and Social Care in the Community, 2008. **16**(2): p. 147-154.
17. Wisdom, J.P., Cavaleri, M., Gogel, L., and Nacht, M. *Barriers and facilitators to adolescent drug treatment: Youth, family, and staff reports*. Addiction Research and Theory, 2011. **19**(2): p. 179-188.
18. Dietze, P., Richards, J., Rumbold, G., Aitken, C., Day, C., McGregor, C., and Ritter, A. *Treatment utilisation by heroin-dependent persons in Australia: Implications for treatment service systems*. 2003. Turning Point Alcohol and Drug Centre. Fitzroy.
19. Baker, A. and Lee, N.K. *A review of psychosocial interventions for amphetamine use*. Drug Alcohol Rev, 2003. **22**: p. 323-335.
20. Wright, S. and Klee, H. *A Profile of Amphetamine Users Who Present to Treatment Services and Do Not Return*. Drugs: education, prevention and policy, 1999. **6**(2): p. 227-241.
21. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
22. Glasner-Edwards, S., Marinelli-Casey, P., Hillhouse, M., Ang, A., Mooney, L.J., Rawson, R., and Methamphetamine Treatment Project Corporate, A. *Depression among methamphetamine users: association with outcomes from the Methamphetamine Treatment Project at 3-year follow-up*. J Nerv Ment Dis, 2009. **197**(4): p. 225-231.

23. Pennay, A.E. and Lee, N.K. *Putting the call out for more research: the poor evidence base for treating methamphetamine withdrawal*. Drug Alcohol Rev, 2011. **30**(2): p. 216-222.
24. Boeri, M.W., Tyndall, B.D., and Woodall, D.R. *Suburban Poverty: Barriers to Services and Injury Prevention among Marginalized Women who Use Methamphetamine*. Western Journal of Emergency Medicine, 2011. **12**(3): p. 284-292.
25. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
26. Pennay, A.E. and Lee, N.K. *Barriers to methamphetamine withdrawal treatment in Australia: findings from a survey of AOD service providers*. Drug Alcohol Rev, 2009. **28**(6): p. 636-640.
27. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Barriers to formal drug abuse treatment in the rural south: a preliminary ethnographic assessment*. J Psychoactive Drugs, 2008. **40**(2): p. 121-129.
28. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia*. Drug Alcohol Rev, 2009. **28**: p. 592-599.
29. Klee, H., Wright, S., and Morris, J. *Amphetamine Users in Treatment: Factors Associated with Sustained Abstinence from Street Drugs*. Addiction Research, 1999. **7**(3): p. 239-265.
30. Rawson, R.A., Gonzales, R., and Brethen, P. *Treatment of methamphetamine use disorders: an update*. J Subst Abuse Treat, 2002. **23**: p. 145-150.
31. Falck, R.S., Wang, J., Carlson, R.G., Krishnan, L.L., Leukefeld, C., and Booth, B.M. *Perceived need for substance abuse treatment among illicit stimulant drug users in rural areas of Ohio, Arkansas, and Kentucky*. Drug Alcohol Depend, 2007. **91**: p. 107-114.
32. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
33. Quinn, B., Stoové, M., Papanastasiou, C., and Dietze, P. *Methamphetamine use in Melbourne, Australia: baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence*. Journal of Substance Use, 2012. **Early online**: p. 1-14.
34. Kessler, R.C. *Kessler Psychological Distress Scale (K10)*. 1996. Harvard Medical School. Boston, MA.
35. Topp, L. and Mattick, R.P. *Choosing a cutoff on the Severity of Dependence Scale (SDS) for amphetamine users*. Addiction, 1997. **92**(7): p. 839-845.

36. Bush, K., Kivlahan, D.R., McDonnell, M.B., Fihn, S.D., and Bradley, K.A. *The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking*. Archives of Internal Medicine, 1998. **158**: p. 1789-1795.
37. Mitchell, P.H., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., and Berkman, L.F. *A short social support measure for patients recovering from myocardial infarction: the ENRICHD Social Support Inventory*. J Cardiopulm Rehabil, 2003. **23**(6): p. 398-403.
38. Darke, S., Hall, W., Wodak, A., Heather, N., and Ward, J. *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index*. British Journal of Addiction, 1992. **87**: p. 733-742.
39. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
40. Hosmer, D.W. and Lemeshow, S., *Applied Logistic Regression*. 2nd ed. 2000, New York: Wiley.
41. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. Drug Alcohol Rev, 2001. **20**: p. 49-56.
42. Monk, R.L. and Heim, D. *Self-image bias in drug use attributions*. Psychol Addict Behav, 2011. **25**(4): p. 645-51.
43. Dyer, K.R. and Cruickshank, C.C. *Depression and other psychological health problems among methamphetamine dependent patients in treatment: Implications for assessment and treatment outcome*. Australian Psychologist, 2005. **40**(2): p. 96-108.
44. Degenhardt, L. and Topp, L. *'Crystal meth' use among polydrug users in Sydney's dance party subculture: characteristics, use patterns and associated harms*. Int J Drug Policy, 2003. **14**(1): p. 17-24.
45. Darke, S. and Hall, W. *Levels and correlates of polydrug use among heroin users and regular amphetamine users*. Drug Alcohol Depend, 1995. **39**(3): p. 231-235.
46. Winhusen, T., Stitzer, M., Woody, G., Brigham, G., Kropp, F., Ghitzza, U., Lindblad, R., Adinoff, B., Green, C., Sharma, G., and Somoza, E. *Design considerations for a study to evaluate the impact of smoking cessation treatment on stimulant use outcomes in stimulant-dependent individuals*. Contemp Clin Trials, 2012. **33**(1): p. 197-205.
47. Heim, D., Davies, J.B., Cheyne, B., and Smallwood, J. *Addiction as a Functional Representation*. Journal of Community & Applied Social Psychology, 2001. **11**: p. 57-62.
48. Daniulaityte, R., Carlson, R.G., and Kenne, D.R. *Methamphetamine use in Dayton, Ohio: preliminary findings from the Ohio Substance Abuse Monitoring Network*. J Psychoactive Drugs, 2007. **39**(3): p. 211-221.
49. Mechanic, D. *Is the prevalence of mental disorders a good measure of the need for services?* Health Aff (Millwood), 2003. **22**(5): p. 8-20.

50. Edlund, M.J., Unutzer, J., and Curran, G.M. *Perceived need for alcohol, drug, and mental health treatment*. Social psychiatry and psychiatric epidemiology, 2006. **41**: p. 480-487.
51. McKetin, R., McLaren, J., and Kelly, E. *The Sydney methamphetamine market: patterns of supply, use, personal harms and social consequences*. NDLERF Monograph Series No. 13. 2005. National Drug and Alcohol Research Centre, University of NSW. Sydney.
52. Semple, S.J., Grant, I., and Patterson, T.L. *Utilization of Drug Treatment Programs by Methamphetamine Users: The Role of Social Stigma*. Am J Addict, 2005. **14**(4): p. 367-380.
53. Butler, R. and Sheridan, J. *Innocent parties or devious drug users: the views of primary healthcare practitioners with respect to those who misuse prescription drugs*. Harm Reduction Journal, 2010. **7**(21): p. 1-11.
54. Pennay, A., Ferris, J., Reed, M., Devaney, M., and Lee, N. *Evaluation of 'Access Point' Specialist Methamphetamine Clinic*. 2010. Turning Point Alcohol and Drug Centre. Fitzroy, Melbourne.
55. Wright, S. and Klee, H. *Developing drug services for amphetamine users: taking account of gender-specific factors*. Journal of Substance Use, 2000. **5**: p. 122-130.
56. Bobrova, N., Rhodes, T., Power, R., Alcorn, R., Neifeld, E., Krasiukov, N., Latyshevskaya, N., and Maksimova, S. *Barriers to accessing drug treatment in Russia: a qualitative study among injecting drug users in two cities*. Drug Alcohol Depend, 2006. **82 Suppl 1**: p. S57-63.
57. Wright, S., Klee, H., and Reid, P. *Attitudes of Amphetamine Users Towards Treatment Services*. Drugs: education, prevention and policy, 1999. **6**(1): p. 71-86.
58. Gerada, C. *Drug misuse: a review of treatments*. Clinical Medicine, 2005. **5**(1): p. 69-73.
59. Smith, T.L., Volpe, F.R., Hashima, J.N., and Schuckit, M.A. *Impact of a stimulant-focused enhanced program on the outcome of alcohol- and/or stimulant-dependent men*. Alcohol Clin Exp Res, 1999. **23**(11): p. 1772-1779.
60. Leonard, W., Dowsett, G., Slavin, S., Mitchell, A., and Pitts, M. *Crystal Clear: The social determinants of gay men's use of crystal methamphetamine in Victoria*. Monograph Series Number 67. 2008. La Trobe University, The Australian Research Centre in Sex, Health & Society. Melbourne.
61. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.

# Chapter Four: Changes among the cohort over the follow-up period

## Introduction

The research presented in Chapter Three demonstrated that many study participants reported experiencing significant barriers to accessing professional support for their methamphetamine use and related harms. It is important to examine the impacts of these service barriers (and other factors) on participants over time. The prospective design of this study allowed for the investigation of changes among the cohort over the 12-month follow-up period (e.g., to drug use patterns, involvement in risk behaviours and experience of drug-related harms).

Most longitudinal studies of methamphetamine use trajectories have been conducted outside of Australia [e.g., 114, 116, 366]. Further, much of this research relied on data sourced from treatment-recruited cohorts and focused largely on treatment outcomes [e.g., 298, 319, 367, 368]. Consequently, little prospective research has examined the natural history of methamphetamine use among Australian methamphetamine users [115, 257], particularly with community-recruited samples. The research presented in Chapter Four addresses this gap. This chapter follows on from the cross-sectional baseline analyses presented in Chapters One and Three by describing changes to participants' patterns of methamphetamine and other drug use over the 12-month follow-up period. Changes to the sample's psychosocial characteristics, experience of drug-related harms, involvement in risk behaviours and patterns of drug treatment and other service utilisation during this time were identified. This allowed for the examination of factors associated with changing patterns of methamphetamine use and the potential role of professional intervention and service utilisation. This research provides evidence of remission from methamphetamine dependence and/or from risky use patterns without the assistance of professional support among some participants. Identifying the characteristics and behaviours of methamphetamine users able to naturally remit from dependent and problematic use patterns is important for developing targeted interventions for individuals less likely to alter problematic or harmful use patterns without professional intervention.

The information presented in this chapter represents the following submitted manuscript:

**Quinn, B., Stoové, M., & Dietze, P.** *One-year changes in methamphetamine use, dependence and remission in a community-recruited cohort*. Drug Alcohol Depend. Submitted: 19<sup>th</sup> October 2012.



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# Declaration for Thesis: Chapter Four

**Monash University**

## Declaration by candidate

In the case of Chapter Four, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	80

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Results interpretation, manuscript conception, preparation and review	N/A
Paul Dietze	Study design, results interpretation, manuscript conception, preparation and review	N/A

Candidate's  
Signature

	Date 29/10/2012
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## Declaration by co-authors

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
- (4) there are no other authors of the publication according to these criteria;
- (5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- (6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

**Location(s)** **Centre for Population Health, Burnet Institute**

<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>

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# **One-year changes in methamphetamine use, dependence and remission in a community-recruited cohort**

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## Abstract

**Aims:** To describe changes to the characteristics and behaviours of a community-recruited cohort of methamphetamine users over 12 months along with predictors of remission from methamphetamine dependence and past-month abstinence from methamphetamine use.

**Method:** A prospective cohort of regular ( $\geq$  monthly) methamphetamine users was administered structured interviews at baseline and 12 months.

**Findings:** At baseline, 60% (n=115) of participants (N=255) were classified as methamphetamine-dependent according to the Severity of Dependence Scale (score  $\geq 4$ ). At follow-up (N=201; 79%), significantly ( $p < 0.05$ ) fewer participants reported: current unemployment; past-year homelessness; recent criminal behaviours; and, very high psychological distress. Overall, frequency of recent methamphetamine use was significantly reduced. Other drug use generally decreased, indicating minimal drug substitution/uptake. Remission from methamphetamine dependence (n=38) was independently associated with: age (OR: 0.93; 95% CI: 0.88-1.00); maintaining or gaining employment since baseline (OR: 3.14; 95% CI: 1.21-8.14); and, a greater increase in self-perceived social support (OR: 1.08; 95% CI: 1.01-1.16). Past-month abstinence at follow-up (n=64) was independently associated with: being female (OR: 1.94; 95% CI: 1.10-3.44); recent criminal behaviours (OR: 0.46; 95% CI: 0.26-0.82); recent ecstasy (OR: 0.30; 95% CI: 0.12-0.72) and benzodiazepine use (OR: 0.53; 95% CI: 0.29-0.96); and, being less methamphetamine-dependent (OR: 0.79; 95% CI: 0.72-0.88). Access of drug treatment was not independently associated with remission from methamphetamine dependence or recent abstinence at follow-up.

**Conclusions:** These findings highlight the potential for natural remission from methamphetamine dependence; however, targeted interventions should be developed for individuals who are likely to maintain dependent and harmful use patterns.

## Introduction

Methamphetamine use is a significant global public health concern [5, 25]. Nevertheless, there is limited research on the natural history of methamphetamine use [369]. Much of the longitudinal research of illicit drug use trajectories has focused on heroin, with limited research examining whether the natural history of other primary drugs differs from heroin use patterns [111, 116]. This gap was highlighted in Calabria et al.'s [116] systematic review of prospective studies of remission from amphetamine, cocaine, cannabis and opioid dependence. Calabria et al. identified only one such study regarding amphetamine use, compared to 10 for opioids, three for cannabis, and four for cocaine.

Most longitudinal data on methamphetamine use trajectories have been collected from treatment-recruited cohorts and are focused on treatment outcomes [e.g., 72, 115, 119, 344, 368, 370-372]. For example, McKetin et al. [248] recently examined the long-term effects of treatment among a prospective cohort of methamphetamine users entering treatment, against a quasi-control group of community-recruited methamphetamine users. At three-years follow-up 34% of the treatment group had remitted from dependence without further drug treatment, and they were significantly less likely to be using methamphetamine than the control group [115]. Nevertheless, high rates of remission from dependence were also shown in their comparison 'no treatment group', with only 46% of these participants being classified as methamphetamine-dependent at three-years follow-up compared to 94% at baseline.

Given that many methamphetamine users are notably reluctant to access treatment services [217, 231], it is important to understand use trajectories in samples broader than treatment entrants alone. However, there is a paucity of prospective research examining non-treatment factors that are associated with: the initiation and maintenance of methamphetamine use; transitions between levels of use; substitution with other substances; and remission from methamphetamine dependence. The limited literature suggests that many methamphetamine users alter harmful use patterns and remit from dependence without accessing formal treatment [63, 111-113]. For example, of Borders et al.'s [63] sample of rural stimulant (cocaine and/or methamphetamine) users in the US, 48% reported recent (last six months) methamphetamine use at baseline, compared to 19% at two-year follow-up, and past-month frequency of methamphetamine use also decreased substantially over the follow-up period. Further, nearly one-third of the sample assessed at the two-year follow-up had remitted from stimulant use altogether without accessing formal alcohol and other drug treatment. An improved understanding of the characteristics of users who 'naturally' remit, and the factors associated with reduced methamphetamine use and remission among community-recruited individuals, would have significant service and policy implications

[111]. Such information, particularly in the context of more limited methamphetamine pharmacotherapy options when compared with other drug classes such as opioids, is important for implementing appropriate, targeted and timely harm reduction initiatives, preventive measures, and treatment programs [116].

This study has two specific aims. First, we aim to describe changes to the socio-demographic, health, drug use and criminogenic characteristics and behaviours of a community-recruited cohort of methamphetamine users [357] over a 12-month period. We then examine the relationship of these changes to changes in methamphetamine use and dependence. Here, we focus on past-month abstinence as well as remission from methamphetamine dependence at follow-up after one year.

## **Method**

### ***Sample***

The study's broad methods and measures have been described in detail elsewhere [357]. Briefly, the cohort was recruited through a combination of targeted, respondent-driven, street outreach and snowball sampling methods throughout metropolitan Melbourne, Australia, between January and October 2010. Twelve-month follow-up interviews were conducted during the equivalent period in 2011. Recruitment via drug treatment organisations was avoided. Inclusion criteria comprised: being aged 18 years or over; residing in metropolitan Melbourne at recruitment; and using methamphetamine at least monthly during the six months preceding the baseline interview. Written informed consent was obtained from all respondents prior to participation. To maximise participant retention, we obtained contact details (e.g., mobile/fixed phone numbers, email and postal address details) for participants and nominated secondary contacts (e.g., family members, peers, workers) at the baseline interview. We attempted to maintain regular (i.e., quarterly) contact with participants during the follow-up period. The study was approved by the Monash University Human Research Ethics Committee.

### ***Questionnaire design and administration***

At baseline, participants were administered a structured questionnaire that collected information on: socio-demographics; lifetime and current/most recent drug use patterns; methamphetamine-related harms; mental and physical health; experiences of drug treatment and relevant health/support services; personal methods of ceasing/reducing methamphetamine use; involvement in risk behaviours; and incarceration history and involvement in criminal behaviours. Validated instruments administered to participants included: the Severity of Dependence Scale (SDS) [270]; the Kessler 10 (K10) [275]; the seven-item ENRICH Social Support Inventory

(ESSI) [358, 373]; and select questions from the Opiate Treatment Index (OTI) Crime Scale [273]. At follow-up, participants were administered a questionnaire that measured the same exposure and outcome variables covered at baseline (however, it was modified to assess changes across these domains since the baseline interview). Baseline questionnaires were conducted face-to-face at mutually convenient times and locations (e.g., cafes). Follow-up interviews were conducted face-to-face where possible; however, participants who had moved away from Melbourne were administered the follow-up survey by phone.

## **Measures**

The key participant characteristics that were examined for changes over time are listed in Table 1.

*Dependence:* A score of four or greater on the SDS was used to indicate methamphetamine dependence [270, 274]. The outcome of interest, remission from methamphetamine dependence (i.e., non-dependence), was defined as a change in classification from methamphetamine-dependent at baseline to non-dependent at follow-up.

*Recent (past-month) abstinence:* Recent abstinence from methamphetamine use was generated from self-reports of the daily frequency of methamphetamine use (days/week) in the month preceding each interview (range: 0-7).

## **Design and statistical analysis**

*Changes in the cohort over follow-up:* Changes over time in participant characteristics were examined using McNemar's test for dichotomous variables and the Wilcoxon signed-rank test for continuous variables (Table 1). Factors with at least a marginally significant ( $p < 0.20$ ) change informed the analyses listed below.

*Remission from dependence:* Associations between remission from methamphetamine dependence and categorical factors assessed at both time-points (e.g., socio-demographics, health status, drug use patterns, experience of related harms) among participants initially classified as methamphetamine-dependent at baseline were assessed using chi-square and bivariate logistic regression analyses. Fisher's exact test was used when bivariate outcomes were infrequent ( $n < 5$ ). The Wilcoxon-Mann-Whitney test was used to examine associations between remission and continuous variables. A multivariate logistic regression analysis identified adjusted associations between the factors considered above and remission from methamphetamine dependence. Given the small numbers of participants who showed remission from dependence (38 of the 115 who were dependent at baseline), methamphetamine-related harms (e.g., adverse employment [60],

mental health [148] and legal/criminal consequences [178]) were excluded from the multivariate model, despite significant findings in bivariate analyses. Adequacy of the final multivariate model was assessed using the Hosmer-Lemeshow goodness-of-fit test [359].

*Past-month abstinence from methamphetamine at follow-up:* Due to the study's eligibility criteria ( $\geq$  monthly use of methamphetamine in the six months prior to recruitment), no participants had been abstinent from methamphetamine in the preceding month when interviewed at baseline. Therefore, associations between past-month abstinence at follow-up and the factors listed above were examined using bivariate generalised estimating equations (GEE). A multivariate GEE model identified adjusted associations with past-month abstinence at follow-up. Again, self-reported experience of methamphetamine-related harms were excluded from these analyses. This was due primarily to the expectation that participants reporting past-month abstinence from methamphetamine would be less likely to be experiencing, or have recently experienced, any associated harms. Adequacy of the final multivariate GEE model was assessed using the quasiliikelihood under the independence model criterion [374].

All data analyses were conducted using Stata Version 11.1 (Statacorp LP, Texas, USA) with a significance level of  $p < 0.05$ . Cases where data were missing for specific variables were excluded from relevant analyses (see Table 1 for final n values).

## Results

### *Sample characteristics*

At baseline (N=255), most participants were male, Australian-born and unemployed with a median age of 30 years (Table 1). Over one-third reported at least one period of homelessness during the previous year, mental health issues were prevalent and polysubstance use universal. Most did not complete high school, approximately two-fifths had been arrested in the previous year and 38% had ever been incarcerated. Seventy-nine percent (n=201) of the sample were followed-up at 12 months an average of 388 days after their baseline interview; another two were known to be deceased, eight were incarcerated, one refused further participation and three were overseas at follow-up.

### *Comparison of the sample at baseline and follow-up*

Positive changes across a number of health, lifestyle and drug use domains were noted at follow-up (Table 1). At follow-up, fewer participants reported: unemployment; homelessness during the previous year; residing in 'unstable'/transitory accommodation (e.g., boarding/rooming house, squat); engaging in criminal behaviours during the previous month; and 'very high' levels of



psychological distress (K10). Despite reduced psychological distress overall, there was no significant change to mental health service access or use of prescribed mental health medications. Perceived social support (ESSI) increased from baseline to follow-up. This corresponded with significantly fewer participants reporting 'no current stable relationship' between baseline and follow-up (58% vs. 47%).

Although there was a shift in the main form of methamphetamine used recently by participants (fewer reporting speed powder use and more reporting crystal methamphetamine use), self-reported frequency of past-month methamphetamine use decreased significantly, as did the proportion of participants classified as methamphetamine-dependent. Despite this, there were no significant changes in participants' preferred/main route of methamphetamine administration. Of the non-dependent participants at baseline who were followed-up (n=83), a minority (n=11, 13%) were classified as methamphetamine-dependent at follow-up, whereas 38 (33%) participants classified as dependent at baseline were no longer classified as dependent at follow-up. Overall, while 70% (140) of participants reported decreased frequency of past-month methamphetamine use at follow-up compared to baseline, nine per cent (n=18) reported a stable frequency of use and 21% (n=43) reported increased use. At follow-up, 32% of participants reported past-month abstinence from methamphetamine.

There was no evidence that decreases in reported methamphetamine use were accompanied by substitution with other drugs. The proportion of participants reporting recent injection of any drug decreased significantly. Reports of past-month use of all other drugs decreased at follow-up, including statistically significant decreases in the proportion of participants reporting ecstasy, hallucinogen, illicit pharmaceutical, tobacco and heroin use. These changes accompanied a significant reduction in the proportion of participants spending money on illicit drugs in the last month and the average amount spent. Indeed, among those who reduced their frequency of methamphetamine use (n=140), there were significant reductions in self-reported frequency of ecstasy, hallucinogen and benzodiazepine use (data not shown). However, four participants initiated injecting in the follow-up period, three of whom started injecting methamphetamine. Three participants initiated heroin use during the follow-up period.

**Table 1: Comparison of characteristics, behaviours of participants who completed interviews at both baseline (BL) and follow-up (FU) (N=201)**

Variable	BL n (%)	FU n (%)	p- value
<b>Participant demographics, social support and health characteristics</b>			
Unemployed	138 (69)	124 (62)	<b>0.023</b>
Currently enrolled in education	24 (11)	23 (11)	0.819
Homeless last 12 months	62 (31)	29 (15)	<b>0.000</b>
Current accommodation unstable*	84 (42)	39 (19)	<b>0.000</b>
Arrested last 12 months	76 (38)	65 (32)	0.172
Recent** involvement in any*** crime	129 (64)	109 (54)	<b>0.011</b>
ESSI7, median (range)	24.5 (8-34)	26 (8-34)	<b>0.004</b>
K10 (recent** psychological distress)			
Median (range)	24 (10-50)	21 (10-46)	<b>0.000</b>
Very high (score: 30-50)	59 (29)	32 (16)	<b>0.000</b>
Sought professional help for mental health issues last 12 months	125 (62)	122 (61)	0.686
Currently prescribed medications for mental health issues	84 (42)	84 (42)	1.000
<b>Methamphetamine and other drug use, associated risk behaviours and harms</b>			
Main form methamphetamine used	n=200		
Speed	137 (69)	101 (52)	<b>0.000</b>
Crystal methamphetamine	63 (32)	95 (48)	
Frequency of recent** methamphetamine use (days/week), median (range)	2 (0.25-7)	0.5 (0-7)	<b>0.000</b>
Methamphetamine-dependent (SDS $\geq$ 4)	117 (58)	88 (44)	<b>0.000</b>
Main methamphetamine ROA	n=195		
Snort/swallow	40 (20)	33 (16)	0.198
Smoke	36 (18)	40 (20)	0.297
Inject	125 (62)	122 (61)	1.000
Recent** drug injection (any drug)	134 (67)	113 (56)	<b>0.000</b>
Prescribed OST currently	46 (24)	59 (29)	0.106
Recent** substance use			
Methamphetamine	201 (100)	137 (68)	-
Ecstasy	57 (28)	40 (20)	<b>0.017</b>
Alcohol	172 (86)	164 (82)	0.103
Cannabis	155 (77)	146 (73)	0.106
Hallucinogens (LSD, mushrooms)	44 (22)	25 (12)	<b>0.001</b>
Illicit pharmaceutical stimulants	47 (23)	28 (14)	<b>0.003</b>

<b>Variable</b>	<b>BL n (%)</b>	<b>FU n (%)</b>	<b>p- value</b>
Cocaine	26 (13)	20 (10)	0.239
Illicit benzodiazepines	128 (64)	95 (47)	<b>0.000</b>
Tobacco	180 (90)	170 (85)	<b>0.013</b>
Heroin	89 (45)	70 (35)	<b>0.001</b>
Illicit OST <sup>†</sup>	40 (20)	27 (13)	<b>0.020</b>
<b>Recent** illicit drug expenditure (\$/week)</b>	n=200		
Spent money on illicit drugs	194 (97)	174 (87)	<b>0.000</b>
Median (range)	150 (10-2100)	100 (0-8,000)	<b>0.004</b>
<b>(Last 12 months) methamphetamine use resulted in/associated with:</b>			
Injuries to self and/or someone else	33 (16)	25 (12)	0.274
Relationship/social problems (incl. fights)	98 (49)	82 (41)	0.090
Financial problems	132 (66)	40 (20)	<b>0.000</b>
Work/study problems	69 (35)	96 (48)	<b>0.000</b>
Legal problems	31 (15)	26 (13)	0.505
<b>Sought help from family/friends for reducing/ceasing methamphetamine use last 12 months</b>	59 (29)	35 (17)	<b>0.002</b>
<b>Currently accessing professional support<sup>‡</sup> for methamphetamine use and/or related harms</b>	42 (21)	33 (16)	0.189

\*Unstable housing was classified according to the temporary or transitional nature of some accommodation types and included 'no fixed address/homeless', 'boarding house, hostel, shelter or refuge', 'squat' and 'staying with a friend/acquaintance (not paying rent)'

\*\*Past month

\*\*\*Includes self-reported involvement in property, dealing/trafficking, fraud or violent offences, and involvement in unspecified criminal activities as an income source

<sup>†</sup>Methadone, buprenorphine and/or Suboxone (buprenorphine-naloxone)

<sup>‡</sup>Regular contact with a general practitioner, generalist psychiatric service, and/or drug-specialist treatment service, including one-on-one or group counselling, residential, outpatient or home detoxification/withdrawal, and residential rehabilitation

### ***Predictors of remission***

Of the participants classified as methamphetamine-dependent at baseline (n=115), 38 had remitted from dependence at follow-up. Factors independently associated with remission from methamphetamine dependence included: being younger; maintaining or gaining employment over the follow-up period; a greater relative increase in self-perceived social support during that time; and not having sought help from family or friends to reduce/cease methamphetamine use since baseline (Table 2). Reports of accessing professional support (i.e., general practitioner, generalist psychiatric service, drug treatment program) for methamphetamine use were not independently associated with remission from methamphetamine dependence. Over half (55%, n=21) of the participants who remitted had not accessed any professional support for methamphetamine use at baseline or during the follow-up period. Of the participants who remained or became methamphetamine-dependent (n=88), 53 (60%) accessed professional support at baseline or over the follow-up period.

**Table 2: Significant predictors of remission from dependence at 12-month follow-up (FU) (n=38) among those initially methamphetamine-dependent at baseline (BL) (N=115)**

Variable	Methamphetamine-dependent at BL N=115			
	FU: Non- dependent n=38	FU: Dependent n=77	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
	n (%)	n (%)		
<b>Age, median (range)</b>	27 (20-48)	32 (18-47)	0.94 (0.89-1.00)	0.93 (0.88-1.00)
<b>Employment status change**</b>				
Unemployed/employed-unemployed	22 (58)	59 (77)	1	1
Unemployed/employed-employed	16 (42)	18 (23)	2.38 (1.04-5.48)	3.14 (1.21-8.14)
<b>ESSI7 change, median (range)</b>	2 (-14-17)	0 (-14-14)	1.06 (1.00-1.13)	1.08 (1.01-1.16)
<b>K10 change, median (range)</b>	-5.5 (-34-11)	-3 (-28-17)	0.96 (0.91-1.00)	
<b>History of incarceration</b>	9 (24)	35 (45)	0.37 (0.16-0.89)	
<b>Injected:</b>				
Any drug at least once	27 (71)	67 (87)	0.37 (0.14-0.96)	
During FU period	25 (66)	64 (83)	0.39 (0.16-0.96)	
<b>Past-month ecstasy use at FU</b>	1 (3)	16 (21)	0.10 (0.01-0.81)	
<b>Ever accessed professional support for methamphetamine use</b>	26 (68)	68 (88)	0.29 (0.11-0.76)	
<b>Sought help from family/friends for reducing/ceasing methamphetamine use since BL</b>	3 (8)	23 (30)	0.20 (0.06-0.72)	0.13 (0.03-0.55)
<b>Attempted to reduce/cease use without help since BL</b>	24 (63)	62 (82)	0.41 (0.17-0.99)	

\*Hosmer-Lemeshow goodness-of-fit test p=0.810

\*\*Compares participants who maintained unemployment or became unemployed over the follow-up period, to those who maintained or gained employment

### ***Predictors of past-month abstinence***

Sixty-four participants (32%) reported past-month abstinence from methamphetamine at follow-up. Factors independently associated with recent methamphetamine abstinence included: being female; not reporting past-month criminal behaviours; and not reporting past-month ecstasy or benzodiazepine use (Table 3). Unsurprisingly, higher SDS scores reduced the likelihood of methamphetamine abstinence at follow-up. In contrast, residing in stable/secure accommodation (e.g., private rental) at baseline and/or follow-up increased the likelihood of past-month abstinence.

**Table 3: Significant correlates of past-month abstinence from methamphetamine use at follow-up\***

Variable	Unadjusted	Adjusted
	OR (95% CI)	OR (95% CI)
<b>Female</b>	2.02 (1.25-3.26)	1.94 (1.10-3.44)
<b>Unemployed</b>	0.55 (0.34-0.92)	
<b>Stable** accommodation</b>	3.02 (1.53-5.95)	2.28 (1.07-4.85)
<b>Arrested last 12 months</b>	0.51 (0.29-0.91)	
<b>ESSI7 total score (range: 8-34)</b>	1.06 (1.01-1.10)	
<b>K10 total score (range: 10-50)</b>	0.95 (0.92-0.98)	
<b>Recent involvement in any crime</b>	0.43 (0.26-0.73)	0.46 (0.26-0.82)
<b>SDS score (range: 0-14)</b>	0.81 (0.74-0.90)	0.79 (0.72-0.88)
<b>Recent use of:</b>		
Ecstasy	0.33 (0.15-0.72)	0.30 (0.12-0.72)
Benzodiazepines	0.39 (0.23-0.66)	0.53 (0.29-0.96)
Heroin	0.49 (0.28-0.85)	
Illicit OST	0.31 (0.12-0.80)	

\*Results are from GEE with a binary distribution for the dependent variable and a final model comprising 451 observations

\*\*‘Stable’ housing was classified according to the permanent/secure nature of some accommodation types, e.g., ‘house/flat you own or are paying off’, ‘parents’ home’, ‘rented house or flat on own or with others’, versus ‘unstable’ (temporary/transitional) housing, e.g., ‘no fixed address/homeless’, ‘boarding house, shelter or refuge’

## Discussion

The current study examined changes to the characteristics and behaviours of a cohort of Melbourne-based methamphetamine users over 12 months. In general, the baseline characteristics of the cohort mirrored those of other Australian methamphetamine-using samples [e.g., 48, 50, 216, 218, 251]. Nevertheless, the sample was characterised by high rates of mental health issues, unemployment, homelessness and polysubstance use at baseline. Many participants experienced numerous positive outcomes during the follow-up period; for example, levels of self-reported unemployment, homelessness and criminal behaviours decreased significantly, with an overall increase in self-perceived social support. The proportion of participants who reported current methamphetamine use reduced substantially, with a significant decrease in past-month frequency of methamphetamine use at follow-up. Significant declines in the proportions of participants reporting use of other substances (e.g., ecstasy, illicit benzodiazepines, heroin, illicit pharmaceutical stimulants) suggests that drug substitution rates were low. It is not unusual for levels of non-primary drug use to decrease in tandem with reduced primary use of methamphetamine [375, 376].

Despite these ‘positive’ changes, there was a significant increase in the proportion of participants reporting that crystal methamphetamine was the main form of methamphetamine they currently/most recently used. Although this needs to be considered in the context of an overall decrease in methamphetamine use, this accords with the findings of local drug trend surveillance which showed an increase in the prevalence of crystal methamphetamine use among Victorian substance users around the same time data was collected for this study [39, 254, 255]. A potential increase in crystal methamphetamine use suggests that Victorian generalist and drug-specific health/support services should be adequately resourced to offer appropriate assistance to users. Harm reduction initiatives could educate users about the risks associated with the use of crystal methamphetamine over other methamphetamine forms [25, 46, 377].

Data collection at only two time-points precludes a comprehensive examination of methamphetamine use cycles (i.e., relapse to methamphetamine and other drug use and dependence [115]) among this sample, and the identification of causal relationships between exposures and outcomes. However, our findings do suggest that a significant minority of participants remitted from methamphetamine dependence within a relatively short period of time. Further, over half of these individuals achieved this without professional assistance. This finding provides evidence for natural or ‘spontaneous’ remission from methamphetamine dependence, and suggests that not every methamphetamine user needs professional intervention. Therefore, aiming to improve service engagement among the broader methamphetamine-using populations



(e.g., through non-targeted initiatives) might result in an unnecessary or even counter-productive access that may be a burden on drug treatment services. Nonetheless, some form of service engagement could provide opportunities for the delivery of harm reduction education to methamphetamine users and could result in positive outcomes not captured by our survey or experienced after the follow-up period.

Maintaining or gaining employment and increased levels of perceived social support were shown to be predictive of remission. This supports previous research which demonstrates the important role of employment and other indicators of social stability in achieving and maintaining non-problematic substance use and abstinence [322, 378-381]. However, participants who became non-dependent were less likely to seek help from family members or peers for reducing/ceasing their methamphetamine use during the follow-up period. It is possible that some individuals were simply able to naturally remit without input/influence from external sources, or that other factors (e.g., employment) offset the need to seek help from support networks. In addition, previous personal support (a higher proportion of participants had accessed family/friends for assistance in the 12 months prior to baseline versus follow-up) might have negated the need for further assistance subsequent to the baseline interview, when some participants were able to successfully address their methamphetamine use independently. Despite being more likely to seek help from family or peers, participants who maintained dependence might have had social networks that reinforced methamphetamine use. Previous research has indicated that methamphetamine use can define peer group membership and social acceptance [233, 326], which is potentially a barrier to achieving non-dependence. Importantly, individuals who have sought assistance from family or peers to address their methamphetamine use, without success, are possibly those most likely to benefit from professional intervention; they have demonstrated motivation and a desire to reduce/cease methamphetamine use, which has been shown to be predictive of drug treatment utilisation and retention, and better treatment outcomes [375, 382, 383].

There could be numerous reasons why younger participants were more likely to remit from methamphetamine dependence compared to their older counterparts. In reference to a prospective study of people who inject drugs (PWID) in Baltimore, Shah et al. [384] hypothesised that older PWID were less likely to cease injecting drug use because they often had more established peer networks and consistent drug sources, compared to younger PWID. This could be the case for the older methamphetamine users in the current study. It is possible that younger methamphetamine users have contact with more diverse (e.g., non-drug-using, non-dependent) social networks that challenge or encourage modification of drug use behaviours. Further, younger users with less entrenched or shorter durations of drug use could face different responsibilities and opportunities (e.g., education, employment) that discourage the maintenance of methamphetamine dependence.

Regardless, these findings highlight the importance of accessing younger methamphetamine users early in their drug use careers to reduce the incidence of associated harms and prevent the transition to more risky use patterns [233, 385-387].

Methamphetamine users are typically polysubstance users [280]. It is therefore not surprising that past-month use of ecstasy and benzodiazepines reduced the likelihood of past-month abstinence from methamphetamine at follow-up. Ecstasy is often used in combination with methamphetamine [388], and benzodiazepines are commonly used to combat methamphetamine's 'comedown' effects [18]. Regardless, these findings highlight the need to simultaneously treat co-occurring substance use disorders, if applicable [48]. This is particularly important given research which demonstrates a greater experience of harms and involvement in risk behaviours among individuals who use both methamphetamine and benzodiazepines [118]. However, more research is needed to investigate the efficacy of different approaches in treating methamphetamine and co-occurring substance use disorders [260].

Lastly, our findings indicate that residing in unstable accommodation and engaging in criminal behaviours reduced the likelihood of recent abstinence. This is unsurprising; studies have demonstrated that methamphetamine use is common among homeless populations [387, 389] and is often associated with increased criminal activity [13, 211]. Nevertheless, these findings highlight the disadvantage experienced by some methamphetamine users and the detrimental impact such problems can have on substance use (and vice versa). These findings, in addition to the associations identified between employment and increased social support and remission from dependence, suggest that the implementation and maintenance of targeted policy and programs that holistically address multiple issues could aid in accessing problematic methamphetamine users who present with various indicators of disadvantage.

### ***Limitations***

As this was a convenience sample, findings cannot be considered representative of the wider Australian methamphetamine-using population, even though the cohort characteristics are similar to other Australian studies of similar target populations. Participant attrition, a source of sampling bias and threat to statistical power [390], is a limitation intrinsic to longitudinal studies [391]. This issue is particularly salient with research involving individuals who present with characteristics, behaviours and problems that make communication and follow-up difficult [392]. The research team implemented specific processes to maximise participant retention. Univariate analyses comparing the baseline characteristics of retained participants versus those lost-to-follow-up suggested that the latter group were initially more disadvantaged across some domains. They were

significantly ( $p < 0.05$ ) more likely to: be male; be unemployed; have been homeless during the previous year; be less educated; report a history of incarceration; and have experienced recent methamphetamine-related legal problems. Such findings suggest that participants lost-to-follow-up might have continued engaging in risky drug use behaviours; therefore, it is possible that we over-estimated rates of remission and past-month abstinence.

It is possible that the baseline interview served as a de facto intervention which motivated some participants to reduce or cease their methamphetamine use during the follow-up period [63]. This could have also resulted in over-estimates of normal processes of remission and past-month abstinence rates. Lastly, as mentioned previously, data collection at only two time-points prevented investigation of temporal relationships between exposure and outcome variables.

## Conclusion

We examined changes to a prospective cohort of urban methamphetamine users over a 12-month period; findings indicated that a minority of methamphetamine users are able to remit from methamphetamine dependence, and/or substantially reduce frequency of methamphetamine use, without professional intervention. Further, many participants experienced a number of positive outcomes during the follow-up period, with significantly fewer reports of unemployment, homelessness and very high levels of psychological distress at 12-month follow-up. Nevertheless, a minority of participants sustained or developed methamphetamine dependence and harmful methamphetamine use patterns over the follow-up period. These findings highlight the potential for natural remission from methamphetamine dependence, but indicate that targeted interventions should be developed for individuals who are most likely to maintain dependent and harmful use patterns.

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## References

1. United Nations Office on Drugs and Crime. *Amphetamines and Ecstasy: 2011 Global ATS Assessment*. 2011. UNODC. Vienna, Austria.
2. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., Wodak, A., Howard, J., and the Reference Group to the United Nations on HIV and injecting drug use. *Meth/amphetamine use and associated HIV: Implications for global policy and public health*. *Int J Drug Policy*, 2010. **21**: p. 347-358.
3. Colfax, G., Santos, G.M., Chu, P., Vittinghoff, E., Pluddemann, A., Kumar, S., and Hart, C. *Amphetamine-group substances and HIV*. *Lancet*, 2010. **376**(9739): p. 458-74.
4. Hser, Y.I., Huang, D., Brecht, M.L., Li, L., and Evans, E. *Contrasting trajectories of heroin, cocaine, and methamphetamine use*. *J Addict Dis*, 2008. **27**(3): p. 13-21.
5. Calabria, B., Degenhardt, L., Briegleb, C., Vos, T., Hall, W., Lynskey, M., Callaghan, B., Rana, U., and McLaren, J. *Systematic review of prospective studies investigating "remission" from amphetamine, cannabis, cocaine or opioid dependence*. *Addict Behav*, 2010. **35**(8): p. 741-749.
6. Brecht, M.L., Greenwell, L., von Mayrhauser, C., and Anglin, M.D. *Two-year outcomes of treatment for methamphetamine use*. *J Psychoactive Drugs*, 2006. **Suppl 3**: p. 415-426.
7. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
8. Gossop, M., Marsden, J., Stewart, D., and Kidd, T. *The National Treatment Outcome Research Study (NTORS): 4-5 year follow-up results*. *Addiction*, 2003. **98**(3): p. 291-303.
9. Christian, D.R., Huber, A., Brecht, M.L., McCann, M.J., Marinelli-Casey, P., Lord, R.H., Reiber, C., Lu, T.H., Project, T.M.T., and Galloway, G.P. *Methamphetamine Users Entering Treatment: Characteristics of the Methamphetamine Treatment Project Sample*. *Subst Use Misuse*, 2007. **42**(14): p. 2207-2222.
10. Rawson, R.A., Huber, A., Brethen, P., Obert, J., Gulati, V., Shoptaw, S., and Ling, W. *Status of methamphetamine users 2-5 years after outpatient treatment*. *J Addict Dis*, 2002. **21**(1): p. 107-119.
11. Murphy, D.A., Hser, Y.I., Huang, D., Brecht, M.L., and Herbeck, D.M. *Self-report of Longitudinal Substance Use: A Comparison of the UCLA Natural History Interview and the Addiction Severity Index*. *J Drug Issues*, 2010. **40**(2): p. 495-516.
12. Gonzales, R., Ang, A., Marinelli-Casey, P., Glik, D.C., Iguchi, M.Y., and Rawson, R.A. *Health-related quality of life trajectories of methamphetamine-dependent individuals as a*

- function of treatment completion and continued care over a 1-year period.* J Subst Abuse Treat, 2009. **37**(4): p. 353-361.
13. Brecht, M.L., Greenwell, L., and Anglin, M.D. *Substance use pathways to methamphetamine use among treated users.* Addict Behav, 2007. **32**(1): p. 24-38.
  14. McKetin, R., Najman, J.M., Baker, A., Lubman, D.I., Dawe, S., Ali, R., Lee, N.K., Mattick, R.P., and Mamun, A. *Evaluating the impact of community-based treatment options on methamphetamine use: findings from the Methamphetamine Treatment Evaluation Study (MATES).* Addiction, 2012. **Early online.**
  15. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia.* Drug Alcohol Depend, 1997. **46**: p. 105-113.
  16. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia.* Drug Alcohol Rev, 2009. **28**: p. 592-599.
  17. Borders, T.F., Booth, B.M., Han, X., Wright, P., Leukefeld, C., Falck, R.S., and Carlson, R.G. *Longitudinal changes in methamphetamine and cocaine use in untreated rural stimulant users: racial differences and the impact of methamphetamine legislation.* Addiction, 2008. **103**(5): p. 800-808.
  18. Cunningham, J.A. *Untreated remissions from drug use: the predominant pathway.* Addict Behav, 1999. **24**(2): p. 267-270.
  19. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Trajectories of Methamphetamine Use in the Rural South: A Longitudinal Qualitative Study.* Human Organization, 2008. **67**(2): p. 181-193.
  20. Quinn, B., Stoové, M., Papanastasiou, C., and Dietze, P. *Methamphetamine use in Melbourne, Australia: baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence.* Journal of Substance Use, 2012. **Early online:** p. 1-14.
  21. Topp, L. and Mattick, R.P. *Choosing a cutoff on the Severity of Dependence Scale (SDS) for amphetamine users.* Addiction, 1997. **92**(7): p. 839-845.
  22. Kessler, R.C. *Kessler Psychological Distress Scale (K10).* 1996. Harvard Medical School. Boston, MA.
  23. Mitchell, P.H., Powell, L., Blumenthal, J., Norton, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., and Berkman, L.F. *A short social support measure for patients recovering from myocardial infarction: the ENRICH Social Support Inventory.* J Cardiopulm Rehabil, 2003. **23**(6): p. 398-403.
  24. Gottlieb, B.H. and Bergen, A.E. *Social support concepts and measures.* Journal of Psychosomatic Research, 2010. **69**(5): p. 511-520.

25. Darke, S., Hall, W., Wodak, A., Heather, N., and Ward, J. *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index*. British Journal of Addiction, 1992. **87**: p. 733-742.
26. Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., and Strang, J. *The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users*. Addiction, 1995. **90**(5): p. 607-614.
27. Roche, A.M., Pidd, K., Bywood, P., and Freeman, T. *Methamphetamine use among Australian workers and its implications for prevention*. Drug Alcohol Rev, 2008. **27**: p. 334-341.
28. Darke, S., Kaye, S., McKetin, R., and Duflou, J. *Major physical and psychological harms of methamphetamine use*. Drug Alcohol Rev, 2008. **27**(3): p. 253-262.
29. Milloy, M.-J., Kerr, T., Buxton, J., Montaner, J., and Wood, E. *Methamphetamine use and rates of incarceration among street-involved youth in a Canadian setting: a cross-sectional analysis*. Substance Abuse, Treatment, Prevention, and Policy, 2009. **4**(17): p. 1-6.
30. Hosmer, D.W. and Lemeshow, S., *Applied Logistic Regression*. 2nd ed. 2000, New York: Wiley.
31. Cui, J. *QIC program and model selection in GEE analyses*. The Stata Journal, 2007. **7**(2): p. 209-220.
32. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. Drug Alcohol Rev, 2001. **20**: p. 49-56.
33. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
34. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
35. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
36. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
37. Baker, A., Lee, N.K., Claire, M., Lewin, T.J., Grant, T., Pohlman, S., Saunders, J.B., Kay-Lambkin, F., Constable, P., Jenner, L., and Carr, V.J. *Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction*. Addiction, 2005. **100**(3): p. 367-378.

38. Brecht, M.L., Huang, D., Evans, E., and Hser, Y.I. *Polydrug use and implications for longitudinal research: ten-year trajectories for heroin, cocaine, and methamphetamine users*. Drug Alcohol Depend, 2008. **96**(3): p. 193-201.
39. Kirwan, A., Dietze, P., and Lloyd, B. *Victorian Drug Trends 2011: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trends Series No. 76. 2012. National Drug and Alcohol Research Centre, University of New South Wales.
40. Nguyen, P., Dietze, P., and Lloyd, B. *Victorian Trends in Ecstasy and Related Drug Markets 2011: Findings from the Ecstasy and related Drugs Reporting System (EDRS)*. Australian Drug Trends Series No. 85. 2012. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
41. Lloyd, B. *Trends in alcohol and drug related ambulance attendances in Melbourne: 2010/11*. 2012. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.
42. McKetin, R., Kelly, E., and McLaren, J. *The relationship between crystalline methamphetamine use and methamphetamine dependence*. Drug Alcohol Depend, 2006. **85**(3): p. 198-204.
43. Fairbairn, N., Wood, E., Stoltz, J., Li, K., Montaner, J., and Kerr, T. *Crystal methamphetamine use associated with non-fatal overdose among a cohort of injection drug users in Vancouver*. Public Health, 2008. **122**(1): p. 70-78.
44. Platt, J.J. *Vocational Rehabilitation of Drug Abusers*. Psychol Bull, 1995. **117**(3): p. 416-433.
45. Silverman, K., Wong, C.J., Needham, M., Diemer, K.N., Knealing, T., Crone-Todd, D., Fingerhood, M., Nuzzo, P., and Kolodner, K. *A randomized trial of employment-based reinforcement of cocaine abstinence in injection drug users*. Journal of Applied Behavior Analysis, 2007. **40**(3): p. 387-410.
46. Scott, C.K., Foss, M.A., and Dennis, M.L. *Factors influencing initial and longer-term responses to substance abuse treatment: a path analysis*. Evaluation and Program Planning, 2003. **26**: p. 287-295.
47. Hser, Y.-I., Grella, C.E., Hsieh, S.-C., Anglin, M.D., and Brown, B.S. *Prior treatment experience related to process and outcomes in DATOS*. Drug Alcohol Depend, 1999. **57**(2): p. 137-150.
48. Wasserman, D.A., Stewart, A.L., and Delucchi, K.L. *Social support and abstinence from opiates and cocaine during opioid maintenance treatment*. Drug Alcohol Depend, 2001. **65**(1): p. 65-75.
49. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction*. Drugs: education, prevention and policy, 1994. **1**(3): p. 289-297.



50. Morgan, P., Beck, J., Joe, K., McDonnell, D., and Guitierrez, R. *Ice and Other Methamphetamine Use. Final Report to the National Institute on Drug Abuse*. 1994. National Institute of Health. Rockville, MD.
51. Simpson, D.D. and Joe, G.W. *Motivation as a predictor of early dropout from drug abuse treatment*. *Psychotherapy: Theory, Research, Practice, Training*, 1993. **30**(2): p. 357-368.
52. Joe, G.W., Simpson, D.D., and Broome, K.M. *Effects of readiness for drug abuse treatment on client retention and assessment of process*. *Addiction*, 1998. **93**(8): p. 1177-1190.
53. Shah, N.G., Galai, N., Celentano, D.D., Vlahov, D., and Strathdee, S.A. *Longitudinal predictors of injection cessation and subsequent relapse among a cohort of injection drug users in Baltimore, MD, 1988–2000*. *Drug Alcohol Depend*, 2006. **83**(2): p. 147-156.
54. Gonzales, R., Ang, A., McCann, M.J., and Rawson, R.A. *An emerging problem: methamphetamine abuse among treatment seeking youth*. *Subst Abus*, 2008. **29**(2): p. 71-80.
55. Grant, B.F. and Dawson, D.A. *Age of onset of drug use and its association with DSM-IV drug abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey*. *Journal of Substance Abuse*, 1998. **10**(2): p. 163-173.
56. Nyamathi, A., Dixon, E.L., Shoptaw, S., Marfisee, M., Gelberg, L., Williams, S., Dominick, S., and Leake, B. *Profile of lifetime methamphetamine use among homeless adults in Los Angeles*. *Drug Alcohol Depend*, 2008. **92**: p. 277-281.
57. Darke, S. and Hall, W. *Levels and correlates of polydrug use among heroin users and regular amphetamine users*. *Drug Alcohol Depend*, 1995. **39**(3): p. 231-235.
58. Boeri, M.W., Sterk, C.E., Bahora, M., and Elifson, K.W. *Poly-drug use among ecstasy users: Separate, synergistic, and indiscriminate patterns*. *J Drug Issues*, 2008. **38**(2): p. 517-541.
59. Degenhardt, L. and Topp, L. *'Crystal meth' use among polydrug users in Sydney's dance party subculture: characteristics, use patterns and associated harms*. *Int J Drug Policy*, 2003. **14**(1): p. 17-24.
60. Darke, S., Ross, J., and Cohen, J. *The use of benzodiazepines among regular amphetamine users*. *Addiction*, 1994. **89**(12): p. 1683-1690.
61. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. *Australian Psychologist*, 2005. **40**(2): p. 88-95.
62. Semple, S.J., Patterson, T.L., and Grant, I. *A comparison of injection and non-injection methamphetamine-using HIV positive men who have sex with men*. *Drug Alcohol Depend*, 2004. **76**(2): p. 203-212.

63. Cartier, J., Farabee, D., and Prendergast, M.L. *Methamphetamine Use, Self-Reported Violent Crime, and Recidivism Among Offenders in California Who Abuse Substances*. Journal of Interpersonal Violence, 2006. **21**(4): p. 435-445.
64. Degenhardt, L., Roxburgh, A., Black, E., Bruno, R., Campbell, G., Kinner, S., and Fetherston, J. *The epidemiology of methamphetamine use and harm in Australia*. Drug Alcohol Rev, 2008. **27**(3): p. 243-252.
65. Harris, P.M. *Attrition Revisited*. American Journal of Evaluation, 1998. **19**(3): p. 293-305.
66. Szklo, M. *Population-based Cohort Studies*. Epidemiologic Reviews, 1998. **20**(1): p. 81-90.
67. Haring, R., Alte, D., Völzke, H., Sauer, S., Wallaschofski, H., John, U., and Schmidt, C.O. *Extended recruitment efforts minimize attrition but not necessarily bias*. Journal of Clinical Epidemiology, 2009. **62**: p. 252-260.

## Appendix 1

### *STROBE Statement: Checklist of items that should be included in reports of cohort studies.*

	Item No.	Recommendation	Item included?
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	<input checked="" type="checkbox"/>
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	<input checked="" type="checkbox"/>
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	<input checked="" type="checkbox"/>
Objectives	3	State specific objectives, including any prespecified hypotheses	<input checked="" type="checkbox"/>
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	<input checked="" type="checkbox"/>
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	<input checked="" type="checkbox"/>
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	<input checked="" type="checkbox"/>
		(b) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	<input checked="" type="checkbox"/>
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	<input checked="" type="checkbox"/>
Bias	9	Describe any efforts to address potential sources of bias	<input checked="" type="checkbox"/>
Study size	10	Explain how the study size was arrived at	<input checked="" type="checkbox"/>
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	<input checked="" type="checkbox"/>
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	<input checked="" type="checkbox"/>

	Item No.	Recommendation	Item included?
		(b) Describe any methods used to examine subgroups and interactions	<input checked="" type="checkbox"/>
		(c) Explain how missing data were addressed	<input checked="" type="checkbox"/>
		(d) If applicable, explain how loss to follow-up was addressed	<input checked="" type="checkbox"/>
		(e) Describe any sensitivity analyses	N/A
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	<input checked="" type="checkbox"/>
		(b) Give reasons for non-participation at each stage	<input checked="" type="checkbox"/>
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	<input checked="" type="checkbox"/>
		(b) Indicate number of participants with missing data for each variable of interest	<input checked="" type="checkbox"/>
		(c) Summarise follow-up time (e.g., average and total amount)	<input checked="" type="checkbox"/>
Outcome data	15*	Report numbers of outcome events or summary measures over time	<input checked="" type="checkbox"/>
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included	<input checked="" type="checkbox"/>
		(b) Report category boundaries when continuous variables were categorized	<input checked="" type="checkbox"/>
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	<input checked="" type="checkbox"/>
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	<input checked="" type="checkbox"/>
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and	<input checked="" type="checkbox"/>

	Item No.	Recommendation	Item included?
		magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	<input checked="" type="checkbox"/>
Generalisability	21	Discuss the generalisability (external validity) of the study results	<input checked="" type="checkbox"/>
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	<input checked="" type="checkbox"/>

\*Give information separately for exposed and unexposed groups.

# **Chapter Five: What does the literature say about factors associated with use of professional support for methamphetamine users?**

## **Introduction**

The findings presented in Chapter Four demonstrated that a minority of the sample were able to remit from methamphetamine dependence and problematic use patterns without professional intervention over the follow-up period. In contrast, approximately two-thirds of participants (67%;  $n=77$ ) who were classified as methamphetamine-dependent at baseline ( $N=115$ ) were classified equivalently at follow-up. Forty-four percent ( $n=34$ ) of these participants had not accessed any services for their methamphetamine use and/or related harms during follow-up. Given that these individuals may have benefited from professional intervention, it is important to understand pathways to drug treatment and health/support service utilisation among methamphetamine users, including factors associated with service access. Therefore, in Chapter Five, the available literature is reviewed to summarise current understandings of service use trajectories and the characteristics and behaviours associated with, and enablers of, accessing professional support among methamphetamine users. There is increasing evidence of the effectiveness of different approaches for treating and addressing the needs of methamphetamine users [e.g., 242, 337, 348, 393]; however, in the context of continued low rates of service engagement and retention among methamphetamine users [34, 238], potential measures raised in the literature of countering barriers to service utilisation are discussed in this section. Knowledge gaps and relevant areas that would benefit from future research are also identified. The current literature contains no other reviews of this nature.

The literature review findings presented in this chapter contextualise the research presented in Chapter Six, which investigates factors associated with accessing professional support among this study's participants.

The information presented in this chapter represents the following submitted manuscript:

**Quinn, B.,** Stoové, M., & Dietze, P. *Review of enabling factors for professional support access by methamphetamine users.* Substance Abuse Treatment, Prevention and Policy. Submitted: 29<sup>th</sup> October 2012.

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## Declaration for Thesis: Chapter Five

**Monash University**

### Declaration by candidate

In the case of Chapter Five, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	75

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Manuscript preparation and review	N/A
Paul Dietze	Study design, results interpretation, manuscript preparation and review	N/A

**Candidate's  
Signature**

	<b>Date</b> 29/10/2012
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### Declaration by co-authors

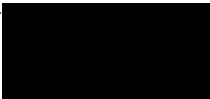

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
- (4) there are no other authors of the publication according to these criteria;



(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

<b>Location(s)</b>	<b>Centre for Population Health, Burnet Institute</b>	
<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>

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# **Review of enabling factors for professional support access by methamphetamine users**

Brendan Quinn<sup>1,2</sup>, Mark Stoové<sup>1,2</sup>, Paul Dietze<sup>1,2</sup>

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## Abstract

**Background:** There is limited research on service utilisation patterns among methamphetamine users, particularly among out-of-treatment or community-recruited methamphetamine users. Further, few studies have investigated enablers to counter the documented service barriers for this group. Therefore, this review examined relevant literature to identify factors associated with, and enablers to, use of professional support among methamphetamine users. Potential methods of improving service engagement, and knowledge gaps regarding these issues, are discussed.

**Methods:** Relevant literature was identified through electronic databases (e.g., Medline, Cochrane Library). Additional publications (e.g., grey literature) were sourced using key papers' reference lists and Google Scholar. Included publications involved human research and focused on the use of professional support by methamphetamine and amphetamine-type stimulant users.

**Results:** Research suggests that utilisation of professional support by methamphetamine users is strongly related to lower socioeconomic status, engaging in heavier and riskier methamphetamine use patterns, and experiencing more methamphetamine-related harms. There are methamphetamine users who are less likely to access services who might benefit from professional intervention (e.g., females, methamphetamine smokers). Methods (e.g., systemic/structural measures, staff-related and peer-based approaches) suggested in the literature to counter service barriers and engage methamphetamine users with professional support include: motivational interviewing to address low levels of motivation and perceived need for service utilisation; flexible opening hours to improve service accessibility; implementing targeted treatment programs to meet the specific needs of different methamphetamine-using sub-groups (e.g., men who have sex with men); and peer-educator, network-oriented interventions. However, there is a lack of evaluative research investigating the utility of these (and other) approaches in addressing the needs of methamphetamine users and improving service engagement among this group.

**Conclusions:** There is a need for low threshold treatment options and early intervention initiatives to improve access to methamphetamine users who might not benefit from high threshold approaches and interrupt trajectories to more harmful use patterns. Research is needed to evaluate whether the suggested measures in this review are effective in enhancing levels of service access among methamphetamine users and reducing methamphetamine-related harms.

## Background

Methamphetamine remains one of the more commonly used illicit drugs in Australia [15]. Its use, particularly heavy, injecting and dependent use patterns [45, 46], can result in numerous personal and interpersonal harms which have significant public health implications [25, 260].

Research findings highlight challenges associated with engaging and retaining methamphetamine users with professional support (i.e., drug treatment and health and support services) [87, 240, 285]. However, little is known about patterns of service utilisation by methamphetamine users. In particular, because many studies of methamphetamine use obtained data from treatment-recruited samples [e.g., 140, 300, 344, 371, 394, 395], there is limited information available about users naïve to, or who engage less with, professional support. Further, although numerous impediments to service utilisation and optimal treatment outcomes for methamphetamine users have been reported in the literature, such as stigma [295] and experience of complex clinical symptoms [260], few studies have explored enablers to counter service barriers for this group.

We review relevant literature of factors associated with, and enablers to, access of professional support among methamphetamine users. In doing so, potential methods of countering documented personal, social and structural service barriers and improving service engagement among methamphetamine users are discussed. Knowledge gaps regarding these issues are identified.

## Method

Relevant literature was identified through: electronic databases (e.g., Cochrane Library, Medline, PubMed); grey literature (i.e., non-commercial literature, such as government reports); reference lists of key papers; and the authors' personal libraries. Google Scholar was used mainly to search for grey literature and publications not identified through other search strategies. The search focused on publications concerning the use of professional support (i.e., drug-specialist treatment and relevant health and support services such as general practitioners (GPs)) by methamphetamine and amphetamine-type stimulant (ATS) users, particularly publications that examined or discussed factors associated with service access and outcomes for the target population.

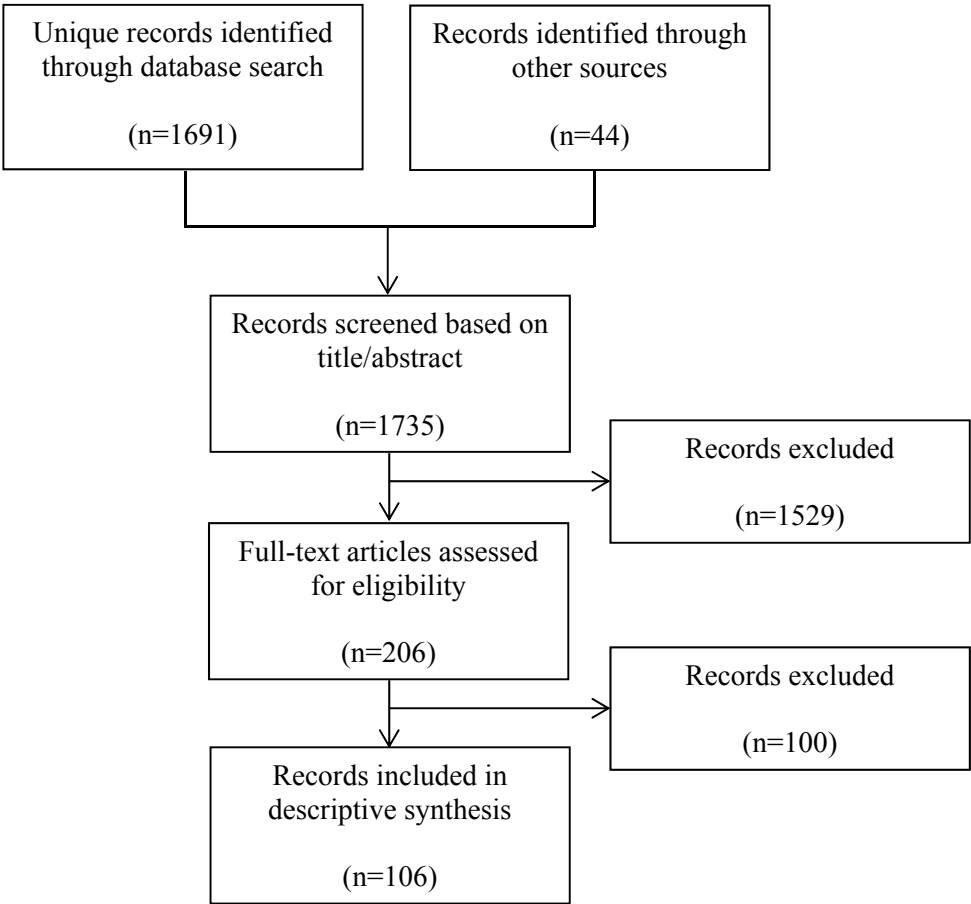
The primary search terms (and variations, used in isolation and combination) included:

1. Methamphetamine or amphetamine or psychostimulant; AND
2. Treatment or service; AND
3. Access or enabler or utilisation/utilization or retention or outcomes.

Eligible articles involved human research and were selected according to relevance to the research aims (Figure 1). Numerous study types were included in the review, including: randomised controlled trials (RCTs); cross-sectional designs; cohort studies; evaluations; and systematic and other reviews. Further, given the general paucity of research of this area, expert opinion and commentary were examined to provide applied insights in addition to research findings.

Importantly, this article is not a review of the effectiveness of different treatment modalities for methamphetamine use. However, treatment approaches are discussed with respect to their relationship to/impact on service engagement by methamphetamine users. The review findings are presented below according to user characteristics associated with service access, systemic and structural measures of improving service engagement (i.e., related to service attributes, approaches or processes), and staff-related and peer-based approaches to enhancing treatment of, and access to, professional support among methamphetamine users.

**Figure 1: Literature review search strategy**



## Results

### *User characteristics and behaviours associated with service access*

Not surprisingly, access to drug-specialist and other health and support services by methamphetamine users appears predominantly related to riskier and heavier drug use patterns and a greater experience of methamphetamine-related harms and other indicators of disadvantage [115, 216-218, 233, 251, 257, 396-398]. For example, McKetin et al. [115] compared a prospective cohort of Sydney in-treatment methamphetamine users to a quasi-control group of community-based users recruited in 2006-07 for the Methamphetamine Treatment Evaluation Study (MATES). Treatment users were more likely to be younger, have a prison history, and, despite being more likely to be non-injectors, reported higher levels of polysubstance use and more intense methamphetamine use patterns. Treatment users also reported more psychotic symptoms, higher levels of psychological distress, and demonstrated greater ‘readiness to change’ than non-treatment users. Similarly, 10 years earlier, Hando et al. [217] examined the characteristics of amphetamine users who were currently in treatment for amphetamine use and/or related harms compared to users not in treatment. Treatment clients were significantly more likely to be unemployed, have greater levels of amphetamine dependence, and report more frequent use of heroin, benzodiazepines and anti-depressants during the previous six months.

Other researchers have examined the characteristics of methamphetamine users who access hospital and psychiatric emergency services compared to other substance-using and non-substance-using patients [221, 223-225, 399-403]. For example, Bunting et al.’s [402] comparison of crystal methamphetamine emergency department (ED) users and patients with other toxicology-related problems indicated that crystal methamphetamine users were more likely to have a history of injecting drug use and mental health problems. Similarly, Marshall et al. [396] showed that frequent methamphetamine injection increased the likelihood of ED utilisation among ‘street-involved’ Canadian youth.

### *Systemic and structural approaches to improving service engagement*

#### *Addressing low motivation and perceived need*

In general, methamphetamine users have commonly been characterised by low levels of motivation and perceived need to access professional support for methamphetamine use and related harms [e.g., 50, 231, 297, 303]. Baker et al. [48] proposed that a range of interventions should therefore be available to methamphetamine users experiencing varying degrees of motivation to reduce/cease methamphetamine use and/or access professional support. For example, individuals reluctant to alter problematic use patterns could be accessed via primary healthcare clinics or needle syringe programs (NSPs), where brief interventions could be

delivered with a harm reduction focus and users made aware of available treatment options [48]. In this context, treatment approaches acknowledging the perceived benefits or pleasurable aspects of use might be particularly attractive for enhancing service engagement among methamphetamine users with low motivation or perceived need for service utilisation [81, 230].

Motivational interviewing [404] has been suggested to address methamphetamine user ambivalence towards modifying problematic drug use patterns and seeking treatment [258, 339, 350, 405, 406], assist individuals in identifying harms associated with methamphetamine use [339], and effectively market the benefits and nature of drug treatment programs [407]. In addition, researchers have suggested combining motivational interviewing with stepped care treatment models, which involve progressively more intense ‘steps’ that are contingent on clients’ responses to previous steps [408], as a means of engaging and treating methamphetamine users reluctant to access services, particularly those with comorbid psychological issues [313, 409]. However, there is a lack of evidence for the efficacy and acceptability of both motivational interviewing and stepped care approaches in improving service engagement among methamphetamine users [339, 409, 410].

#### *Accessibility and availability*

Researchers have suggested different measures to address accessibility and availability issues that impact on levels of service engagement among methamphetamine users (e.g., significant wait times and naivety of available treatment options [50, 324], barriers associated with geographical location [70, 231]). For example, Roche et al. [60] examined the use of methamphetamine and experience of related harms among Australian employees. They suggested that work-based interventions might improve accessibility to drug treatment among employed methamphetamine users. Similarly, McKetin et al. [238] advocated flexible service opening hours to improve levels of service engagement among employed methamphetamine users and others with schedules not amenable to the limited operating hours of some services. Providing treatment and information to methamphetamine users remotely via information technology is a low threshold initiative that has been suggested as a means of overcoming accessibility problems for methamphetamine users [25, 350].

#### *‘Alternative’ pathways to service engagement*

Despite the perceptions of some methamphetamine users that generalist drug treatment services are ineffective or inappropriate for addressing their needs [217], there is a lack of evidence indicating that methamphetamine-specific services produce better outcomes than standard treatment-as-usual approaches for methamphetamine users [411, 412]. Regardless, researchers have suggested novel methods of improving service engagement and retention among

methamphetamine users who might be deterred by generalist or ‘traditional’ treatment services or approaches. For example, the provision of ‘alternative’ therapies such as acupuncture has been suggested as a means of attracting methamphetamine users to services [217, 313, 339]. Further, if treatment cost is prohibitive for some methamphetamine users (which has been shown to be a treatment barrier for users in the US [413]), Donovan and Wells [414] suggested that 12-Step mutual support groups are a low- or no-cost alternative to formal treatment options. Despite a lack of evidence of the efficacy of acupuncture in producing good outcomes among this population [415], promoting this approach might at least attract users to services where they can be made aware of other treatment options. Further, given poor dental health among some methamphetamine users [4], dentists have been suggested as a means of early intervention and facilitating pathways to drug treatment [143].

### *Engaging methamphetamine-using sub-groups*

The diversity of methamphetamine-using populations represents a need to adapt versatile treatment and harm reduction interventions to suit different sub-groups [48, 70, 71, 236]. In their analysis of crystal methamphetamine use by men who have sex with men (MSM) and methamphetamine-related harms and treatment and prevention options among this group, Leonard et al. [306] advocated the implementation of treatment programs targeted specifically towards methamphetamine-using MSM, primarily to overcome barriers to methamphetamine treatment utilisation for this group (e.g., limited awareness of, or sensitivity towards, the unique needs of MSM). To improve treatment engagement and retention among MSM, others have suggested providing combined treatment and harm reduction options targeting both risky sexual behaviours and methamphetamine use [189, 416-418].

The unique needs of female methamphetamine users [301] require consideration to overcome treatment barriers and optimise service provision [239, 304, 305, 419, 420]. For example, services that address the needs of substance-using women and their children have the potential to improve access among female methamphetamine users [250]. Further, findings from Wright et al.’s [302] matched case-control study of English amphetamine users indicated that the well-being of female respondents’ children was a strong motivator towards abstinence. However, findings also indicated that female amphetamine users can be deterred from treatment utilisation due to a fear of social services being notified and the subsequent removal of children. Consequently, Wright et al. suggested that drug treatment services should adopt clearly defined confidentiality policies to counter concerns related to child protection and thereby optimise treatment engagement among female users; however, this might not be possible under current Australian child protection laws.



In relation to other methamphetamine-using subgroups, the provision of smoking equipment through NSPs [25] and the implementation of supervised smoking facilities [421] have been suggested to provide alternatives to injecting methamphetamine and improve access to methamphetamine smoking sub-groups. The development of ‘drug checking’ facilities has been suggested as a means of improving access to younger users and those without previous experience of the drug service system [422]. Lastly, given low rates of treatment access among culturally and linguistically diverse methamphetamine users [34, 238], the implementation of targeted initiatives could improve service engagement among methamphetamine-using populations of diverse ethnicities (e.g., Indigenous and immigrant populations). The development of these measures would benefit from the input of community members to ensure they are culturally and language appropriate [70].

#### *Treatment approaches to address methamphetamine use patterns and relapse*

High rates of relapse and heavy use patterns among methamphetamine users represent a significant barrier to treatment retention and achieving optimal treatment outcomes [241, 316]. Baker and Lee’s [339] review of psychosocial interventions for ATS use indicated that relapse prevention strategies (a type of cognitive behavioural therapy [423]) are therefore one of the more successful treatment approaches for producing better outcomes and reducing subsequent treatment episodes, particularly among heavy methamphetamine users. Further, given that methamphetamine users typically engage in extensive polysubstance use [260], some researchers have called for the acknowledgement of other drug use (and related harms) in addition to methamphetamine in treatment settings to optimise treatment engagement and outcomes [217, 361, 424]. Baker et al. [48], for example, stressed the need for interventions designed to treat concurrent methamphetamine and heroin use.

Low threshold treatment options have been suggested to address the needs of users deterred by lengthy treatment programs or who are engaging in less frequent and risky methamphetamine use patterns. Smout et al. [340] demonstrated that interventions as short as 30 minutes can produce good outcomes among methamphetamine users. The authors tested the acceptability of a single-session half-hour intervention for psychostimulant users, the ‘Psychostimulant Check-Up’. Of the 80 participants administered the initial Check-Up, 62% completed a subsequent three-month follow-up survey. Findings demonstrated significant reductions in self-reported methamphetamine use and related harms and increased awareness of relevant services. Smout et al. advocated for a RCT to establish whether reported changes were specific to the intervention. Further, motivational incentives (i.e., contingency management) have demonstrated effectiveness in maintaining abstinence and improving service access and retention among some methamphetamine users [411,

425-428]; however, this approach has been less successful with individuals who have a greater severity of methamphetamine dependence and engage in heavier use patterns [429, 430].

### ***Service provider/staff-related approaches***

#### *Improving staff knowledge of methamphetamine use and related issues*

Not every drug treatment and health/support service will be suitably equipped to manage the needs of methamphetamine users and associated issues [239]. Therefore, in some cases augmenting the skills and knowledge of current staff may improve service provider confidence regarding the treatment of methamphetamine users [66, 137, 431]. This training could negate the need to implement methamphetamine-specific programs and improve access to appropriate support for methamphetamine users. For example, GPs are a common source of assistance and point of referral for methamphetamine users [216, 218]. However, research findings suggest some GPs need to develop their knowledge of methamphetamine users and related harms to better meet the needs of this population and improve patient referral to appropriate drug treatment and mental health services [219].

#### *Countering stigma*

Semple et al. [295] suggested numerous strategies (as previously outlined by Bolton [432] in relation to mental health service access) to address stigma as a service barrier for methamphetamine users, including: examining personal attitudes towards methamphetamine use and methamphetamine users; improving knowledge about underlying methamphetamine use motivations; avoiding stigmatising language; and, listening to patients about their use and its consequences. However, Semple et al. [295] had not assessed the impact of these methods on service utilisation by methamphetamine users.

In a review of psychosocial interventions for methamphetamine use, Baker and Lee [339] noted that a non-judgemental approach is one of the key components required to engage and retain methamphetamine-using clients and overcome barriers such as stigma. Similarly, Pennay and Lee [229, 243] suggested that improving service provider attitudes towards methamphetamine users, in addition to enhancing understandings of methamphetamine withdrawal and related behaviours, are key methods of addressing the stigma specifically associated with withdrawal service access for this group.

## ***Peer relations and influence***

### *Methamphetamine-related relationship/social harms*

Research has highlighted the complex associations between social factors, methamphetamine use and access of personal and professional support among methamphetamine users [64]. In this context, weak peer affiliation (i.e., infrequent contact with friends and acquaintances) [233] and experience of adverse methamphetamine-related social consequences [217, 230] have been shown to motivate users to access treatment and abstain from, or moderate, use. For example, findings from Sommers et al.'s [132] in-depth interviews with 106 methamphetamine users in Los Angeles County demonstrated that experience of violent or aggressive episodes motivated users to seek treatment. Similarly, negative impacts on others resulting from an individual's use of methamphetamine have been shown to positively influence use cessation among Thai methamphetamine users [433].

### *Peers as support and enablers to service utilisation*

Findings from surveys of amphetamine [216] and ecstasy [434] users in Australia and the UK indicate that users commonly access friends, social networks and even dealers when seeking information about psychostimulant use and related harms. This accords with research demonstrating that positive social support can enhance the effects of drug treatment and assist with sustaining abstinence among substance users in general [322, 435]. Further, Ravarino et al.'s [436] research demonstrated that positive social support can facilitate treatment access among methamphetamine users. They examined attendance at 'interim' peer support groups by methamphetamine users who were assigned to waiting lists for formal drug treatment; findings indicated that involvement in these peer support groups increased the likelihood of subsequent treatment engagement.

Peer-educator, network-oriented interventions have contributed to reduced methamphetamine consumption among Thai users [437]. However, there is a lack of research examining the impact of similar interventions on other methamphetamine-using populations. This represents a significant knowledge gap, given the highly social nature of methamphetamine use and high cohesiveness of methamphetamine-using peer groups [438], which suggests that some peers will influence the activities and attitudes of other group members. In this context, in the UK, Klee and Reid [439] assessed the feasibility of using 'peer leaders' ('high-status' members of amphetamine-using peer groups with a disproportionate influence on the behaviours and attitudes of other group members) for drug prevention initiatives. Qualitative interviews with peer leaders and group members indicated that peer leaders might be useful in deterring the progression of group members' current behaviours to more problematic drug use patterns, such as initiation to heroin use or transition to injecting. However, they were unlikely to be successful as a means of

primary prevention (i.e., initial drug use uptake), or to prevent transition to more frequent amphetamine use.

### ***Other pathways to service access***

#### ***Mandated or coerced drug treatment***

The criminal justice system can be a common referral source to voluntary drug treatment for methamphetamine users [252]; however, others are mandated or coerced into drug treatment through the justice system. Mandated treatment occurs via numerous pathways, including drug court supervision/diversion programs, mandated inmate treatment, and as conditions of probation, parole or child custody [440]. Some research has explored treatment utilisation and outcomes among methamphetamine users mandated/coerced into drug treatment, although the vast majority is US-based [e.g., 240, 315, 440-444] and often emerging from the introduction of California's Substance Abuse and Crime Prevention Act of 2000 [445]. Findings from this research are generally positive. For example, Marinelli-Casey [441] examined methamphetamine-dependent individuals in outpatient treatment and under drug court supervision to a comparable group not supervised by a drug court. Those supervised by the drug court demonstrated better rates of treatment engagement, retention, completion and abstinence in relation to a 16-week Matrix Model treatment program. In contrast, Brecht et al. [440] compared individuals in treatment for methamphetamine use due to 'legal pressure' to those without; findings indicated that, although participants in treatment under legal pressure were more likely to be younger and have longer stays in treatment, they were more likely to relapse within the first six months following treatment.

## **Discussion**

In light of research identifying barriers to service utilisation and the provision of appropriate support to methamphetamine users in general [e.g., 50, 231, 306], specialised methamphetamine programs have been implemented in the Australian states of NSW and Victoria in recent years [324, 446]. However, despite the increased availability of services with a methamphetamine-specific focus (and/or with staff skilled to manage methamphetamine-related problems) in these regions, rates of treatment utilisation and retention among methamphetamine users remain low in Australia overall [34]. Further, although knowledge of the effectiveness of different approaches in treating and meeting the needs of methamphetamine users is gradually improving [e.g., 236, 249, 337, 345, 348], it is unclear how or if this has influenced practices of engaging and treating methamphetamine users in frontline services.

There has been limited research on drug treatment and health and support service utilisation among out-of-treatment or community-recruited methamphetamine users and sub-populations. Nonetheless, the available research findings suggest that access of professional support by methamphetamine users is strongly related to high levels of use and poor drug and other health-related outcomes [e.g., 48, 218, 238, 251]. In consideration of this, there is a need for low threshold treatment options and early intervention measures to interrupt trajectories to heavier and more harmful patterns of use. Low threshold measures identified in this review include the provision of professional support remotely (i.e., via the internet) [350] and use of the Psychostimulant Check-Up for individuals deterred by lengthy treatment programs [340]. Such initiatives have the potential to reduce the prevalence of methamphetamine use patterns that require higher threshold specialist interventions (e.g., utilisation of residential withdrawal and rehabilitation options), and improve service engagement among methamphetamine users and sub-populations who are less likely to engage with services (e.g., those with low perceived need and/or motivation for professional support [231], employed users [238], methamphetamine smokers [251]).

This review identified a range of other systemic and structural, staff-related and peer-based methods of improving service engagement among methamphetamine users. For example, dispensing smoking equipment through NSPs was suggested to improve access to professional support among methamphetamine smokers [25] and flexible opening hours were proposed to improve service accessibility [238]. However, despite the many suggested methods of enhancing service utilisation among, and meeting the needs of, methamphetamine users outlined in this review, there is a significant lack of evidence for the efficacy of these measures in achieving this goal. Further research is therefore needed to evaluate these suggested initiatives. Specifically, implementation and evaluation trials are required to assess the effectiveness of measures designed to engage methamphetamine users with professional support (e.g., staff-related approaches of addressing stigma). Research is needed to assess the efficacy of peer interventions on reducing methamphetamine-related harms and to investigate the role of peers in facilitating treatment access (e.g., by improving user knowledge of available services). Trials are also needed to investigate the efficacy of different approaches (e.g., 12-Step support groups, the Psychostimulant Check-Up) in treating, engaging and producing good outcomes among methamphetamine users. Given the overall heterogeneity of methamphetamine-using populations [e.g., 70, 301, 416], such research will need to examine whether certain approaches are more successful in treating and/or engaging different methamphetamine user ‘types’. Lastly, research is required to examine treatment outcomes, drug use trajectories and experience of harms among methamphetamine users mandated or coerced into drug treatment, particularly in countries outside of the US.

## Conclusion

This review explored factors associated with, and enablers to, the utilisation of professional support for methamphetamine users outlined in the available literature. There is a lack of research examining drug use and service utilisation trajectories among out-of-treatment or community-recruited methamphetamine users in particular; however, those who access various professional support modalities appear to be of lower socioeconomic status, engaging in heavier and riskier methamphetamine and other drug use patterns, and experiencing more methamphetamine-related harms than methamphetamine users not in contact with services. There are methamphetamine users who are less likely to access services who might benefit from professional intervention (e.g., females, methamphetamine smokers). Numerous methods suggested in the literature to counter service barriers and engage methamphetamine users with professional support were discussed; however, research is needed to evaluate whether these or other methods are effective in enhancing levels of service access among methamphetamine users and reducing methamphetamine-related harms.

### ***Competing Interests***

No competing interests are declared.

### ***Authors' Contributions***

BQ participated in the study design, data collection and analysis, and manuscript preparation and review. MS participated in data analysis and manuscript preparation and review. PD participated in study design, data analysis and manuscript preparation and review. All authors read and approved the final manuscript.

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## References

1. Australian Institute of Health and Welfare. *2010 National Drug Strategy Household Survey report*. Drug statistics series no. 25. Cat. no. PHE 145. 2011. AIHW. Canberra.
2. McKetin, R., Kelly, E., and McLaren, J. *The relationship between crystalline methamphetamine use and methamphetamine dependence*. Drug Alcohol Depend, 2006. **85**(3): p. 198-204.
3. McKetin, R., Kelly, E., McLaren, J., and Proudfoot, H. *Impaired physical health among methamphetamine users in comparison with the general population: the role of methamphetamine dependence and opioid use*. Drug Alcohol Rev, 2008. **27**(5): p. 482-489.
4. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. Australian Psychologist, 2005. **40**(2): p. 88-95.
5. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., Wodak, A., Howard, J., and the Reference Group to the United Nations on HIV and injecting drug use. *Meth/amphetamine use and associated HIV: Implications for global policy and public health*. Int J Drug Policy, 2010. **21**: p. 347-358.
6. Cretzmeyer, M., Vaughan Sarrazin, M., Huber, D.L., Block, R.I., and Hall, J.A. *Treatment of methamphetamine abuse: research findings and clinical directions*. J Subst Abuse Treat, 2003. **24**: p. 267-277.
7. Maxwell, J.C. and Spence, R.T. *Profiles of club drug users in treatment*. Subst Use Misuse, 2005. **40**(9-10): p. 1409-1426.
8. Wu, L.J., Altshuler, S.J., Short, R.A., and Roll, J.M. *Predicting drug court outcome among amphetamine-using participants*. J Subst Abuse Treat, 2012. **42**(4): p. 373-382.
9. Callaghan, R.C., Brands, B., Taylor, L., and Lentz, T. *The clinical characteristics of adolescents reporting methamphetamine as their primary drug of choice: an examination of youth admitted to inpatient substance-abuse treatment in northern British Columbia, Canada, 2001-2005*. J Adolesc Health, 2007. **40**(3): p. 286-289.
10. Cohen, J.B., Dickow, A., Homer, K., Zweben, J.E., Balabis, J., Vandersloot, D., and Reiber, C. *Abuse and Violence History of Men and Women in Treatment for Methamphetamine Dependence*. The American Journal on Addictions, 2003. **12**: p. 377-385.
11. Rawson, R.A., Huber, A., Brethen, P., Obert, J., Gulati, V., Shoptaw, S., and Ling, W. *Status of methamphetamine users 2-5 years after outpatient treatment*. J Addict Dis, 2002. **21**(1): p. 107-119.



12. Brecht, M.L., Greenwell, L., von Mayrhauser, C., and Anglin, M.D. *Two-year outcomes of treatment for methamphetamine use*. J Psychoactive Drugs, 2006. **Suppl 3**: p. 415-426.
13. Hser, Y.-I., Huang, D., Chou, C.-P., Teruya, C., and Anglin, M.D. *Longitudinal Patterns of Treatment Utilization and Outcomes Among Methamphetamine Abusers: A Growth Curve Modeling Approach*. J Drug Issues, 2003. **33**(4): p. 921-938.
14. Rawson, R.A., Gonzales, R., Obert, J.L., McCann, M.J., and Brethen, P. *Methamphetamine use among treatment-seeking adolescents in Southern California: Participant characteristics and treatment response*. J Subst Abuse Treat, 2005. **29**: p. 67-74.
15. Semple, S.J., Grant, I., and Patterson, T.L. *Utilization of Drug Treatment Programs by Methamphetamine Users: The Role of Social Stigma*. Am J Addict, 2005. **14**(4): p. 367-380.
16. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. Drug Alcohol Depend, 1997. **46**: p. 105-113.
17. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
18. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction*. Drugs: education, prevention and policy, 1994. **1**(3): p. 289-297.
19. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
20. Cogger, S., McKetin, R., Ross, J., and Najman, J. *Methamphetamine Treatment Evaluation Study (MATES): Findings from the Brisbane Site*. Technical Report No. 295. 2008. National Drug and Alcohol Research Centre. Sydney.
21. Marshall, B.D., Grafstein, E., Buxton, J.A., Qi, J., Wood, E., Shoveller, J.A., and Kerr, T. *Frequent methamphetamine injection predicts emergency department utilization among street-involved youth*. Public Health, 2012. **126**(1): p. 47-53.
22. Carlson, R.G., Sexton, R., Wang, J., Falck, R., Leukefeld, C.G., and Booth, B.M. *Predictors of Substance Abuse Treatment Entry Among Rural Illicit Stimulant Users in Ohio, Arkansas, and Kentucky*. Substance Abuse, 2010. **31**: p. 1-7.
23. Oser, C.B., Leukefeld, C.G., Tindall, M.S., Garrity, T.F., Carlson, R.G., Falck, R., Wang, J., and Booth, B.M. *Rural drug users: factors associated with substance abuse treatment utilization*. Int J Offender Ther Comp Criminol, 2011. **55**(4): p. 567-586.

24. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
25. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
26. Hadjizacharia, P., Green, D.J., Plurad, D., Chan, L.S., Inaba, K., Shulman, I., and Demetriades, D. *Methamphetamines in trauma: effect on injury patterns and outcome*. J Trauma, 2009. **66**(3): p. 895-898.
27. Hendrickson, R.G., Cloutier, R., and McConnell, K.J. *Methamphetamine-related emergency department utilization and cost*. Acad Emerg Med, 2008. **15**(1): p. 23-31.
28. Pasic, J., Russo, J.E., Ries, R.K., and Roy-Byrne, P.P. *Methamphetamine users in the psychiatric emergency services: a case-control study*. Am J Drug Alcohol Abuse, 2007. **33**(5): p. 675-686.
29. Schermer, C.R. and Wisner, D.H. *Methamphetamine use in trauma patients: a population-based study*. J Am Coll Surg, 1999. **189**(5): p. 442-449.
30. Tominaga, G.T., Garcia, G., Dzierba, A., and Wong, J. *Toll of Methamphetamine on the Trauma System*. Archives of Surgery, 2004. **139**(8): p. 844-847.
31. Bunting, P.J., Fulde, G.W., and Forster, S.L. *Comparison of crystalline methamphetamine ("ice") users and other patients with toxicology-related problems presenting to a hospital emergency department*. Med J Aust, 2007. **187**(10): p. 564-566.
32. Leamon, M.H., Canning, R.D., and Benjamin, L. *The impact of amphetamine-related disorders on community psychiatric emergency services: 1993-1997*. Am J Addict, 2000. **9**(1): p. 70-78.
33. Richards, J.R., Bretz, S.W., Johnson, E.B., Turnipseed, S.D., Brofeldt, B.T., and Derlet, R.W. *Methamphetamine Abuse and Emergency Department Utilization*. Western Journal of Medicine, 1999. **170**(4): p. 198-202.
34. Leamon, M.H., Gibson, D.R., Canning, R.D., and Benjamin, L. *Hospitalization of patients with cocaine and amphetamine use disorders from a psychiatric emergency service*. Psychiatr Serv, 2002. **53**(11): p. 1461-1466.
35. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
36. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia*. Drug Alcohol Rev, 2009. **28**: p. 592-599.

37. Falck, R.S., Wang, J., Carlson, R.G., Krishnan, L.L., Leukefeld, C., and Booth, B.M. *Perceived need for substance abuse treatment among illicit stimulant drug users in rural areas of Ohio, Arkansas, and Kentucky*. Drug Alcohol Depend, 2007. **91**: p. 107-114.
38. Wright, S., Klee, H., and Reid, P. *Attitudes of Amphetamine Users Towards Treatment Services*. Drugs: education, prevention and policy, 1999. **6**(1): p. 71-86.
39. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. Drug Alcohol Rev, 2001. **20**: p. 49-56.
40. White, B., Degenhardt, L., Breen, C., Bruno, R., Newman, J., and Proudfoot, P. *Risk and benefit perceptions of party drug use*. Addictive Behaviors, 2006. **31**(1): p. 137-142.
41. Klee, H., Wright, S., and Morris, J. *Amphetamine Users in Treatment: Factors Associated with Sustained Abstinence from Street Drugs*. Addiction Research, 1999. **7**(3): p. 239-265.
42. Hettema, J., Steele, J., and Miller, W.R. *Motivational interviewing*. Annu Rev Clin Psychol, 2005. **1**: p. 91-111.
43. Baker, A. and Lee, N.K. *A review of psychosocial interventions for amphetamine use*. Drug Alcohol Rev, 2003. **22**: p. 323-335.
44. Kay-Lambkin, F. *Technology and innovation in the psychosocial treatment of amphetamine use, risk and dependence*. Drug Alcohol Rev, 2008. **27**: p. 318-325.
45. Huang, Y.S., Tang, T.C., Lin, C.H., and Yen, C.F. *Effects of motivational enhancement therapy on readiness to change MDMA and methamphetamine use behaviors in Taiwanese adolescents*. Subst Use Misuse, 2011. **46**(4): p. 411-416.
46. Baker, A., Boggs, T.G., and Lewin, T.J. *Randomized controlled trial of brief cognitive-behavioural interventions among regular users of amphetamine*. Addiction, 2001. **96**(9): p. 1279-1287.
47. Galloway, G.P., Polcin, D., Kielstein, A., Brown, M., and Mendelson, J. *A nine session manual of motivational enhancement therapy for methamphetamine dependence: adherence and efficacy*. J Psychoactive Drugs, 2007. **Suppl 4**: p. 393-400.
48. Digiusto, E. and Treloar, C. *Equity of access to treatment, and barriers to treatment for illicit drug use in Australia*. Addiction, 2007. **102**: p. 958-969.
49. Bower, P. and Gilbody, S. *Stepped care in psychological therapies: access, effectiveness and efficiency*. British Journal of Psychiatry, 2005. **186**: p. 11-17.
50. Kay-Lambkin, F.J., Baker, A.L., McKetin, R., and Lee, N. *Stepping through treatment: Reflections on an adaptive treatment strategy among methamphetamine users with depression*. Drug Alcohol Rev, 2010. **29**: p. 475-482.
51. Lee, N., Johns, L., Jenkinson, R., Johnston, J., Connolly, K., Hall, K., and Cash, R. *Clinical treatment guidelines for alcohol and drug clinicians. No. 14: Methamphetamine*

- dependence and treatment*. 2007. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.
52. Smedslund, G., Berg, R.C., Hammerstrom, K.T., Steiro, A., Leiknes, K.A., Dahl, H.M., and Karlsen, K. *Motivational interviewing for substance abuse*. Cochrane Database Syst Rev, 2011(5): p. CD008063.
  53. Pennay, A., Ferris, J., Reed, M., Devaney, M., and Lee, N. *Evaluation of 'Access Point' Specialist Methamphetamine Clinic*. 2010. Turning Point Alcohol and Drug Centre. Fitzroy, Melbourne.
  54. Freese, T.E., Obert, J., Dickow, A., Cohen, J., and Lord, R.H. *Methamphetamine abuse: issues for special populations*. J Psychoactive Drugs, 2000. **32**(2): p. 177-182.
  55. Roche, A.M., Pidd, K., Bywood, P., and Freeman, T. *Methamphetamine use among Australian workers and its implications for prevention*. Drug Alcohol Rev, 2008. **27**: p. 334-341.
  56. McKetin, R., Kelly, E., and Indig, D. *Characteristics of treatment provided for amphetamine use in New South Wales, Australia*. Drug Alcohol Rev, 2005. **24**(5): p. 433-436.
  57. Chamberlain, J., McDonald, S., and Torgensen, K. *Methamphetamine: tools and partnerships to fight the threat*. J Law Med Ethics, 2004. **32**(4 Suppl): p. 104-105.
  58. Donovan, D.M. and Wells, E.A. *'Tweaking 12-Step': the potential role of 12-Step self-help group involvement in methamphetamine recovery*. Addiction, 2007. **102**((Suppl. 1)): p. 121-129.
  59. Rawson, R.A., McCann, M.J., Flammino, F., Shoptaw, S., Miotto, K., Reiber, C., and Ling, W. *A comparison of contingency management and cognitive-behavioral approaches for stimulant-dependent individuals*. Addiction, 2006. **101**(2): p. 267-274.
  60. Callaghan, R.C., Tavares, J., Taylor, L., and Veldhuizen, S. *A national survey of primary methamphetamine-related admissions to youth residential substance abuse treatment facilities in Canada, 2005 to 2006*. Can J Psychiatry, 2007. **52**(10): p. 684-688.
  61. Russell, L.C., Sharp, B., and Gilbertson, B. *Acupuncture for addicted patients with chronic histories of arrest: A pilot study of the Consortium Treatment Center*. J Subst Abuse Treat, 2000. **19**(2): p. 199-205.
  62. Hamamoto, D.T. and Rhodus, N.L. *Methamphetamine abuse and dentistry*. Oral Dis, 2009. **15**(1): p. 27-37.
  63. Shetty, V., Mooney, L.J., Zigler, C.M., Belin, T.R., Murphy, D., and Rawson, R. *The relationship between methamphetamine use and increased dental disease*. J Am Dent Assoc, 2010. **141**(3): p. 307-318.

64. Ciketic, S., Hayatbakhsh, M.R., Doran, C.M., Najman, J.M., and McKetin, R. *A review of psychological and pharmacological treatment options for methamphetamine dependence*. Journal of Substance Use, 2012. **17**(4): p. 363-383.
65. Newton, T.F., De La Garza, R., 2nd, Kalechstein, A.D., Tziortzis, D., and Jacobsen, C.A. *Theories of addiction: methamphetamine users' explanations for continuing drug use and relapse*. Am J Addict, 2009. **18**(4): p. 294-300.
66. Leonard, W., Dowsett, G., Slavin, S., Mitchell, A., and Pitts, M. *Crystal Clear: The social determinants of gay men's use of crystal methamphetamine in Victoria*. Monograph Series Number 67. 2008. La Trobe University, The Australian Research Centre in Sex, Health & Society. Melbourne.
67. Rajasingham, R., Mimiaga, M.J., White, J.M., Pinkston, M.M., Baden, R.P., and Mitty, J.A. *A Systematic Review of Behavioral and Treatment Outcome Studies Among HIV-Infected Men Who Have Sex with Men Who Abuse Crystal Methamphetamine*. AIDS Patient Care STDS, 2012. **26**(1): p. 36-52.
68. Shoptaw, S., Reback, C.J., Peck, J.A., Yang, X., Rotheram-Fuller, E., Larkins, S., Veniegas, R.C., Freese, T.E., and Hucks-Ortiz, C. *Behavioral treatment approaches for methamphetamine dependence and HIV-related sexual risk behaviors among urban gay and bisexual men*. Drug Alcohol Depend, 2005. **78**(2): p. 125-134.
69. Landovitz, R.J., Fletcher, J.B., Inzhakova, G., Lake, J.E., Shoptaw, S., and Reback, C.J. *A novel combination HIV prevention strategy: post-exposure prophylaxis with contingency management for substance abuse treatment among methamphetamine-using men who have sex with men*. AIDS Patient Care STDS, 2012. **26**(6): p. 320-328.
70. Shoptaw, S., Reback, C.J., Larkins, S., Wang, P.C., Rotheram-Fuller, E., Dang, J., and Yang, X. *Outcomes using two tailored behavioral treatments for substance abuse in urban gay and bisexual men*. J Subst Abuse Treat, 2008. **35**(3): p. 285-293.
71. Dluzen, D.E. and Liu, B. *Gender differences in methamphetamine use and responses: a review*. Gend Med, 2008. **5**(1): p. 24-35.
72. Rawson, R.A., Gonzales, R., and Brethen, P. *Treatment of methamphetamine use disorders: an update*. J Subst Abuse Treat, 2002. **23**: p. 145-150.
73. Wenzel, S.L., Green, H.D., Jr., Tucker, J.S., Golinelli, D., Kennedy, D.P., Ryan, G., and Zhou, A. *The social context of homeless women's alcohol and drug use*. Drug Alcohol Depend, 2009. **105**(1-2): p. 16-23.
74. Cohen, J.B., Greenberg, R., Uri, J., Halpin, M., and Zweben, J.E. *Women with methamphetamine dependence: research on etiology and treatment*. J Psychoactive Drugs, 2007. **Suppl 4**: p. 347-351.
75. Ozaki, S. *[Current situation of substance abuse/dependence in psychiatric hospital settings]*. Nihon Arukoru Yakubutsu Igakkai Zasshi, 2004. **39**(1): p. 35-40.

76. Lindsay, B., Albrecht, J., and Terplan, M. *Against professional advice: treatment attrition among pregnant methamphetamine users*. Substance Abuse and Rehabilitation, 2011. **2**(1): p. 189-195.
77. Boeri, M.W., Tyndall, B.D., and Woodall, D.R. *Suburban Poverty: Barriers to Services and Injury Prevention among Marginalized Women who Use Methamphetamine*. Western Journal of Emergency Medicine, 2011. **12**(3): p. 284-292.
78. Wright, S. and Klee, H. *Developing drug services for amphetamine users: taking account of gender-specific factors*. Journal of Substance Use, 2000. **5**: p. 122-130.
79. Collins, C.L., Kerr, T., Tyndall, M.W., Marsh, D.C., Kretz, P.S., Montaner, J.S., and Wood, E. *Rationale to evaluate medically supervised safer smoking facilities for non-injection illicit drug users*. Can J Public Health, 2005. **96**(5): p. 344-347.
80. Hungerbuehler, I., Buecheli, A., and Schaub, M. *Drug Checking: A prevention measure for a heterogeneous group with high consumption frequency and polydrug use - evaluation of zurich's drug checking services*. Harm Reduction Journal, 2011. **8**(16): p. 1-6.
81. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2009–2010: report on the National Minimum Data Set*. Drug treatment series no. 14. Cat. no. HSE 114. 2011. AIHW. Canberra.
82. Simon, S.L., Dacey, J., Glynn, S., Rawson, R., and Ling, W. *The effect of relapse on cognition in abstinent methamphetamine abusers*. J Subst Abuse Treat, 2004. **27**(1): p. 59-66.
83. Hillhouse, M.P., Marinelli-Casey, P., Gonzales, R., Ang, A., Rawson, R.A., and Authors, T.M.T.P.C. *Predicting in-treatment performance and post-treatment outcomes in methamphetamine users*. Addiction, 2007. **102**(Suppl. 1): p. 84-95.
84. Carroll, K.M. *Relapse prevention as a psychosocial treatment: a review of controlled clinical trials*. Exp Clin Psychopharmacology, 1996. **4**: p. 46-54.
85. Winhusen, T., Stitzer, M., Woody, G., Brigham, G., Kropp, F., Ghitza, U., Lindblad, R., Adinoff, B., Green, C., Sharma, G., and Somoza, E. *Design considerations for a study to evaluate the impact of smoking cessation treatment on stimulant use outcomes in stimulant-dependent individuals*. Contemp Clin Trials, 2012. **33**(1): p. 197-205.
86. Halkitis, P.N., Palamar, J.J., and Mukherjee, P.P. *Poly-club-drug use among gay and bisexual men: a longitudinal analysis*. Drug Alcohol Depend, 2007. **89**(2-3): p. 153-160.
87. Smout, M.F., Longo, M., Harrison, S., Minniti, R., Cahill, S., Wickes, W., and White, J.M. *The Psychostimulant Check-Up: A pilot study of a brief intervention to reduce illicit stimulant use*. Drug Alcohol Rev, 2010. **29**: p. 169-176.
88. Roll, J.M., Petry, N.M., Stitzer, M.L., Brecht, M.L., Peirce, J.M., McCann, M.J., Blaine, J., MacDonald, M., DiMaria, J., Lucero, L., and Kellogg, S. *Contingency management for*

- the treatment of methamphetamine use disorders. Am J Psychiatry*, 2006. **163**(11): p. 1993-1999.
89. Higgins, S.T. *Extending contingency management to the treatment of methamphetamine use disorders. Am J Psychiatry*, 2006. **163**(11): p. 1870-1872.
  90. Reback, C.J., Peck, J.A., Dierst-Davies, R., Nuno, M., Kamien, J.B., and Amass, L. *Contingency management among homeless, out-of-treatment men who have sex with men. J Subst Abuse Treat*, 2010. **39**(3): p. 255-263.
  91. Roll, J.M. *Contingency management: an evidence-based component of methamphetamine use disorder treatments. Addiction*, 2007. **102**(Suppl. 1): p. 114-120.
  92. Stitzer, M.L., Petry, N.M., and Peirce, J. *Motivational incentives research in the National Drug Abuse Treatment Clinical Trials Network. J Subst Abuse Treat*, 2010. **38 Suppl 1**: p. S61-69.
  93. Menza, T.W., Jameson, D.R., Hughes, J.P., Colfax, G.N., Shoptaw, S., and Golden, M.R. *Contingency management to reduce methamphetamine use and sexual risk among men who have sex with men: a randomized controlled trial. BMC Public Health*, 2010. **10**: p. 774.
  94. Lee, N., Nielsen, S., Ferris, J., Pennay, A., Devaney, M., and Reed, M. *Australian Treatment Outcome Study: Amphetamines*. 2009. Turning Point Alcohol & Drug Centre. Fitzroy, Australia.
  95. Degenhardt, L., Baker, A., and Maher, L. *Methamphetamine: geographic areas and populations at risk, and emerging evidence for effective interventions. Drug Alcohol Rev*, 2008. **27**(3): p. 217-219.
  96. Copeland, A.L. and Sorensen, J.L. *Differences between methamphetamine users and cocaine users in treatment. Drug Alcohol Depend*, 2001. **62**: p. 91-95.
  97. Saltman, D.C., Newman, C.E., Mao, L., Kippax, S.C., and Kidd, M.R. *Experiences in managing problematic crystal methamphetamine use and associated depression in gay men and HIV positive men: in-depth interviews with general practitioners in Sydney, Australia. BMC Family Practice*, 2008. **9**(45): p. 1-7.
  98. Bolton, J. *How can we reduce the stigma of mental illness? British Medical Journal*, 2003. **326**(7386): p. S57.
  99. Pennay, A.E. and Lee, N.K. *Barriers to methamphetamine withdrawal treatment in Australia: findings from a survey of AOD service providers. Drug Alcohol Rev*, 2009. **28**(6): p. 636-640.
  100. Pennay, A.E. and Lee, N.K. *Putting the call out for more research: the poor evidence base for treating methamphetamine withdrawal. Drug Alcohol Rev*, 2011. **30**(2): p. 216-222.

101. Boshears, P., Boeri, M., and Harbry, L. *Addiction and sociality: Perspectives from methamphetamine users in suburban USA*. *Addict Res Theory*, 2011. **19**(4): p. 289-301.
102. Sommers, I., Baskin, D., and Baskin-Sommers, A. *Methamphetamine use among young adults: Health and social consequences*. *Addictive Behaviors*, 2006. **31**(8): p. 1469-1476.
103. German, D., Sherman, S.G., Srirojn, B., Thomson, N., Aramrattana, A., and Celentano, D.D. *Motivations for methamphetamine cessation among young people in northern Thailand*. *Addiction*, 2006. **101**: p. 1143-1152.
104. Murphy, P.N., Wareing, M., and Fisk, J.E. *Users' perceptions of the risks and effects of taking ecstasy (MDMA): a questionnaire study*. *Journal of Psychopharmacology*, 2006. **20**(3): p. 447-455.
105. Scott, C.K., Foss, M.A., and Dennis, M.L. *Factors influencing initial and longer-term responses to substance abuse treatment: a path analysis*. *Evaluation and Program Planning*, 2003. **26**: p. 287-295.
106. Ramirez, R., Hinman, A., Sterling, S., Weisner, C., and Campbell, C. *Peer influences on adolescent alcohol and other drug use outcomes*. *J Nurs Scholarsh*, 2012. **44**(1): p. 36-44.
107. Ravarino, J.M., Gardner, M.K., Hill, R.D., and Lundberg, K. *Effectiveness of pretreatment interim support group attendance in facilitating treatment enrollment among methamphetamine abusers*. *Addict Behav*, 2008. **33**(2): p. 336-341.
108. Sherman, S.G., Sutcliffe, C., Srirojn, B., Latkin, C.A., Aramratanna, A., and Celentano, D.D. *Evaluation of a peer network intervention trial among young methamphetamine users in Chiang Mai, Thailand*. *Social Science & Medicine*, 2009. **68**(1): p. 69-79.
109. Klee, H. *A new target in behavioural research: amphetamine misuse*. *British Journal of Addiction*, 1992. **87**: p. 439-446.
110. Klee, H. and Reid, P. *Amphetamine-Misusing Groups: A Feasibility Study of the Use of Peer Group Leaders for Drug Prevention Work among their Associates*. Home Office Drugs Prevention Initiative Paper 3. 1995. Home Office. London.
111. Gunter, T.D., Black, D.W., Zwick, J., and Arndt, S. *Drug and alcohol treatment services effective for methamphetamine abuse*. *Ann Clin Psychiatry*, 2004. **16**(4): p. 195-200.
112. Brecht, M.L., Anglin, M.D., and Dylan, M. *Coerced treatment for methamphetamine abuse: differential patient characteristics and outcomes*. *Am J Drug Alcohol Abuse*, 2005. **31**(2): p. 337-356.
113. Brecht, M., Greenwell, L., and Anglin, M.D. *Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002)*. *J Subst Abuse Treat*, 2005. **29**: p. 295-306.
114. Marinelli-Casey, P., Gonzales, R., Hillhouse, M., Ang, A., Zweben, J., Cohen, J., Hora, P.F., Rawson, R.A., and Methamphetamine Treatment Project Corporate, A. *Drug court*



- treatment for methamphetamine dependence: treatment response and posttreatment outcomes.* J Subst Abuse Treat, 2008. **34**(2): p. 242-248.
115. Brecht, M.L. and Urada, D. *Treatment outcomes for methamphetamine users: California Proposition 36 and comparison clients.* J Psychoactive Drugs, 2011. **Suppl 7**: p. 68-76.
  116. Evans, E., Longshore, D., Prendergast, M., and Urada, D. *Evaluation of the Substance Abuse and Crime Prevention Act: client characteristics, treatment completion and re-offending three years after implementation.* J Psychoactive Drugs, 2006. **Suppl 3**: p. 357-367.
  117. Listwan, S.J., Shaffer, D.K., and Hartman, J.L. *Combating Methamphetamine Use in the Community: The Efficacy of the Drug Court Model.* Crime & Delinquency, 2009. **55**(4): p. 627-644.
  118. Anglin, M.D., Urada, D., Brecht, M.L., Hawken, A., Rawson, R., and Longshore, D. *Criminal justice intreatment admissions for methamphetamine use in California: a focus on Proposition 36.* J Psychoactive Drugs, 2007. **Suppl 4**: p. 367-81.
  119. Dunlop, A., Tulloch, B., McKetin, R., Adam, T., Baker, A., and Wodak, A. *Preliminary evaluation of the NSW stimulant treatment program.* 2008. NSW Department of Health. Sydney.
  120. Knapp, W.P., Soares, B.G., Farrel, M., and Lima, M.S. *Psychosocial interventions for cocaine and psychostimulant amphetamines related disorders.* Cochrane Database Syst Rev, 2007. **3**(CD003023).
  121. Shoptaw, S.J., Kao, U., Heinzerling, K., and Ling, W. *Treatment for amphetamine withdrawal.* Cochrane Database Syst Rev, 2009(2): p. CD003021.
  122. Shoptaw, S.J., Kao, U., and Ling, W. *Treatment for amphetamine psychosis.* Cochrane Database Syst Rev, 2009(1): p. CD003026.
  123. Lee, N.K. and Rawson, R.A. *A systematic review of cognitive and behavioural therapies for methamphetamine dependence.* Drug Alcohol Rev, 2008. **27**: p. 309-317.

# Chapter Six: Service access among the cohort over follow-up

## Introduction

Chapter Six examines factors associated with, and enablers of, use of professional support among study participants and builds on the literature review presented in Chapter Five. The research presented in this chapter redresses the lack of prospective research on patterns of drug treatment and health and social support service utilisation among methamphetamine users.

The findings presented in Chapters One, Three and Four demonstrated that many study participants had accessed professional support for their methamphetamine use and/or related harms (including contact over their lifetimes, at the time of interview and/or during the follow-up period). Descriptions in the literature of drug treatment utilisation patterns among methamphetamine users have largely relied on data obtained from treatment-recruited samples [e.g., 344, 394, 447], and only partial understandings of dependent methamphetamine users who have limited experience of service engagement. A prospective investigation of Australian methamphetamine users over three years in the MATES [115, 248] described the characteristics of treatment entrants versus a quasi-control group of community-recruited methamphetamine users. However, to date, published MATES findings have focused primarily on treatment outcomes [115, 248] and no information has been published regarding use of non-drug-specialist health and social support services by MATES participants.

Chapter Six completes the set of empirical papers included in this thesis. This chapter examines patterns of drug treatment and health and social support service utilisation among study participants. Specifically, the research presented in this chapter explored the characteristics and behaviours of participants associated with current (at baseline and follow-up interviews) contact with professional support for methamphetamine use and/or related harms. Further analyses examine predictors of initiating contact with services during the follow-up period among participants not reporting contact with professional support at baseline. The information presented in Chapter Six will contribute to the development of targeted treatment and harm reduction initiatives for methamphetamine users who are unlikely to access services for methamphetamine use and related harms, but who would very plausibly benefit from professional intervention.

The information presented in this chapter represents the following submitted manuscript:

**Quinn, B.,** Stoové, M., & Dietze, P. *Factors associated with professional support access among a prospective cohort of methamphetamine users.* J Subst Abuse Treat. Submitted 21<sup>st</sup> September 2012.

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## Declaration for Thesis: Chapter Six

**Monash University**

### Declaration by candidate

In the case of Chapter Six, the nature and extent of my contribution to the work was the following:

Nature of contribution	Extent of contribution (%)
Study design, data collection and analysis, results interpretation, manuscript preparation and review	75

The following co-authors contributed to the work. Co-authors who are students at Monash University must also indicate the extent of their contribution in percentage terms:

Name	Nature of contribution	Extent of contribution (%) for student co-authors only
Mark Stoové	Results interpretation, manuscript preparation and review	N/A
Paul Dietze	Study design, results interpretation, manuscript preparation and review	N/A

**Candidate's  
Signature**

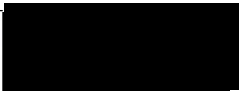
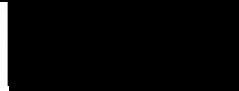
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### Declaration by co-authors

The undersigned hereby certify that:

- (1) the above declaration correctly reflects the nature and extent of the candidate's contribution to this work, and the nature of the contribution of each of the co-authors.
- (2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
- (3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

- (4) there are no other authors of the publication according to these criteria;
- (5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
- (6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

<b>Location(s)</b>	<b>Centre for Population Health, Burnet Institute</b>	
<b>Signature 1</b>		<b>Date</b> <b>29/10/2012</b>
<b>Signature 2</b>		<b>29/10/2012</b>

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# **Factors associated with professional support access among a prospective cohort of methamphetamine users**

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## Abstract

Encouraging out-of-treatment methamphetamine users who engage in problematic use patterns to initiate access of drug treatment and other health and support services is a key focus of drug policy. We followed a community-recruited cohort (N=255) of regular methamphetamine users in Melbourne, Australia, to investigate patterns of engagement with professional support for methamphetamine use and/or associated harms over 12 months. Multivariate logistic regression identified factors independently associated with initiating contact with services during follow-up. Generalised estimating equations identified factors associated with current (at the time of interview) service access. General practitioners were the most common source of professional support during follow-up (24%). Overall, service utilisation was associated with riskier methamphetamine use patterns (e.g., injecting), professional support access for other issues (e.g., mental health), and greater experience of methamphetamine-related harms (e.g., adverse social consequences). These findings provide insights to inform strategies that will improve treatment initiation and retention by methamphetamine users.

## Introduction

Most research of service access by methamphetamine users has focused on treatment outcomes from individuals sampled at the point of specialist drug treatment entry or during treatment episodes [e.g., 139, 171, 238, 315, 368]. This work shows that methamphetamine users who utilise drug treatment exhibit extensive polysubstance use [139], a high prevalence of mental health issues [171], and low socioeconomic status [238]. However, there is less research comparing methamphetamine users who access treatment to those who do not. Understanding more about those who do not access treatment, particularly those whose profile suggests they might benefit from professional intervention, will inform strategies for improving treatment coverage amongst methamphetamine users.

Few studies have examined patterns of professional support utilisation among methamphetamine users outside of the specialist drug treatment sector. This is a significant gap, given that general practitioners (GPs) are a common entry-point to the drug treatment sector and are often accessed by psychostimulant users who are seeking advice or assistance about their use [216, 217]. Further, the well-established association between methamphetamine use and psychiatric issues [148, 260] suggests that some users may be in contact with generalist mental health services. An improved understanding of the ways methamphetamine users access services outside of the specialist drug treatment sector could be used to increase the capacity of general healthcare providers to appropriately address the needs of methamphetamine-using clients and facilitate effective referral pathways [219]. Further, improved knowledge of the characteristics of methamphetamine users who are not in contact with the service system, yet who would potentially benefit from professional intervention, could be used to inform the development of targeted programs designed to assist methamphetamine users who are less likely to access professional support.

Cross-sectional studies have explored some of these issues, showing that drug treatment and health and support service utilisation was generally associated with heavier and riskier drug use patterns and greater experience of associated harms and other indicators of disadvantage [218, 251]. For example, Kelly et al. [218] showed that past-month GP access among regular methamphetamine users was independently associated with poor physical and mental health and past-year heroin injection. Lifetime access of drug treatment for methamphetamine use was independently associated with methamphetamine dependence, lifetime injection of heroin and being born outside of Australia. Similarly, McKetin and Kelly [251] showed that, in a sample of dependent methamphetamine users, participants who were female, full-time employed, born overseas and smoked methamphetamine (versus other routes of administration) were less likely to report lifetime drug treatment access. These cross-sectional studies (and other research in this area



[e.g., 119]) cannot determine temporal trajectories of service access and the factors that predicted individuals not previously in contact with the service sector engaging with professional support. However, available prospective studies in this domain provide few insights because most examine the period following treatment entry [e.g., 346], precluding a thorough exploration of service utilisation trajectories of those outside of the specialist drug treatment sector.

In this study we address these research gaps by examining utilisation of professional support services among a cohort of methamphetamine users in Melbourne to: 1) describe patterns of drug treatment and health and support service utilisation over the study's 12-month follow-up period; 2) identify factors associated with initiating contact with professional support for methamphetamine use during follow-up; and 3) investigate the characteristics and behaviours associated with current (at the time of baseline or follow-up interview) access of professional support for methamphetamine use and/or related harms.

## **Materials and methods**

### ***Sample***

The study's broad methods and measures have been described in detail elsewhere [357]. Briefly, the cohort was recruited through a combination of targeted, respondent-driven, street outreach and snowball sampling methods across Melbourne, Australia, between January and October 2010, with 12-month follow-up interviews conducted during the equivalent period in 2011. Inclusion criteria comprised: being aged 18 years or over; residing in metropolitan Melbourne at the time of recruitment; and using methamphetamine (e.g., speed powder, crystal methamphetamine/'ice') at least monthly during the six months preceding the baseline interview. Written informed consent was obtained from all respondents prior to participation. To maximise participant retention, the researchers obtained contact details (e.g., fixed/mobile phone numbers, email and postal address details) for participants and nominated secondary contacts (e.g., family members, peers, workers) at the baseline interview. We attempted to maintain regular (i.e., quarterly) contact with participants during the follow-up period. The study was approved by the Monash University Human Research Ethics Committee.

### ***Questionnaire administration and measures***

Participants were administered a structured questionnaire at both baseline and follow-up that collected information on: socio-demographics; lifetime and current/recent drug use patterns; mental and physical health; involvement in risk behaviours; experience of methamphetamine-related harms; experience of drug treatment and relevant health and support services; personal methods of ceasing/reducing methamphetamine use; and incarceration history and involvement in

criminal behaviours. Baseline questionnaires were conducted face-to-face at mutually convenient times and locations (e.g., cafes, parks). Follow-up interviews were conducted face-to-face where possible; however, participants who had moved away from Melbourne since the baseline interview were administered the follow-up survey by phone.

Validated instruments administered to participants included: the Severity of Dependence Scale (SDS) [270] to classify methamphetamine dependence; the Kessler 10 (K10) [275] to measure psychological distress over the previous month; the seven-item ENRICH Social Support Inventory (ESSI) [358, 373] to measure self-perceived social support; and select questions from the Opiate Treatment Index (OTI) Crime Scale [273].

Treatment and health and support service utilisation for methamphetamine use was determined by self-report. At baseline, participants were asked about lifetime and current professional support access for methamphetamine use. At follow-up, participants were asked about current utilisation of professional support and access since the baseline interview. Specifically, participants were asked to comment on their access of six specialist drug treatment modalities in relation to methamphetamine use and/or associated harms: individual (one-on-one) drug counselling; group counselling; residential rehabilitation; and residential, outpatient and home withdrawal/detoxification services. Utilisation of GPs and generalist psychiatric services for methamphetamine use was also assessed, in addition to the use of emergency services (i.e., hospital, ambulance) on the basis of previously reported high rates of emergency service access by methamphetamine users [39, 222, 225].

### ***Design and statistical analysis***

Descriptive analyses examined the number of participants reporting lifetime, past-year and current contact with the service types listed above (Table 1). Logistic regression identified bivariate associations between service access over the follow-up period (among those not in contact with any service at baseline, N=159) and factors assessed at baseline and follow-up (i.e., socio-demographics, health status, drug use patterns, experience of related harms, involvement in criminal behaviours). Factors significant ( $p < 0.05$ ) at the bivariate level were entered into a multivariate logistic regression model (using stepwise backwards elimination and controlled for age and sex) to identify adjusted associations with service access (Table 2). Adequacy of the final multivariate model was assessed using the Hosmer-Lemeshow goodness-of-fit test [359]. Bivariate generalised estimating equations (GEE) identified unadjusted associations between current service utilisation and the factors listed above at baseline and follow-up. A multivariate GEE model, achieved by backwards elimination and controlled for age and sex, identified

characteristics and behaviours that were independently associated with current service access for methamphetamine use (Tables 3). Adequacy of the final multivariate GEE model was assessed using the quasiliikelihood under the independence model criterion [374]. All data analyses were conducted using Stata Version 11.1 (Statacorp LP, Texas, USA) with a significance level of  $p < 0.05$ .

## Results

### *Sample characteristics*

The characteristics of the 255 baseline participants have been discussed in detail elsewhere [357]. Briefly, at baseline participants were mostly male and Australian-born with a median age of 30 years. Most (62%) had not completed secondary education and unemployment was high (74%). Polysubstance use was universal; the majority of the sample reported past-month use of alcohol (85%), cannabis (81%) and illicit benzodiazepines (65%) in addition to methamphetamine. Approximately two-thirds (67%) had engaged in any recent criminal activity (excluding illicit drug use) and 38% had ever been incarcerated. Speed powder was the most common form of methamphetamine used (62%), and most participants (62%) mainly injected the drug. Eighty percent of baseline participants used methamphetamine at least weekly during the previous month and 60% were classified as methamphetamine-dependent according to the SDS.

Analysis of follow-up data (described in detail elsewhere [448]) showed a number of positive changes to participants interviewed at follow-up ( $N=201$ ), including significantly fewer reports of: unemployment; past-year homelessness; recent criminal behaviours; and ‘very high’ psychological distress. Frequency of past-month methamphetamine use decreased for the majority of follow-up participants (70%), and fewer participants were classified as methamphetamine-dependent (44% at follow-up versus 60% at baseline). The proportions of participants reporting recent use of other drugs decreased significantly for ecstasy, hallucinogens, illicit pharmaceutical stimulants, illicit benzodiazepines, tobacco, heroin and illicit opiate substitution therapy (OST).

### *Service utilisation*

At baseline, most participants reported lifetime access of any professional support for their methamphetamine use. However, less than one-quarter (22%) were currently in contact with any treatment or health/support service, despite 60% of the sample being classified as methamphetamine-dependent using the SDS. The most commonly accessed services for methamphetamine use and/or related harms (lifetime and current) were GPs, followed by one-on-one drug counsellors and generalist psychiatrists/psychologists (Table 1).

**Table 1: Utilisation of professional support for methamphetamine use and related harms at baseline (BL) and follow-up (FU) among participants who completed both interviews (N=201)**

	BL		FU		
	Ever n (%)	Current n (%)	Anytime during FU period* n (%)	Initiated since	
				BL** n (%)	Current n (%)
<b>One-on-one drug counselling</b>	73 (36)	16 (8)	40 (20)	24 (12)	17 (8)
<b>Group counselling</b>	24 (12)	0 (0)	8 (4)	5 (2)	0 (0)
<b>GP</b>	84 (42)	17 (8)	49 (24)	32 (17)	16 (8)
<b>Generalist psychiatric service</b>	49 (24)	12 (6)	27 (13)	15 (8)	11 (5)
<b>Withdrawal/detoxification</b>					
<i>Residential</i>	34 (17)	-	8 (4)	8 (4)	-
<i>Outpatient</i>	2 (1)	0 (0)	0 (0)	-	-
<i>Home/community-based</i>	10 (5)	0 (0)	0 (0)	-	-
<b>Residential rehabilitation</b>	19 (9)	-	3 (1)	3 (1)	-
<b>Hospital***</b>	16 (8)	-	8 (4)	8 (4)	-
<b>Ambulance</b>	19 (9)	-	8 (4)	8 (4)	-
<b>Any</b>	116 (58)	42 (21)	84 (42)	42 (26)	33 (16)

\*Includes contact at baseline

\*\*Not in contact with service/s at baseline

\*\*\*Includes access of emergency department and/or other areas

There was a non-significant decrease in the percentage of participants reporting current service access at follow-up (16%) compared to baseline (22%). One-quarter (n=14) of the participants in contact with services for methamphetamine use at baseline (n=56) were accessing professional support at follow-up. Overall, 42% (n=84) of participants interviewed at follow-up reported utilising any professional support for methamphetamine use and/or associated harms in the follow-up period (including current access at baseline). Over one-quarter (26%) of follow-up participants reported initiating contact with professional support during follow-up after having no such contact at baseline. Again, GPs were the most commonly accessed service type during the follow-up period, followed by one-on-one drug counselling and generalist psychiatric services. Participants initiating professional support for methamphetamine use reported spending a median of 17 weeks in regular contact with a one-on-one drug counsellor during the follow-up period (range: 1-52), compared to six weeks with a generalist psychiatrist/psychologist (range: 1-52), six weeks in residential rehabilitation (range: 1-6); four weeks with a GP (range: 1-52), two weeks in group counselling (range: 1-16), and one week in residential withdrawal/detoxification (range: 1-26).

Of the participants who did not report injecting the drug but were classified as methamphetamine dependent at baseline (n=49) and follow-up (n=24), only 14% (n=7) and 13% (n=3) were currently in contact with any professional support, respectively.

### ***Predictors of service access during the follow-up period***

Factors independently associated with utilisation of professional support during follow-up, among participants not in contact with any services at baseline (n=159), included: seeking help to reduce/cease methamphetamine use from family and/or friends during the 12 months prior to baseline; service access for mental health issues during follow-up; attempting any method to reduce/cease methamphetamine use (e.g., intentional drug substitution, isolation) without assistance (professional or otherwise) since baseline; and accessing professional support for 'other' drugs during this time. Participants who reported reduced (or no) experience of methamphetamine-related relationship/social problems at follow-up were less likely to access services for methamphetamine use and/or associated harms during the follow-up period (Table 2).

**Table 2: Significant predictors of service access for methamphetamine use during the follow-up (FU) period (i.e., excluding those in contact with professional support at baseline (BL))**

Variable	TOTAL N=159 n (%)	Accessed professional support since baseline?		Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
		Yes n=42 n (%)	No n=117 n (%)		
Employed at BL	52 (33)	8 (19)	44 (38)	0.39 (0.17-0.92)	
K10 total score at BL, median (range)	23 (10-50)	29 (10-44)	22 (10-50)	1.07 (1.03-1.12)	
Accessed professional support for mental health issues during 12 months pre-BL	89 (56)	33 (79)	56 (48)	3.99 (1.76-9.08)	
Prescribed any mental health medication/s at BL	59 (37)	23 (55)	36 (31)	2.72 (1.32-5.61)	
BL relationship status:					
<i>Married/de facto</i>	29 (18)	11 (26)	18 (15)	1	
<i>Stable relationship, not living together</i>	40 (25)	6 (14)	34 (29)	0.29 (0.09-0.91)	
<i>No current stable relationship</i>	90 (57)	25 (60)	65 (56)	0.63 (0.26-1.52)	
Has children at BL and/or FU	42 (26)	17 (40)	25 (21)	2.50 (1.17-5.34)	
Number of close friends in contact with at BL:					
<i>None</i>	16 (10)	7 (17)	9 (8)	1	
<i>1-5</i>	69 (43)	21 (50)	48 (41)	0.56 (0.18-1.71)	
<i>6-10</i>	39 (25)	10 (24)	29 (25)	0.44 (0.13-1.50)	
<i>&gt;10</i>	35 (22)	4 (10)	31 (27)	0.17 (0.04-0.70)	
SDS at BL:					
<i>Methamphetamine-dependent (SDS<math>\geq</math>4)</i>	85 (53)	35 (83)	50 (43)	6.70 (2.75-16.32)	
<i>SDS total score, median (range)</i>	4 (0-13)	8 (0-12)	3 (0-13)	1.37 (1.21-1.55)	
Frequency of methamphetamine use at BL, median (range)	2 (0.25-7)	2 (0.25-7)	1.5 (0.25-7)	1.23 (1.01-1.48)	
Main route of methamphetamine administration at BL:					
<i>Inject</i>	90 (57)	29 (69)	61 (52)	1	
<i>Smoke</i>	30 (19)	8 (19)	22 (19)	0.76 (0.30-1.92)	

Variable	TOTAL N=159 n (%)	Accessed professional support since baseline?		Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
		Yes n=42 n (%)	No n=117 n (%)		
<i>Snort/swallow</i>	39 (25)	5 (12)	34 (29)	0.31 (0.11-0.87)	
Sought help from family/friends for reducing/ceasing methamphetamine during 12 months pre-BL	42 (26)	21 (50)	21 (18)	4.57 (2.12-9.85)	5.35 (1.74-16.43)
Lifetime access of professional support for other** drug use at BL	104 (65)	33 (79)	71 (61)	2.38 (1.04-5.42)	
Change to experience of methamphetamine-related past-year financial harms <sup>y</sup>	n=156	n=41	n=115		
<i>Problems/no-problems – problems</i>	69 (44)	25 (61)	44 (38)	1	
<i>Problems/no-problems – no problems</i>	87 (56)	16 (39)	71 (62)	0.40 (0.19-0.82)	
Change to experience of methamphetamine-related past-year criminogenic harms <sup>y</sup>	n=156	n=41	n=115		
<i>Problems/no-problems – problems</i>	21 (13)	10 (24)	11 (10)	1	
<i>Problems/no-problems – no problems</i>	135 (87)	31 (76)	104 (90)	0.33 (0.13-0.84)	
Change to experience of methamphetamine-related past-year relationship/social harms <sup>y</sup>	n=156	n=41	n=115		
<i>Problems/no-problems – problems</i>	64 (41)	27 (66)	37 (32)	1	1
<i>Problems/no-problems – no problems</i>	92 (59)	14 (34)	78 (68)	0.25 (0.12-0.52)	0.22 (0.08-0.59)
K10 total score at FU, median (range)	20 (10-42)	22 (10-39)	18.5 (10-42)	1.06 (1.01-1.11)	
Accessed professional support access mental health issues since BL	90 (57)	38 (90)	52 (44)	11.87 (3.98-35.42)	12.29 (3.14-48.15)
Prescribed any mental health medication/s at FU	60 (38)	24 (57)	36 (31)	3.00 (1.45-6.20)	
Number of close friends in contact with at FU:					
<i>None</i>	14 (9)	7 (17)	7 (6)	1	
<i>1-5</i>	80 (50)	24 (57)	56 (48)	0.43 (0.14-1.36)	
<i>6-10</i>	33 (21)	9 (21)	24 (21)	0.38 (0.10-1.37)	
<i>&gt;10</i>	32 (20)	2 (5)	30 (26)	0.07 (0.01-0.39)	

Variable	TOTAL N=159 n (%)	Accessed professional support since baseline?		Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
		Yes n=42 n (%)	No n=117 n (%)		
SDS at FU:	n=156	n=41	n=115		
<i>Methamphetamine-dependent (SDS<sub>≥</sub>4)</i>	60 (38)	25 (61)	35 (30)	3.57 (1.70-7.51)	
<i>SDS total score, median (range)</i>	2.5 (0-14)	5 (0-14)	1 (0-10)	1.31 (1.16-1.48)	
Sought help from family/friends for reducing/ceasing methamphetamine use since BL	29 (18)	16 (38)	13 (11)	4.92 (2.11-11.50)	
	n=158		n=116		
Attempted any <sup>‡</sup> method of reducing/ceasing use without help since BL	94 (59)	36 (86)	58 (50)	6.00 (2.35-15.33)	6.15 (1.84-20.56)
Access of professional support for other** drug use since BL	66 (42)	27 (64)	39 (33)	3.60 (1.72-7.54)	9.98 (3.05-32.64)

\*Hosmer-Lemeshow goodness-of-fit test p=0.905

\*\*I.e., licit and illicit substances other than methamphetamine

<sup>‡</sup>Compares participants who continued or started experiencing methamphetamine-related problems at FU, to those who ceased experiencing such harms or failed to experience them at BL and FU

<sup>‡</sup> Includes: 'cold turkey', substitution of other drugs, taking a geographical/health trip, isolating self, moving and avoidance of specific friends/acquaintances/social networks



### ***Correlates of current service access***

Despite a number of significant bivariate associations, current access of professional support for methamphetamine use was independently associated with only three factors: past-year service access for mental health issues; current methamphetamine dependence; and mainly injecting methamphetamine compared to smoking and snorting/swallowing the drug (Table 3).

**Table 3: Significant correlates of current service access for methamphetamine use\***

<b>Variable</b>	<b>Unadjusted OR (95% CI)</b>	<b>Adjusted OR (95% CI)</b>
<b>Age (years)</b>	1.04 (1.01-1.06)	
<b>Currently enrolled in education (part- or full-time)</b>	0.52 (0.08-0.84)	
<b>Arrested during the last 12 months</b>	1.93 (1.20-3.09)	
<b>ESSI7 (social support)</b>	0.96 (0.93-1.00)	
<b>K10 (psychological distress)</b>	1.04 (1.01-1.06)	
<b>Accessed professional support for mental health issues last 12 months</b>	5.91 (3.05-11.43)	5.02 (2.54-9.94)
<b>Has children</b>	2.36 (1.40-3.96)	
<b>Number of close friends in contact with:</b>		
<i>None</i>	<i>1</i>	
<i>1-5</i>	<i>0.79 (0.38-1.67)</i>	
<i>6-10</i>	<i>0.55 (0.23-1.30)</i>	
<i>&gt;10</i>	<i>0.18 (0.06-0.56)</i>	
<b>Methamphetamine-dependent (SDS<math>\geq</math>4)</b>	2.95 (1.74-5.00)	2.34 (1.34-4.08)
<b>Main route of methamphetamine administration:</b>		
<i>Inject</i>	<i>1</i>	<i>1</i>
<i>Smoke</i>	<i>0.39 (0.19-0.78)</i>	<i>0.43 (0.21-0.89)</i>
<i>Snort/swallow</i>	<i>0.11 (0.03-0.39)</i>	<i>0.16 (0.05-0.54)</i>
<b>Recent**:</b>		
<i>Injecting drug use (any drug)</i>	<i>2.94 (1.63-5.30)</i>	
<i>Alcohol use</i>	<i>0.55 (0.31-0.99)</i>	
<i>Heroin use</i>	<i>1.65 (1.02-2.68)</i>	
<i>Hallucinogen use</i>	<i>0.39 (0.17-0.87)</i>	
<b>Recent** methamphetamine use frequency (days/week)</b>	1.17 (1.04-1.32)	
<b>Currently prescribed OST</b>	2.17 (1.30-3.63)	
<b>(Last 12 months) methamphetamine use resulted in:</b>		
<i>Relationship/social problems</i>	<i>2.10 (1.30-3.38)</i>	
<i>Fights/arguments</i>	<i>1.93 (1.19-3.12)</i>	
<i>Causing/incurring methamphetamine-related injuries</i>		
<i>Work/study problems</i>	<i>1.69 (1.02-2.79)</i>	
<i>Financial problems</i>	<i>1.93 (1.16-3.22)</i>	
<i>Legal/police problems</i>	<i>2.03 (1.14-3.58)</i>	
<b>Ever overdosed on methamphetamine</b>	2.14 (1.15-4.00)	
<b>(Last 12 months) regret making decisions while methamphetamine-intoxicated</b>	<i>1</i>	
<i>None-minority of the time</i>	<i>1.98 (1.21-3.22)</i>	
<i>Half-all the time</i>		
<b>Sought help from family/peers for reducing/ceasing methamphetamine use last 12 months</b>	2.32 (1.42-3.78)	

<b>Variable</b>	<b>Unadjusted OR (95% CI)</b>	<b>Adjusted OR (95% CI)</b>
<b>Attempted any** method of reducing/ceasing methamphetamine use without professional support last 12 months</b>	1.68 (1.01-2.77)	
<b>Ever accessed professional support for other drugs</b>	5.46 (2.48-11.99)	

\*Results are from GEE with a binary distribution for the dependent variable and a final model comprising 449 observations

\*\*Past month

## Discussion

This study investigated patterns of drug treatment and health and support service utilisation for methamphetamine use and related harms among a prospective cohort of Melbourne-based methamphetamine users over 12 months. Reflecting previous findings [216-218], GPs were the most common source of professional support for methamphetamine users. This may indicate greater accessibility, availability, familiarity and high levels of GP utilisation for other health issues in comparison to other service types [449-451]. For these reasons, GPs are also likely to be a common starting point when methamphetamine users are seeking referral to drug treatment services [216, 218]. One-on-one drug counsellors were the most common specialist drug service type accessed by participants, and the service that participants spent the most time in contact with over the follow-up period. Only small numbers of participants reported access of more intensive drug treatment services (i.e., residential detoxification/withdrawal and/or rehabilitation) for methamphetamine use. This might be suggestive of a preference for low versus high threshold treatment services or forms of professional support among methamphetamine users [217]. Alternatively, many individuals may be able to address dependent and harmful methamphetamine use patterns without the need for intensive professional intervention [63, 111, 112].

We also explored the characteristics of methamphetamine-using individuals most likely to access professional support. To this end, our findings accord somewhat with those of Kelly et al. [218] and McKetin and Kelly [251], in that heavier use patterns were associated with service utilisation. For example, McKetin and Kelly [251] found that methamphetamine smokers were less likely to access drug treatment in their lifetime than individuals who preferred other routes of administration. In the current study, methamphetamine injectors were significantly more likely to currently be in contact with professional support than methamphetamine smokers and snorters/swallowers. This could result from a greater availability of services targeting people who inject drugs (e.g., needle syringe programs (NSPs)), which facilitates pathways to drug treatment and other relevant health/support services for methamphetamine injecting sub-groups. Our findings support calls from other researchers who have suggested the provision of smoking equipment through NSPs could serve the dual purpose of providing harm reduction alternatives to injecting and improving professional support access to methamphetamine smokers [25, 452].

In this study, service utilisation for other issues, including mental health problems and other drug use, increased the likelihood of professional support access for methamphetamine use and/or associated harms. Given the well-established association between methamphetamine use and mental health problems [148, 260] and high levels of polysubstance use among methamphetamine users [280], service contact for these issues potentially increases the opportunity for treatment of

methamphetamine use and referral to appropriate professional support if needed. It is also possible that such contact is associated with the diminishment of particular barriers to professional support among methamphetamine users, such as naivety regarding available services and stigma associated with drug treatment utilisation [295, 324]. These findings suggest a need to facilitate professional support pathways for methamphetamine users who engage in harmful use patterns, yet who are not in regular contact with frontline health and support services. For example, dependent methamphetamine users who do not engage in injecting drug use.

Among participants not in contact with professional support for methamphetamine use at baseline, two key factors were associated with initiating contact with services during follow-up. These were: seeking help from family and/or peers in the year prior to baseline, and adopting personal methods of methamphetamine reduction/cessation without help during the follow-up period (e.g., purposeful drug substitution). These findings may suggest increased levels of motivation to change drug use patterns among these participants; such treatment readiness has been identified as a key factor in drug treatment utilisation, retention and better treatment outcomes [375, 383]. The implementation of targeted initiatives to identify and access individuals when they first experience ‘readiness to change’ [48] could have significant implications for earlier methamphetamine treatment initiation/utilisation and harm reduction.

Previous research has demonstrated the complex interactions between social factors, substance use and service utilisation among methamphetamine users [64, 216]. For example, surveys of amphetamine users in the UK indicated that weak peer affiliation was independently associated with seeking help for drug use [233]. Accordingly, in this study, participants with reduced experience of relationship/social problems were less likely to access services over the follow-up period. This means that adverse social outcomes associated with methamphetamine use may be considerable motivators for service utilisation among methamphetamine users. Overall, our findings highlight a need for targeted interventions to improve pathways to professional support among methamphetamine users engaging in harmful use patterns who have limited professional and social support networks. Such initiatives could also aim to educate users about identifying significant harms associated with methamphetamine use other than adverse social outcomes.

### ***Limitations***

The baseline interview possibly served as a de facto intervention which motivated some participants to access professional support during the follow-up period for their methamphetamine use [63]. This may have resulted in over-estimates of service access and contributed to a range of improved outcomes among the cohort at follow-up. However, even then, only a relatively small

number of participants engaged with services during follow-up, which also means that statistical precision of the study on this key outcome was low. Finally, in spite of our attempts to minimise attrition, we lost contact with some participants. Participant attrition is a source of systematic bias intrinsic to longitudinal cohort studies [391]. Those lost to follow-up were significantly more likely to: be male; have experienced homelessness during the year prior to baseline recruitment; be unemployed; be less educated; report a history of incarceration; mainly use crystal methamphetamine/‘ice’; engage in riskier alcohol consumption patterns; and have experienced recent methamphetamine-related legal problems at baseline. These differences suggest that participants lost to follow-up might have been more likely to continue engaging in risky drug use behaviours compared to those retained in the study.

## **Conclusion**

This study examined patterns of drug treatment and health and support service utilisation in a prospective cohort of regular methamphetamine users in Melbourne, Australia. Service access was associated with riskier drug use patterns, greater experience of methamphetamine-related harms, and service access for mental health issues and other drug use. These findings build on current understandings of professional support utilisation trajectories among methamphetamine-using populations. They highlight the potential for targeted interventions designed to access non-methamphetamine-injectors and methamphetamine users with limited social and professional support networks. Such initiatives will assist with improving treatment engagement and retention among methamphetamine-using populations.

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## References

1. Gonzales, R., Ang, A., Marinelli-Casey, P., Glik, D.C., Iguchi, M.Y., and Rawson, R.A. *Health-related quality of life trajectories of methamphetamine-dependent individuals as a function of treatment completion and continued care over a 1-year period*. J Subst Abuse Treat, 2009. **37**(4): p. 353-361.
2. Brecht, M., Greenwell, L., and Anglin, M.D. *Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002)*. J Subst Abuse Treat, 2005. **29**: p. 295-306.
3. McKetin, R., Kelly, E., and Indig, D. *Characteristics of treatment provided for amphetamine use in New South Wales, Australia*. Drug Alcohol Rev, 2005. **24**(5): p. 433-436.
4. Huber, A., Ling, W., Shoptaw, S., Gulati, V., Brethen, P., and Rawson, R. *Integrating Treatments for Methamphetamine Abuse: A Psychosocial Perspective*. J Addict Dis, 1997. **16**(4): p. 41-50.
5. McKetin, R., Lubman, D.I., Lee, N.M., Ross, J.E., and Slade, T.N. *Major depression among methamphetamine users entering drug treatment programs*. Med J Aust, 2011. **195**(3): p. S51-5.
6. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. Drug Alcohol Rev, 1999. **18**: p. 63-73.
7. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. Drug Alcohol Depend, 1997. **46**: p. 105-113.
8. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. Australian Psychologist, 2005. **40**(2): p. 88-95.
9. Darke, S., Kaye, S., McKetin, R., and Duflou, J. *Major physical and psychological harms of methamphetamine use*. Drug Alcohol Rev, 2008. **27**(3): p. 253-262.
10. Saltman, D.C., Newman, C.E., Mao, L., Kippax, S.C., and Kidd, M.R. *Experiences in managing problematic crystal methamphetamine use and associated depression in gay men and HIV positive men: in-depth interviews with general practitioners in Sydney, Australia*. BMC Family Practice, 2008. **9**(45): p. 1-7.
11. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.



12. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
13. Christian, D.R., Huber, A., Brecht, M.L., McCann, M.J., Marinelli-Casey, P., Lord, R.H., Reiber, C., Lu, T.H., Project, T.M.T., and Galloway, G.P. *Methamphetamine Users Entering Treatment: Characteristics of the Methamphetamine Treatment Project Sample*. Subst Use Misuse, 2007. **42**(14): p. 2207-2222.
14. Gossop, M., Marsden, J., and Stewart, D. *Treatment outcomes of stimulant misusers: one year follow-up results from the National Treatment Outcome Research Study (NTORS)*. Addict Behav, 2000. **25**(4): p. 509-522.
15. Quinn, B., Stoové, M., Papanastasiou, C., and Dietze, P. *Methamphetamine use in Melbourne, Australia: baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence*. Journal of Substance Use, 2012. **Early online**: p. 1-14.
16. Topp, L. and Mattick, R.P. *Choosing a cutoff on the Severity of Dependence Scale (SDS) for amphetamine users*. Addiction, 1997. **92**(7): p. 839-845.
17. Kessler, R.C. *Kessler Psychological Distress Scale (K10)*. 1996. Harvard Medical School. Boston, MA.
18. Mitchell, P.H., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., and Berkman, L.F. *A short social support measure for patients recovering from myocardial infarction: the ENRICHD Social Support Inventory*. J Cardiopulm Rehabil, 2003. **23**(6): p. 398-403.
19. Gottlieb, B.H. and Bergen, A.E. *Social support concepts and measures*. Journal of Psychosomatic Research, 2010. **69**(5): p. 511-520.
20. Darke, S., Hall, W., Wodak, A., Heather, N., and Ward, J. *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index*. British Journal of Addiction, 1992. **87**: p. 733-742.
21. Lloyd, B. *Trends in alcohol and drug related ambulance attendances in Melbourne: 2010/11*. 2012. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.
22. Gray, S.D., Fatovich, D.M., McCoubrie, D.L., and Daly, F.F. *Amphetamine-related presentations to an inner-city tertiary emergency department: a prospective evaluation*. Med J Aust, 2007. **186**(7): p. 336-339.
23. Hendrickson, R.G., Cloutier, R., and McConnell, K.J. *Methamphetamine-related emergency department utilization and cost*. Acad Emerg Med, 2008. **15**(1): p. 23-31.
24. Hosmer, D.W. and Lemeshow, S., *Applied Logistic Regression*. 2nd ed. 2000, New York: Wiley.

25. Cui, J. *QIC program and model selection in GEE analyses*. The Stata Journal, 2007. **7**(2): p. 209-220.
26. Quinn, B., Stoové, M., and Dietze, P. *One-year changes in methamphetamine use, dependence and remission in a community-recruited cohort*. Addiction, Submitted.
27. Hindler, C., Nazareth, I., King, M., Cohen, J., Farmer, R., and Gerada, C. *Drug users' views on general practitioners*. BMJ, 1995. **310**(6975): p. 302.
28. McGeary, K.A. and French, M.T. *Illicit Drug Use and Emergency Room Utilization*. HSR: Health Services Research, 2000. **35**(1): p. 153-169.
29. Darke, S., Ross, J., Teesson, M., and Lynskey, M. *Health service utilization and benzodiazepine use among heroin users: findings from the Australian Treatment Outcome Study (ATOS)*. Addiction, 2003. **98**(8): p. 1129-1135.
30. Borders, T.F., Booth, B.M., Han, X., Wright, P., Leukefeld, C., Falck, R.S., and Carlson, R.G. *Longitudinal changes in methamphetamine and cocaine use in untreated rural stimulant users: racial differences and the impact of methamphetamine legislation*. Addiction, 2008. **103**(5): p. 800-808.
31. Cunningham, J.A. *Untreated remissions from drug use: the predominant pathway*. Addict Behav, 1999. **24**(2): p. 267-270.
32. Hser, Y.I., Huang, D., Brecht, M.L., Li, L., and Evans, E. *Contrasting trajectories of heroin, cocaine, and methamphetamine use*. J Addict Dis, 2008. **27**(3): p. 13-21.
33. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., Wodak, A., Howard, J., and the Reference Group to the United Nations on HIV and injecting drug use. *Meth/amphetamine use and associated HIV: Implications for global policy and public health*. Int J Drug Policy, 2010. **21**: p. 347-358.
34. Leonard, L., DeRubeis, E., Pelude, L., Medd, E., Birkett, N., and Seto, J. *"I inject less as I have easier access to pipes": injecting, and sharing of crack-smoking materials, decline as safer crack-smoking resources are distributed*. Int J Drug Policy, 2008. **19**(3): p. 255-264.
35. Darke, S. and Hall, W. *Levels and correlates of polydrug use among heroin users and regular amphetamine users*. Drug Alcohol Depend, 1995. **39**(3): p. 231-235.
36. Semple, S.J., Grant, I., and Patterson, T.L. *Utilization of Drug Treatment Programs by Methamphetamine Users: The Role of Social Stigma*. Am J Addict, 2005. **14**(4): p. 367-380.
37. Pennay, A., Ferris, J., Reed, M., Devaney, M., and Lee, N. *Evaluation of 'Access Point' Specialist Methamphetamine Clinic*. 2010. Turning Point Alcohol and Drug Centre. Fitzroy, Melbourne.

38. Joe, G.W., Simpson, D.D., and Broome, K.M. *Effects of readiness for drug abuse treatment on client retention and assessment of process*. *Addiction*, 1998. **93**(8): p. 1177-1190.
39. Baker, A., Lee, N.K., Claire, M., Lewin, T.J., Grant, T., Pohlman, S., Saunders, J.B., Kay-Lambkin, F., Constable, P., Jenner, L., and Carr, V.J. *Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction*. *Addiction*, 2005. **100**(3): p. 367-378.
40. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. *Drug Alcohol Rev*, 2001. **20**: p. 49-56.
41. Boshears, P., Boeri, M., and Harbry, L. *Addiction and sociality: Perspectives from methamphetamine users in suburban USA*. *Addict Res Theory*, 2011. **19**(4): p. 289-301.
42. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction*. *Drugs: education, prevention and policy*, 1994. **1**(3): p. 289-297.
43. Szklo, M. *Population-based Cohort Studies*. *Epidemiologic Reviews*, 1998. **20**(1): p. 81-90.

# Integrated discussion

Methamphetamine is a versatile drug. It is used by a range of people worldwide [5] for a variety of purposes, including: to increase energy/stamina for work or study [85, 453], to self-medicate for mental health issues [454], to enhance sexual experiences [83], for its appetite suppressant/weight loss properties [75] and ‘high’/euphoric effects [455] (among numerous other use motivations). However, methamphetamine consumption is associated with several forms of harms, including significant psychological and physical co-morbidity [45, 260], deleterious financial [217] and social outcomes [176], and transmission of BBVIs and STIs [110, 456]. These harms can impact significantly on methamphetamine users, the wider community and criminal justice and health/support systems [128, 148, 178, 226]. For this reason, the use of methamphetamine, particularly heavy and dependent use patterns, is a significant public health concern [188].

Despite the significance of methamphetamine use as a public health concern, the scientific literature contains substantial knowledge gaps relating to methamphetamine use and treatment, including only limited understandings of the natural history of its use and patterns of drug treatment and other service utilisation by methamphetamine users. Similar to studies of other primary substance users [367], research on these areas with respect to methamphetamine use has mainly involved samples of methamphetamine users recruited from treatment services or programs [e.g., 140, 368, 395, 457]. The research presented in this thesis aimed to address these gaps. Using a combination of literature reviews and empirical articles, this thesis examined methamphetamine use patterns and issues related to access of professional support (i.e., drug treatment and relevant health and social support services) for methamphetamine users. A core component of this investigation was analyses of data sourced from a prospective cohort of community-recruited methamphetamine users in Melbourne, Australia, who were first interviewed during 2010 and followed-up in 2011.

## **Methamphetamine use in Melbourne (and changes over time)**

### ***Cross-sectional analysis at baseline***

Chapter One of this thesis introduced the cohort of Melbourne-based, regular methamphetamine users recruited for this study. Few previous research projects have been specifically designed to investigate patterns of ATS or methamphetamine use in Melbourne [80, 264, 308, 349]. This is a significant oversight given that Melbourne is the second largest city in Australia [256], the high

levels of methamphetamine consumption in Australia relative to other countries [5], and the dynamic nature of ATS use, manufacture and trafficking patterns across the country over the last two decades [8, 10, 12, 458].

Chapter One provided valuable information on recent patterns of methamphetamine use in Melbourne, enabling broad comparisons between the cohort and methamphetamine-using samples recruited in other regions of Australia. Overall, the characteristics and behaviours of this study's sample at baseline generally mirrored those of previous Australian samples of ATS and methamphetamine users. For example, participants were predominantly male, unemployed, aged in their late twenties/early thirties, polysubstance users, non-Indigenous, Australian-born and from English-speaking backgrounds. These characteristics have remained fairly stable across Australian samples of methamphetamine users recruited during the last decade [e.g., 13, 20, 46, 50, 51, 103, 175, 231, 257, 459]. Most participants reported that speed powder was the main form of methamphetamine they currently used; this contrasts with some samples of Australian methamphetamine users that reported greater current or recent use of crystal methamphetamine or methamphetamine base [e.g., 103, 231, 459]. However, a high frequency of methamphetamine use (most used the drug at least weekly during the previous month), in addition to high rates of injecting and heroin use, mean that this study's sample was more similar to sentinel populations of PWID (e.g., the IDRS [17]) than those comprising regular ecstasy users (e.g., the EDRS [16]).

In addition to describing patterns of methamphetamine use in Melbourne, the first chapter also compared participants classified as methamphetamine-dependent (according to the SDS) to non-methamphetamine-dependent participants at baseline. Although few significant differences were found between these groups using multivariate logistic regression analysis, methamphetamine dependence was independently associated with three factors: experience of high psychological distress in the previous month, current use of prescribed mental health medication(s), and mainly injecting methamphetamine (versus other routes of administration). These identified associations between indicators of poor mental health [169, 213], injecting drug use patterns [51, 108] and methamphetamine dependence are consistent with previous research. Further, given low rates of current contact with professional support among the sample at baseline, this research suggests that little progress has been made towards effectively targeting such methamphetamine users and engaging them with professional support. It therefore provides some validity to the outcomes presented in the other empirical chapters of this thesis (e.g., the ongoing existence of barriers to professional support for methamphetamine users) and their broad applicability to informing policy and practice to enhance levels of service engagement among methamphetamine-using populations.

### *Follow-up findings*

The prospective nature of this overall study allowed examination of changes experienced by the cohort since baseline. Despite the limited follow-up period of 12 months, the research presented in Chapter Four is an important addition to the literature. It is one of very few studies to prospectively investigate patterns of methamphetamine and other drug use, experience of methamphetamine-related harms and changes to the psychosocial characteristics of a community-recruited cohort of methamphetamine users [63, 307]. Indeed, this was the first cohort study of community-recruited methamphetamine users to be conducted in Melbourne, and one of very few cohort studies specifically involving methamphetamine users in Australia [115, 257, 431].

Many of this study's participants experienced positive changes over the follow-up period. For example, levels of self-reported homelessness and/or unstable accommodation, past-month involvement in criminal behaviours, psychological distress and unemployment all decreased significantly from baseline. Corresponding with an overall reduction in methamphetamine use, at follow-up, significantly fewer participants reported past-month use of ecstasy, hallucinogens, illicit pharmaceutical stimulants, heroin, illicit benzodiazepines and illicit pharmacotherapies (methadone, buprenorphine, Suboxone) compared to baseline. This general decrease in self-reported use of 'other' substances, in addition to fewer reports of past-month drug injection and an overall decrease in expenditure on illicit drugs at follow-up, shows that reduced use of methamphetamine was associated with minimal drug substitution/uptake. These findings reflect those of Australian [375] and US research [376] of general declines in levels of non-primary drug use in tandem with reduced primary use of methamphetamine.

Following on from the examination of the participants' methamphetamine dependence outlined in Chapter One, one of the key aims of the research presented in Chapter Four was to investigate remission from dependence and identify factors associated with shifts from methamphetamine dependence at baseline to non-dependence during follow-up. Four factors significantly predicted remission from methamphetamine dependence at follow-up: maintaining or gaining employment over the follow-up period; being younger; a greater relative increase in self-perceived social support during follow-up; and not having sought assistance from family or peers to reduce/cease methamphetamine use since baseline. Crucially, accessing any form of professional support over the follow-up period was not associated with remission from methamphetamine dependence. A second analysis in Chapter Four explored changes in methamphetamine use frequency among the cohort. These findings need to be considered with respect to the limits associated with self-reports of past-month substance use frequency 12 months apart (e.g., the cyclical nature of methamphetamine use could not be taken into account); nevertheless, most participants (70%) reported reduced frequency of methamphetamine use at follow-up. Just under one-third (32%)

reported past-month abstinence from methamphetamine use at follow-up. Correlates of past-month abstinence at follow-up were: being female; residing in stable accommodation (i.e., permanent/secure housing); no involvement in past-month criminal behaviours; reduced dependence on methamphetamine; and no use of ecstasy or benzodiazepines in the past month.

These findings related to remission from dependence and past-month abstinence highlight the potential for some people to address problematic methamphetamine use patterns without the aid of professional support [63, 111, 112]. However, despite positive changes among the cohort overall, some participants sustained problematic methamphetamine use patterns and continued to experience substantial methamphetamine-related harms. For example, two-thirds of participants classified as methamphetamine-dependent at baseline who were followed-up (n=115) remained classified as dependent at follow-up. A minority (44%) of these participants had no contact with services since baseline. Some participants may therefore have benefited from drug treatment utilisation over the follow-up period; however, given that indicators of ‘functionality’ (e.g., social support, employment, stable accommodation) were associated with remission from dependence and reduced use among participants, investment in services or initiatives that enhance functionality and stability in users’ lives may be a suitable allocation of resources alongside funding of professional dependence services. Further, these results imply that dependence services need to be delivered more holistically and be incorporated with, or have clear referral pathways to, services such as housing and employment support.

### ***Possible changes in crystal methamphetamine use***

Despite a general reduction in substance use among the sample over the follow-up period, a significantly greater proportion of participants reported that crystal methamphetamine was the main form of methamphetamine they currently or most recently used at follow-up compared to baseline. This finding does need to be considered in the context of an overall decrease in methamphetamine use in the cohort; however, this shift in preferred methamphetamine form among participants is consistent with the findings of local drug trend monitoring systems around the same time. Although the cross-sectional nature of these monitoring systems warrants cautionary interpretations of findings, the Victorian arms of the IDRS [255] and EDRS projects [254] reported that significantly higher proportions of participants had recently (last six months) used crystal methamphetamine in 2011 compared to the previous year. In addition, the daily rate of crystal methamphetamine-related ambulance attendances in Melbourne increased significantly in the 2010-11 financial year compared to 2009-10 [39]. These findings imply an increase in the use and availability of crystal methamphetamine in Melbourne during this period. More recent IDRS and EDRS findings suggest that this trend continued in 2012 [458]. The proportion of

Victorian EDRS participants who reported use of crystal methamphetamine in the past six months increased from 38% in 2011 to 48% in 2012; likewise, the proportion of Victorian IDRS participants who reported recent use of crystal methamphetamine increased from 53% in 2011 to 59% in 2012. Again, while these findings should be interpreted with caution given the nature of this drug surveillance research (e.g., cross-sectional study design, error associated with self-report), they are consistent with the findings of this study.

A potential increase in crystal methamphetamine use in Melbourne is cause for concern given the increased likelihood of incurring certain harms due to the use of crystal methamphetamine versus other methamphetamine forms [19, 101, 460]. McKetin et al. [46] showed that regular methamphetamine users who used crystal methamphetamine were more likely to be methamphetamine-dependent than users of other methamphetamine forms (e.g., speed powder, base). Therefore, targeted initiatives could educate users about the harms associated with crystal methamphetamine use (e.g., higher rates of dependence among crystal methamphetamine users [46]) and available sources of professional support.

## **Barriers to access of professional support for methamphetamine users**

In consideration of low rates of current drug treatment utilisation among participating methamphetamine users (Chapter One), the second and third chapters in this thesis focus on barriers to use of professional support for this group. A review of the literature relating to service barriers for methamphetamine users appears in Chapter Two, and an investigation of self-reported barriers to professional support among the sample at baseline is described in Chapter Three. Unsurprisingly, the research presented in the literature review indicated that methamphetamine users experience service barriers which reflect those that impact on substance users more generally. These include both user-centred and systemic/structural impediments: accessibility problems (e.g., waiting lists and naivety of available services) [288, 324]; a lack of services equipped to meet the needs of female clients [250, 287]; stigma and negative staff attitudes associated with service access [289, 295]; and complex personal issues (e.g., poor physical and mental health, homelessness) [239, 288]. However, this review also highlighted impediments to professional support access that are particularly pertinent to methamphetamine users, including: issues of actual and perceived ‘service fit’ or suitability to the needs of methamphetamine users (possibly a result of many drug treatment services being oriented to alcohol and opiate users) [217, 230, 313]; insufficient service provider knowledge about contexts of methamphetamine use and the best approaches to engaging, treating and retaining methamphetamine users [219, 229, 239]; a lack of approved pharmacotherapies for treating/managing methamphetamine withdrawal



and dependence [235, 329]; and low levels of motivation and/or perceived need among methamphetamine users to access professional support [231, 234].

Many of the self-reported barriers to professional support identified in the literature review were also reported by study participants, such as: adverse past experiences reducing the likelihood of subsequent service access [343]; confidentiality concerns [302]; and concerns that interaction with other users would adversely influence one's own drug use behaviours [324]. However, a key aspect of this research that distinguishes it from most previous work was its investigation of self-perceived non-problematic methamphetamine use as a service barrier among study participants. Specifically, were participants who reported that their use was not sufficiently harmful/problematic to warrant service utilisation justified in their self-perception? This concept has rarely been explored in the literature with respect to methamphetamine users [50, 216, 231, 297]. Findings indicated that, in general, participants who reported self-perceived non-problematic methamphetamine use at baseline were engaging in less risky use patterns (primarily reduced frequency of use) and experiencing fewer methamphetamine-related harms compared to the remainder of the sample. As discussed previously with respect to natural remission from methamphetamine dependence and problematic use patterns, these findings suggest that some methamphetamine users might not benefit from treatment. Nevertheless, there was some evidence of unmet or unrecognised need among participants who self-classified their methamphetamine use as non-problematic at baseline but reported experiencing methamphetamine-related harms. Therefore, targeted harm reduction initiatives could address any immediate adverse consequences experienced by methamphetamine users who are reluctant to access professional support. Educating methamphetamine users of varying use levels about available service options (and the benefits of accessing professional support) might also improve levels of service engagement among such individuals before or after their progression to riskier/more harmful use patterns.

Further research is needed to clarify the findings presented in Chapter Three and/or investigate additional reasons for low motivation/perceived need for accessing professional support among methamphetamine users. Qualitative methods would be suited to exploring this issue. For example, one aspect not comprehensively covered in this research was the possibility of masking effects. Given that most methamphetamine users are polysubstance users [51, 280] (as demonstrated by the baseline findings presented in Chapter One), the harms resulting from other substance use may take priority over, or mask, those associated with methamphetamine consumption. In this context, Wallace et al. [231] noted that methamphetamine-dependent individuals who use opiates might not identify as methamphetamine-dependent because their experience of the physical symptoms of methamphetamine withdrawal are less acute than those

resulting from opiate withdrawal. These findings highlight the importance of addressing the use of other substances when treating methamphetamine use [361, 424].

Previous researchers have suggested that some of the personally and socially desirable outcomes of methamphetamine use, such as increased sociability and reduced appetite [80, 81, 461], may counter or mask methamphetamine-related harms [53]. This accords with research demonstrating high levels of ‘functional’ use among methamphetamine users or enhanced individual functioning resulting from methamphetamine use [310]. In addition, functional or practical methamphetamine use deterred some of this study’s participants from seeking professional support (Chapter Three). Regardless, the more desirable effects of methamphetamine consumption tend to dissipate with heavier use due to increased tolerance [91], which may contribute to increased levels of treatment-seeking and access among more dependent methamphetamine users [216, 297]. This typical trajectory highlights a need to educate methamphetamine users about identifying early signs of problematic or dependent use patterns.

### ***Service barriers: Theoretical relevance***

Findings regarding service barriers were presented in Chapters Two and Three; Rhodes’ [462] discussion of risk theory provides a useful theoretical framework for understanding some barriers to professional support for methamphetamine users. Rhodes argues that, as opposed to health and risk behaviour paradigms that conceptualise risk and risk behaviours as outcomes of individual actions and choices [e.g., 463, 464], it is vital to adopt an approach that acknowledges the influence of social norms, situations and interactions on individuals’ attitudes and behaviours. This is important given the significant influence of various social and relational factors on methamphetamine use trajectories [64]. For example, as demonstrated in Chapter 4, one of the factors associated with remission from methamphetamine dependence over the follow-up period was a greater relative increase in perceived social support. Further, participants who maintained or developed social and relationship problems over the study period were more likely to initiate contact with professional support during follow-up (Chapter 6).

Rhodes [462] considers two risk behaviour paradigms. The first consists of situated rationality theories, which are underscored by the notion that individuals hold different perceptions of risk and risk behaviour. These theories conceptualise an individual’s risk behaviour as the result of socially situated risk perceptions, and emphasise the relativity of risk. To understand why some people engage in risk behaviours, such as harmful methamphetamine use, there is a need to understand the relative importance given by individuals to these risk behaviours with respect to other lifestyle-associated risks. In this context, situated rationality theories help explain why some

individuals refrain from seeking professional support for harmful methamphetamine use patterns. For instance, the ‘hierarchy of risk priorities’ [462] dictates that certain aspects of methamphetamine consumption are of more immediate concern and consequently given greater everyday priority than other health and lifestyle factors. This suggests that individuals maintain harmful patterns of methamphetamine use (i.e., risk behaviours) because the potential consequences of altering or ceasing use (e.g., social isolation) are perceived to outweigh certain harms (e.g., reduced work performance). This priority hierarchy might limit an individual’s perceived need or motivation to access professional support.

Rhodes’ second risk behaviour paradigm, comprised of social action theories, builds on situated rationality concepts by positing that risk perception and behaviour are not simply outcomes of rational individual choices, but the product of an interplay between social interactions, network norms and contexts [462]. Thus, individual decisions and behaviours are not just context-dependent but influenced by social factors and social capital. In reference to the self-reported treatment barriers identified in Chapter Three, methamphetamine users may be deterred from accessing professional support by an unequal balance of power, such as that existing between service client and service provider, where an unsympathetic or unskilled health practitioner may shape an individual’s general perception of service staff and the stigma associated with service access and adversely affect subsequent treatment utilisation [303]. Similarly, the interaction between members of different methamphetamine-using sub-groups with varying levels of social capital in treatment settings, such as MSM and heterosexuals [306], might influence service access for some users.

Importantly, social action theories dictate that risk perception and behaviour are socially calculated and context-dependent. Group norms consequently define ‘acceptable’ methamphetamine use patterns, including frequency of consumption and ROA (e.g., injecting versus smoking). Group norms could potentially influence the utilisation of professional support, which may only be acceptable under specific circumstances (e.g., when experiencing certain harms, such as psychosis). This implies that changing user attitudes towards, and perceptions of, various treatment modalities and service access requires strategies that target socially-defined population and group norms concerning methamphetamine risk behaviours and experience of related harms. Accordingly, Rhodes [462] notes that understanding what risk and risk behaviour actually mean to substance users will assist in developing appropriate interventions to reduce the harms associated with drug use. For example, given low levels of perceived need among this study’s sample, low-threshold interventions (e.g., harm reduction and education initiatives) could be more beneficial for, or attractive to, some methamphetamine users than engagement with formal drug treatment.

## **Pathways and enablers to professional support**

In contrast to the service barriers discussed in Chapters Two and Three of this thesis, Chapters Five and Six investigated factors associated with, and enablers of, access to professional support among methamphetamine users. The findings of the research presented in Chapter Six will be discussed first to enable this section (and the thesis) to conclude with a discussion of the potential methods of overcoming barriers to professional support for methamphetamine users identified throughout the thesis.

### ***Service utilisation patterns***

As previously mentioned, most studies relating to access of professional support by methamphetamine users have involved participants recruited from services [e.g., 230, 371, 431]. Little prospective research has examined service utilisation trajectories among out-of-treatment or community-recruited samples of methamphetamine users. This study therefore makes a valuable contribution to the current literature by investigating patterns of drug treatment and relevant health and social support service utilisation by cohort participants over the 12-month follow-up period. GPs were the most common source of professional support accessed by participants. This reflects the findings of previous research [216, 218], and highlights the important role of GPs in addressing the needs of methamphetamine users and as entry points for referral to more appropriate support if necessary (e.g., specialist drug treatment, mental health services). One-on-one drug counsellors were the most common specialist drug service type accessed by participants. In comparison, only small proportions reported accessing more intensive treatment services such as residential withdrawal/detoxification and rehabilitation services. Several possible reasons explain this discrepancy. For example, given the fact that some methamphetamine users can address harmful and dependent use patterns without the need for intensive professional intervention [111, 112], as demonstrated by the findings in Chapter Four, some methamphetamine users may prefer low versus high threshold treatment services [217]. However, it is also possible that barriers to the use of intensive treatment options (e.g., residential withdrawal and rehabilitation services), such as waiting lists [229], prevent some methamphetamine users from accessing such services. Nevertheless, these findings highlight the valuable role that low threshold services occupy in the drug treatment sector in disrupting trajectories towards more harmful use patterns.

### ***Factors associated with service access***

In addition to examining service utilisation patterns over the follow-up period, Chapter Six involved analyses of the characteristics of participants who were most likely to access

professional support; specifically, those who initiated service contact during follow-up and those who were currently in contact with any professional support when interviewed at baseline or follow-up. Reflecting other findings presented in this thesis, participants who accessed professional support were more motivated to change their methamphetamine use patterns. For example, participants who initiated service contact during follow-up were significantly more likely to have sought help from family and/or peers for reducing/ceasing methamphetamine use and to have attempted methods of self-treating methamphetamine use (e.g., drug substitution, ‘cold turkey’) without assistance.

In line with previous Australian research [216, 218, 251], heavier and dependent methamphetamine use patterns were associated with an increased likelihood of service contact. For example, participants who injected methamphetamine were significantly more likely to be in contact with services for their use and/or related harms than participants who mainly administered the drug via other means (i.e., smoking, intranasal or oral ingestion). This finding contrasts with research in the US which demonstrated poorer treatment engagement among methamphetamine injectors [314]; however, this discrepancy is likely a result of greater service coverage for PWID in Australia compared to the US [317]. Referring back to Rhodes’ social action theories [462], a higher rate of service contact among injectors could be a result of group norms. For example, the substantial service coverage for Australian PWID means that accessing drug treatment and relevant health and social support services (e.g., NSPs) could be normative among methamphetamine injecting sub-groups. This service coverage for PWID could also mean that there are fewer barriers to drug treatment and health and social support service utilisation for methamphetamine injectors (e.g., fewer issues of accessibility) than for individuals using methamphetamine via other ROA [465].

Lastly, participants who reported accessing services for mental health issues and other drug (non-methamphetamine) use were more likely to have accessed professional support for methamphetamine use and/or related harms. It is possible that high levels of psychological comorbidity [260] and polysubstance use [280] increase the likelihood of service contact in general, which potentially facilitates access of professional support for methamphetamine use and/or related harms.

### ***Improving service engagement among methamphetamine users (and/or countering service barriers)***

Overall, this study’s findings highlight a need to increase and improve dependence treatment access points for methamphetamine users who are engaging in harmful patterns of use, yet who

have limited professional support networks (e.g., methamphetamine-dependent smokers not in contact with the drug treatment or mental health service systems) and/or low levels of motivation or perceived need to seek professional assistance. In this context, strategies for accelerating motivation to engage with services need to be developed. Accordingly, the literature review in Chapter Five identified potential methods of addressing the service barriers identified and discussed in this thesis. For example, motivational interviewing and stepped-care treatment models have been recommended as promising approaches for addressing low motivation and/or perceived need to access professional support [313, 339, 350, 409, 466]. Baker et al. [48] suggested opportunistically accessing methamphetamine users with low motivation for treatment service utilisation via frontline services (e.g., NSPs, primary healthcare clinics), where brief harm reduction interventions could be delivered and users made aware of available treatment options. However, such engagement should not only be about enhancing treatment utilisation. Given the findings of this study, contact with low-threshold services could involve assessing methamphetamine users' other 'functional' needs (e.g., employment, mental health, social support) which may facilitate remission from dependence and problematic use patterns without formal drug treatment.

Programs targeting methamphetamine users with unique needs, including females, MSM, CALD sub-populations and users with significant psychological morbidity, could improve service engagement and address negative user perceptions of current treatment options [238, 239, 308]. For example, providing combined harm reduction and treatment options which target methamphetamine use and risky sexual behaviours could improve levels of service utilisation among MSM [189, 417]. To this end, education of service providers about the specific needs, characteristics and behaviours of methamphetamine users would improve staff attitudes and confidence in treating this population [66, 229, 243]. Some methamphetamine users report being distrustful of, or embarrassed about, accessing professional support (as demonstrated by the findings presented in Chapter Three); this could be addressed by following Baker and Lees' [339] recommendation that services promote a non-judgemental approach and be resourced appropriately to provide sufficient and accessible support to methamphetamine users. Flexible opening hours and drop-in facilities could improve service utilisation among users experiencing accessibility issues, such as those with work and family commitments [60, 238]. The provision of treatment or harm reduction education remotely via the internet could further alleviate issues related to stigma and accessibility and be another low-threshold treatment initiative attractive to users with low perceived need for professional support [25, 350].

Promoting the policies and guidelines of services regarding client confidentiality could address user fears of potential legal ramifications resulting from treatment access (e.g., in the case of

mothers who do not access drug treatment due to a fear of child protection services being notified [302]). In addition, given that many substance users want to address problematic use patterns and associated harms without ceasing use entirely [313, 467], emphasising non-abstinence based approaches could attract some methamphetamine users to relevant services. Acknowledging the perceived benefits and desired outcomes of methamphetamine use might also ensure that health promotion messages, and the service staff delivering them, are deemed credible by methamphetamine users [81, 230].

Many of the approaches mentioned here are promising in their potential for improving levels of service engagement among methamphetamine users. However, little is known about the utility of these measures in achieving this aim; evaluative research is needed to determine if these methods are successful in improving access to professional support among methamphetamine users in general, or among certain types or sub-groups of methamphetamine users. Given the heterogeneity of methamphetamine users (as demonstrated by the range of characteristics and behaviours reported by this study's sample, such as different routes of methamphetamine administration, trajectories of use, service utilisation patterns and experience of related harms), such research will need to use adaptive evaluation frameworks to determine which types of interventions work for different types of users. Further, effective research translation is needed to ensure that approaches identified as 'successful' are subsequently adopted by frontline services with the intention of improving service utilisation among methamphetamine users.

## **Thesis limitations**

### ***Classification of methamphetamine dependence***

The SDS has been used commonly to classify dependence in key studies of methamphetamine and ATS users in Australia [e.g., 46, 48, 52, 103, 216, 217]. The five-item questionnaire has previously been calibrated against DSM-III-R classifications of amphetamine dependence [270] and validated in samples of Australian and English amphetamine users against user behavioural patterns associated with severity of drug dependence [274]. However, the findings presented in this thesis suggest the SDS may be unsuitable for classifying dependence and identifying problematic methamphetamine use, particularly among individuals labelled 'dependent' who are not engaging in harmful or risky use patterns (and vice versa). This unsuitability results from the scale's focus on the psychological aspects of dependence (e.g., past-year preoccupation with, and anxiety about, methamphetamine use) instead of users' experiences of methamphetamine-related harms [468]. The use of an alternative or additional measure of drug dependence in the current study (e.g., a DSM-IV diagnosis of methamphetamine dependence using the Composite International Diagnostic Interview (CIDI) [469, 470]) might have provided a more accurate

indication of levels of methamphetamine dependence among the sample and clarified participants' SDS scores. Nevertheless, it is important to note that the use of the SDS in the current study enabled comparisons between the results of this study and those of other Australian studies involving meth/amphetamine users.

### ***Participant attrition***

Bias associated with participant attrition is inherent to longitudinal studies. Measures were implemented to maximise participant retention; for example, comprehensive contact details (i.e., mobile and fixed/landline telephone numbers, postal and email address information if applicable) were collected for both participants and nominated secondary contacts at recruitment. Nevertheless, 54 participants (21%) were lost to follow-up. Univariable analyses of baseline data indicated that these participants were significantly ( $p < 0.05$ ) more likely to: be male; report a period of homelessness during the previous year; be unemployed; report a history of incarceration; be less educated; and have experienced recent methamphetamine-related legal problems. These findings suggest that participants lost-to-follow-up were more disaffected than those retained in the study, and this may have resulted in over-estimates of improved outcomes at follow-up (e.g., over-estimated rates of remission and past-month abstinence). It is also possible that the baseline interview served as a de facto intervention for some participants [63], which may have produced over-estimates of positive outcomes among the sample.

### ***Classifying perceived need and motivation for utilisation of professional support***

Few previous studies have attempted to measure the construct of perceived need and its impact on service utilisation among methamphetamine users. In interviews for this study, open-ended responses were used to clarify the degree to which participants perceived their methamphetamine use to be 'harmful' or 'problematic' and how these perceptions impacted on access of professional support. The intent was to collect sufficient qualitative details of self-reported barriers to service utilisation among the sample. A tool such as the Contemplation Ladder [48, 471] could have provided a better comparative (and quantitative) measure of low levels of motivation, perceived need and/or readiness for professional support among participants. Nevertheless, findings indicated that participants who reported their use was not sufficiently harmful/problematic to warrant access of professional support were generally experiencing fewer methamphetamine-related harms and engaging in less risky use patterns. This provides some validation of the categorisation process.



### ***Limited follow-up period and measurement of use frequency***

Data collection at only two time points, in addition to the fact that methamphetamine use frequency was limited to number of days used per week during the past month, prevented a comprehensive examination of the natural history of methamphetamine use among this study's cohort. These limitations are particularly important given sporadic patterns of binge use among some methamphetamine users [129, 134] and the relapsing nature of methamphetamine use and substance use in general [71, 244, 384]. However, given this study's sample size, in addition to the typical time and resource constraints inherent in preparing a doctoral thesis, a longer period of follow-up (or more frequent points of data collection) was impossible.

# Conclusion

The research presented in this thesis examined methamphetamine use in Melbourne, Australia's second largest city. A prospective cohort of regular methamphetamine users was recruited in 2010 and followed-up in 2011. The characteristics of this community-recruited sample were largely similar to ATS- and methamphetamine-using samples recruited in other regions of Australia. However, one of the key advantages of this study over previous research was the collection of prospective data, which allowed investigations of 12-month trajectories among the sample. Specifically, this research demonstrated that some methamphetamine users are able to remit from dependent and problematic methamphetamine use patterns without accessing professional support, with minimal indicators of other drug substitution/uptake overall.

Barriers to professional support for methamphetamine users were identified in a literature review and self-reports from participants at baseline in this research. Treatment utilisation by participants was examined based on perceived need and self-reported frequency of use and experience of methamphetamine-related harms. Participants who reported that their use was not problematic or harmful enough to warrant service utilisation generally engaged in less risky use patterns and experienced fewer methamphetamine-related harms than the remainder of the sample. However, there was evidence to suggest that some of these participants were experiencing unmet or unrecognised need and would therefore benefit from professional intervention.

A second literature review and final empirical chapter examined pathways to professional support among methamphetamine users. Specifically, patterns of service utilisation among the cohort were investigated over the follow-up period. Overall, accessing professional support for methamphetamine use was associated with service utilisation for other issues (e.g., mental health), riskier methamphetamine use patterns (e.g., injecting), and greater experience of methamphetamine-related harms (e.g., dependence).

The findings presented in this thesis suggest scope for future research. Prospective studies of community-recruited methamphetamine users (with greater length of follow-up) could further investigate the complex natural history of methamphetamine use and service utilisation trajectories among methamphetamine users, with a focus on the impact of methamphetamine use patterns, remission from dependence and relapse on use of professional support (and vice versa). Such research could investigate user concepts of 'non-problematic' use and constructs of perceived need in more detail using appropriate measures (e.g., a combination of quantitative and

qualitative measures); this will allow for a comprehensive examination of methamphetamine use trajectories from less harmful use patterns (corresponding with low perceived need) to more problematic patterns of use.

Finally, although the research presented in this thesis suggests that methamphetamine users in contact with services are those most in need of professional support (e.g., due to higher rates of methamphetamine dependence and risky use patterns), it also highlights a need to develop targeted initiatives for different methamphetamine user sub-populations. For example, data strongly suggests that some methamphetamine users not in treatment (e.g., dependent methamphetamine smokers) would benefit from professional assistance; to translate research into practice, interventions should be developed and implemented to address barriers to professional support. Conversely, the research presented in this thesis suggests that some methamphetamine users would not benefit from utilisation of drug treatment. However, initiatives that address methamphetamine-related harms and educate such users about available modalities of professional support could produce positive outcomes in the longer term, particularly among self-perceived non-problematic users who eventually progress to more harmful patterns of use.

# References

1. Barr, A.M., Panenka, W.J., MacEwan, G.W., Thornton, A.E., Lang, D.J., Honer, W.G., and Lecomte, T. *The need for speed: an update on methamphetamine addiction*. Journal of Psychiatry & Neuroscience, 2006. **31**(5): p. 301-313.
2. Sulzer, D., Sonders, M.S., Poulsen, N.W., and Galli, A. *Mechanisms of neurotransmitter release by amphetamines: a review*. Prog Neurobiol, 2005. **75**(6): p. 406-433.
3. Nordahl, T.E., Salo, R., and Leamon, M. *Neuropsychological effects of chronic methamphetamine use on neurotransmitters and cognition: a review*. J Neuropsychiatry Clin Neurosci, 2003. **15**(3): p. 317-325.
4. Hamamoto, D.T. and Rhodus, N.L. *Methamphetamine abuse and dentistry*. Oral Dis, 2009. **15**(1): p. 27-37.
5. United Nations Office on Drugs and Crime. *Amphetamines and Ecstasy: 2011 Global ATS Assessment*. 2011. UNODC. Vienna, Austria.
6. United Nations Office on Drugs and Crime. *World Drug Report 2012*. 2012. (United Nations publication, Sales No. E.12.XI.1).
7. United Nations Office on Drugs and Crime. *Patterns and Trends of Amphetamine-Type Stimulants and Other Drugs: Asia and the Pacific 2011 (A Report from the Global SMART Programme)*. 2011. UNODC.
8. Chesher, G.B., *Pharmacology of the sympathomimetic psychostimulants*, in *Illicit Psychostimulant Use in Australia*, D. Burrows, B. Flaherty, and M. MacAvoy, Editors. 1993, Australian Government Publishing Service: Canberra. p. 9-30.
9. Wardlaw, G., *Supply reduction (law enforcement) strategies pertaining to illicit use of psychostimulants*, in *Illicit Psychostimulant Use in Australia*, D. Burrows, B. Flaherty, and M. MacAvoy, Editors. 1993, Australian Government Publishing Service: Canberra. p. 91-104.
10. Topp, L., Kaye, S., Bruno, R., Longo, M., Williams, P., O'Reilly, B., Fry, C., Rose, G., and Darke, S. *Australian Drug Trends 2001: Findings of the Illicit Drug Reporting System (IDRS)*. NDARC Monograph Number 48. 2002. National Drug and Alcohol Research Centre, UNSW. Sydney.
11. Australian Bureau of Criminal Intelligence. *Australian Illicit Drug Report 2000-01*. 2002. ABCI. Canberra.
12. Australian Crime Commission. *Illicit Drug Data Report: 2010-11*. 2012. ACC. Canberra.

13. Degenhardt, L., Roxburgh, A., Black, E., Bruno, R., Campbell, G., Kinner, S., and Fetherston, J. *The epidemiology of methamphetamine use and harm in Australia*. Drug Alcohol Rev, 2008. **27**: p. 243-252.
14. Topp, L., Degenhardt, L., Kaye, S., and Darke, S. *The emergence of potent forms of methamphetamine in Sydney, Australia: a case study of the IDRS as a strategic early warning system*. Drug Alcohol Rev, 2002. **21**(4): p. 341-348.
15. Australian Institute of Health and Welfare. *2010 National Drug Strategy Household Survey report*. Drug statistics series no. 25. Cat. no. PHE 145. 2011. AIHW. Canberra.
16. Sindicich, N. and Burns, L. *Australian Trends in Ecstasy and related Drug Markets 2011. Findings from the Ecstasy and Related Drugs Reporting System (EDRS)*. Australian Drug Trend Series No. 82. 2012. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
17. Stafford, J. and Burns, L. *Australian Drug Trends 2011. Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trend Series No. 73. 2012. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
18. Degenhardt, L. and Topp, L. 'Crystal meth' use among polydrug users in Sydney's dance party subculture: characteristics, use patterns and associated harms. Int J Drug Policy, 2003. **14**: p. 17-24.
19. Buxton, J.A. and Dove, N.A. *The burden and management of crystal meth use*. CMAJ, 2008. **178**(12): p. 1537-1539.
20. Kinner, S.A. and Degenhardt, L. *Crystal methamphetamine smoking among regular ecstasy users in Australia: increases in use and associations with harm*. Drug Alcohol Rev, 2008. **27**(3): p. 292-300.
21. McKetin, R., McLaren, J., Kelly, E., Hall, W., and Hickman, M. *Estimating the number of regular and dependent methamphetamine users in Australia*. Technical Report No. 230. 2005. National Drug and Alcohol Research Centre, UNSW. Sydney.
22. United Nations Office on Drugs and Crime. *World Drug Report 2010*. 2010. (United Nations Publication, Sales No. E.10.XI.13).
23. Irvine, R.J., Kostakis, C., Felgate, P.D., Jaehne, E.J., Chen, C., and White, J.M. *Population drug use in Australia: a wastewater analysis*. Forensic Sci Int, 2011. **210**(1-3): p. 69-73.
24. Adhikari, P. and Summerill, A. *1998 National Drug Strategy Household Survey: Detailed findings*. Drug Statistics Series No. 6. 2000. AIHW. Canberra.
25. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., Wodak, A., Howard, J., and the Reference Group to the United Nations on HIV and injecting drug use. *Meth/amphetamine use and associated HIV: Implications for global policy and public health*. Int J Drug Policy, 2010. **21**: p. 347-358.

26. Hall, W., Ross, J., Lynskey, M., Law, M., and Degenhardt, L. *How many dependent heroin users are there in Australia?* NDARC Monograph No. 44. 2000. National Drug and Alcohol Research Centre, UNSW. Sydney.
27. White, V. and Smith, G. *Australian secondary school students' use of tobacco, alcohol, and over-the-counter and illicit substances in 2008.* 2009. Australian Government Department of Health and Ageing. Canberra.
28. Iversen, J., Topp, L., and Maher, L. *Australian NSP Survey: Prevalence of HIV, HCV and injecting and sexual behaviour among Needle and Syringe Program attendees: National Data Report 1995-2010.* 2011. The Kirby Institute for infection and immunity in society, UNSW. Sydney.
29. Roxburgh, A., Ritter, A., Grech, K., Slade, T., and Burns, L. *Trends in Drug Use and Related Harms in Australia, 2001 to 2011.* 2011. Drug Policy Modelling Program, National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
30. Sweeney, J. and Payne, J. *Drug use monitoring in Australia: 2009–10 report on drug use among police detainees.* AIC Monitoring Reports No. 17. 2012. AIC. Canberra.
31. Stafford, J. and Burns, L. *Australian Drug Trends 2010: Findings from the Illicit Drug Reporting System (IDRS).* Australian Drug Trend Series No. 55. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
32. Sindicich, N. and Burns, L. *Australian Trends in Ecstasy and related Drug Markets 2010: Findings from the Ecstasy and Related Drugs Reporting System (EDRS).* Australian Drug Trend Series No. 64. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
33. O'Brien, S., Black, E., Degenhardt, L., Roxburgh, A., Campbell, G., de Graaff, B., Fetherston, J., Jenkinson, R., Kinner, S., Moon, C., and White, N. *Australian Drug Trends 2006: Findings from the Illicit Drug Reporting System (IDRS).* NDARC Monograph No. 60. 2007. National Drug and Alcohol Research Centre, UNSW. Sydney.
34. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2009–2010: report on the National Minimum Data Set.* Drug treatment series no. 14. Cat. no. HSE 114. 2011. AIHW. Canberra.
35. Sara, G., Burgess, P., Malhi, G., and Whiteford, H. *Amphetamine availability and admissions for psychosis in New South Wales, 2001 – 2009.* Australian and New Zealand Journal of Psychiatry, 2011. **45**(4): p. 317-324.
36. Brunt, T.M., van Laar, M., Niesink, R.J., and van den Brink, W. *The relationship of quality and price of the psychostimulants cocaine and amphetamine with health care outcomes.* Drug Alcohol Depend, 2010. **111**(1-2): p. 21-29.

37. Macgregor, S. and Payne, J. *Findings from the DUMA program: Increase in use of methamphetamine*. Research in Practice No. 22. 2011. Australian Institute of Criminology. Canberra.
38. Stafford, J. and Burns, L. *IDRS Drug Trends Bulletin October 2011*. 2011. National Drug and Alcohol Research Centre. Sydney.
39. Lloyd, B. *Trends in alcohol and drug related ambulance attendances in Melbourne: 2010/11*. 2012. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.
40. Iversen, J. and Maher, L. *Australian NSP Survey National Data Report 2007-2011: Prevalence of HIV, HCV and injecting and sexual behaviour among NSP attendees*. 2012. The Kirby Institute, University of New South Wales. Sydney.
41. Stafford, J. and Burns, L. *Key findings from the 2012 IDRS: A survey of people who inject drugs*. Illicit Drug Reporting System: Drug Trends Bulletin. 2012. NDARC, UNSW.
42. Degenhardt, L., Rendle, V., Hall, W., Gilmour, S., and Law, M. *Estimating the number of current regular heroin users in NSW and Australia 1997-2002*. NDARC Technical Report No. 198. 2004. National Drug and Alcohol Research Centre, UNSW. Sydney.
43. McKetin, R., McLaren, J., and Kelly, E. *The dynamics of the Sydney methamphetamine market: an overview of supply, use patterns, harms and social consequences*. National Drug Law Enforcement Research Fund Monograph Series No. 13. 2005. Australasian Centre for Policing Research. Adelaide.
44. McKetin, R., McLaren, J., Lubman, D.I., and Hides, L. *The prevalence of psychotic symptoms among methamphetamine users*. *Addiction*, 2006. **101**(10): p. 1473-1478.
45. McKetin, R., Kelly, E., McLaren, J., and Proudfoot, H. *Impaired physical health among methamphetamine users in comparison with the general population: the role of methamphetamine dependence and opioid use*. *Drug Alcohol Rev*, 2008. **27**(5): p. 482-489.
46. McKetin, R., Kelly, E., and McLaren, J. *The relationship between crystalline methamphetamine use and methamphetamine dependence*. *Drug Alcohol Depend*, 2006. **85**(3): p. 198-204.
47. Sara, G.E., Burgess, P.M., Harris, M.G., Malhi, G.S., and Whitefords, H.A. *Stimulant use and stimulant use disorders in Australia: findings from the National Survey of Mental Health and Wellbeing*. *Med J Aust*, 2011. **195**(10): p. 607-610.
48. Baker, A., Boggs, T.G., and Lewin, T.J. *Characteristics of regular amphetamine users and implications for treatment*. *Drug Alcohol Rev*, 2001. **20**: p. 49-56.
49. Degenhardt, L., Coffey, C., Carlin, J.B., Moran, P., and Patton, G.C. *Who are the new amphetamine users? A 10-year prospective study of young Australians*. *Addiction*, 2007. **102**(8): p. 1269-1279.

50. Kenny, P., Harney, A., Lee, N.K., and Pennay, A. *Treatment utilization and barriers to treatment: Results of a survey of dependent methamphetamine users*. Substance Abuse, Treatment, Prevention, and Policy, 2011. **6**(3): p. 1-7.
51. McKetin, R., Ross, J., Kelly, E., Baker, A., Lee, N., Lubman, D.I., and Mattick, R. *Characteristics and harms associated with injecting versus smoking methamphetamine among methamphetamine treatment entrants*. Drug Alcohol Rev, 2008. **27**(3): p. 277-285.
52. Lynch, M., Kemp, R., Krenske, L., Conroy, A., and Webster, J. *Patterns of amphetamine use. Initial findings from the amphetamines in Queensland research project 2003*. 2003. Crime and Misconduct Commission. Brisbane.
53. Vincent, N., Schoobridge, J., Ask, A., Allsop, S., and Ali, R. *Physical and mental health problems in amphetamine users from metropolitan Adelaide, Australia*. Drug Alcohol Rev, 1998. **17**: p. 187-195.
54. Niv, N. and Hser, Y.I. *Drug treatment service utilization and outcomes for Hispanic and white methamphetamine abusers*. Health Serv Res, 2006. **41**(4 Pt 1): p. 1242-1257.
55. Farrell, M. and Marsden, J. *Methamphetamine: drug use and psychoses becomes a major public health issue in the Asia Pacific region*. Addiction, 2002. **97**: p. 771-772.
56. Hawke, J.M., Jainchill, N., and De Leon, G. *Adolescent amphetamine users in treatment: client profiles and treatment outcomes*. J Psychoactive Drugs, 2000. **32**(1): p. 95-105.
57. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., and Rawson, R. *Anxiety disorders among methamphetamine dependent adults: association with post-treatment functioning*. Am J Addict, 2010. **19**(5): p. 385-390.
58. Shannon, K., Strathdee, S., Shoveller, J., Zhang, R., Montaner, J., and Tyndall, M. *Crystal methamphetamine use among female street-based sex workers: Moving beyond individual-focused interventions*. Drug Alcohol Depend, 2011. **113**(1): p. 76-81.
59. Joe, G.W., Rowan-Szal, G.A., Greener, J.M., Simpson, D.D., and Vance, J. *Male methamphetamine-user inmates in prison treatment: during-treatment outcomes*. J Subst Abuse Treat, 2010. **38**: p. 141-152.
60. Roche, A.M., Pidd, K., Bywood, P., and Freeman, T. *Methamphetamine use among Australian workers and its implications for prevention*. Drug Alcohol Rev, 2008. **27**: p. 334-341.
61. Rawson, R., Huber, A., Brethen, P., Obert, J., Gulati, V., Shoptaw, S., and Ling, W. *Methamphetamine and Cocaine Users: Differences in Characteristics and Treatment Retention*. J Psychoactive Drugs, 2000. **32**(2): p. 233-238.
62. Brecht, M.L. and von Mayrhauser, C. *Differences between ecstasy-using and nonusing methamphetamine users*. J Psychoactive Drugs, 2002. **34**(2): p. 215-223.
63. Borders, T.F., Booth, B.M., Han, X., Wright, P., Leukefeld, C., Falck, R.S., and Carlson, R.G. *Longitudinal changes in methamphetamine and cocaine use in untreated rural*



- stimulant users: racial differences and the impact of methamphetamine legislation.* Addiction, 2008. **103**(5): p. 800-808.
64. Boshears, P., Boeri, M., and Harbry, L. *Addiction and sociality: Perspectives from methamphetamine users in suburban USA.* Addict Res Theory, 2011. **19**(4): p. 289-301.
  65. Aikawa, Y., Ogai, Y., Morita, N., Umeno, M., Okada, N., Ikeda, T., Umezu, H., Senoo, E., Nakatani, Y., and Okazaki, Y. *[A change of patients with methamphetamine-related disorders admitted to Tokyo Metropolitan Matsuzawa Hospital--the comparison between the second and third epidemics of methamphetamine abuse in Japan].* Nihon Arukoru Yakubutsu Igakkai Zasshi, 2012. **47**(2): p. 57-67.
  66. Degenhardt, L., Baker, A., and Maher, L. *Methamphetamine: geographic areas and populations at risk, and emerging evidence for effective interventions.* Drug Alcohol Rev, 2008. **27**(3): p. 217-219.
  67. Marshall, B.D., Wood, E., Shoveller, J.A., Patterson, T.L., Montaner, J.S., and Kerr, T. *Pathways to HIV risk and vulnerability among lesbian, gay, bisexual, and transgendered methamphetamine users: a multi-cohort gender-based analysis.* BMC Public Health, 2011. **11**: p. 20.
  68. Semple, S.J., Strathdee, S.A., Zians, J., and Patterson, T.L. *Life events and sexual risk among HIV-negative, heterosexual, methamphetamine users.* J Sex Res, 2010. **47**(4): p. 355-363.
  69. Ministerial Council on Drug Strategy (MCDS). *National Amphetamine-Type Stimulant Strategy 2008-2011.* 2008. MCDS, Australian Government.
  70. Freese, T.E., Obert, J., Dickow, A., Cohen, J., and Lord, R.H. *Methamphetamine abuse: issues for special populations.* J Psychoactive Drugs, 2000. **32**(2): p. 177-182.
  71. Newton, T.F., De La Garza, R., 2nd, Kalechstein, A.D., Tziortzis, D., and Jacobsen, C.A. *Theories of addiction: methamphetamine users' explanations for continuing drug use and relapse.* Am J Addict, 2009. **18**(4): p. 294-300.
  72. Brecht, M.L., Greenwell, L., and Anglin, M.D. *Substance use pathways to methamphetamine use among treated users.* Addict Behav, 2007. **32**(1): p. 24-38.
  73. Semple, S.J., Patterson, T.L., and Grant, I. *Motivations associated with methamphetamine use among HIV+ men who have sex with men.* J Subst Abuse Treat, 2002. **22**(3): p. 149-156.
  74. Bray, G.A. *Use and abuse of appetite-suppressant drugs in the treatment of obesity.* Ann Intern Med, 1993. **119**(7 Pt 2): p. 707-713.
  75. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., and Rawson, R. *Bulimia nervosa among methamphetamine dependent adults: association with outcomes three years after treatment.* Eat Disord, 2011. **19**(3): p. 259-269.

76. Neale, A., Abraham, S., and Russell, J. *"Ice" use and eating disorders: a report of three cases*. Int J Eat Disord, 2009. **42**(2): p. 188-191.
77. von Mayrhauser, C., Brecht, M.L., and Anglin, M.D. *Use ecology and drug use motivations of methamphetamine users admitted to substance abuse treatment facilities in Los Angeles: an emerging profile*. J Addict Dis, 2002. **21**(1): p. 45-60.
78. Semple, S.J., Grant, I., and Patterson, T.L. *Female Methamphetamine Users: Social Characteristics and Sexual Risk Behavior*. Women & Health, 2005. **40**(3): p. 35-50.
79. Riehm, K.S., Iguchi, M.Y., and Anglin, M.D. *Depressive symptoms among amphetamine and cocaine users before and after substance abuse treatment*. Psychol Addict Behav, 2002. **16**(4): p. 333-337.
80. Johnston, J., Laslett, A.-M., Miller, P., Jenkinson, R., Fry, C., and Dietze, P. *Victorian Psychostimulant Monitoring Project: Trialling Enhanced Drug Trend Monitoring of Melbourne Psychostimulant Markets (Final Report)*. 2004. Turning Point Alcohol & Drug Centre. Fitzroy.
81. White, B., Degenhardt, L., Breen, C., Bruno, R., Newman, J., and Proudfoot, P. *Risk and benefit perceptions of party drug use*. Addictive Behaviors, 2006. **31**(1): p. 137-142.
82. Brecht, M.L., O'Brien, A., von Mayrhauser, C., and Anglin, M.D. *Methamphetamine use behaviors and gender differences*. Addictive Behaviors, 2004. **29**(1): p. 89-106.
83. Halkitis, P.N., Fischgrund, B.N., and Parsons, J.T. *Explanations for methamphetamine use among gay and bisexual men in New York City*. Subst Use Misuse, 2005. **40**(9-10): p. 1331-1345.
84. Couper, F.J., Pemberton, M., Jarvis, A., Hughes, M., and Logan, B.K. *Prevalence of drug use in commercial tractor-trailer drivers*. J Forensic Sci, 2002. **47**(3): p. 562-567.
85. Williamson, A. *Predictors of psychostimulant use by long-distance truck drivers*. Am J Epidemiol, 2007. **166**(11): p. 1320-1326.
86. Parks, K.A. and Kennedy, C.L. *Club drugs: reasons for and consequences of use*. J Psychoactive Drugs, 2004. **36**(3): p. 295-302.
87. Maxwell, J.C. and Spence, R.T. *Profiles of club drug users in treatment*. Subst Use Misuse, 2005. **40**(9-10): p. 1409-1426.
88. Grov, C., Kelly, B.C., and Parsons, J.T. *Polydrug use among club-going young adults recruited through time-space sampling*. Subst Use Misuse, 2009. **44**(6): p. 848-864.
89. Forsyth, A.J. *Places and patterns of drug use in the Scottish dance scene*. Addiction, 1996. **91**(4): p. 511-521.
90. Wada, K. and Fukui, S. *[Relationship between years of methamphetamine use and symptoms of methamphetamine psychosis]*. Arukoru Kenkyuto Yakubutsu Ison, 1990. **25**(3): p. 143-158.

91. Albertson, T.E. and Van Hoozen, B.E. *Methamphetamine and the Expanding Complications of Amphetamines*. Western Journal of Medicine, 1999. **170**(4): p. 214-219.
92. Comer, S.D., Hart, C.L., Ward, A.S., Haney, M., Foltin, R.W., and Fischman, M.W. *Effects of repeated oral methamphetamine administration in humans*. Psychopharmacology (Berl), 2001. **155**(4): p. 397-404.
93. Mravcik, V., Skarupova, K., Orlikova, B., Zabransky, T., Karachaliou, K., and Schulte, B. *Use of gelatine capsules for application of methamphetamine: a new harm reduction approach*. Int J Drug Policy, 2011. **22**(2): p. 172-173.
94. Kashani, J. and Ruha, A.M. *Methamphetamine toxicity secondary to intravaginal body stuffing*. J Toxicol Clin Toxicol, 2004. **42**(7): p. 987-989.
95. Cantrell, F.L., Breckenridge, H.M., and Jost, P. *Transrectal methamphetamine use: a novel route of exposure*. Ann Intern Med, 2006. **145**(1): p. 78-79.
96. Hendrickson, R.G., Horowitz, B.Z., Norton, R.L., and Notenboom, H. *"Parachuting" meth: a novel delivery method for methamphetamine and delayed-onset toxicity from "body stuffing"*. Clin Toxicol (Phila), 2006. **44**(4): p. 379-382.
97. Hall, W. and Hando, J. *Route of administration and adverse effects of amphetamine use among young adults in Sydney, Australia*. Drug Alcohol Rev, 1994. **13**(3): p. 277-284.
98. Morgan, P. *Researching Hidden Communities: A Qualitative Comparative Study of Methamphetamine Users in Three Sites*. in *Proceedings of the December, 1993 Community Epidemiology Work Group*. 1993. Washington , DC : National Institute on Drug Abuse.
99. Darke, S., Cohen, J., Ross, J., Hando, J., and Hall, W. *Transitions between routes of administration of regular amphetamine users*. Addiction, 1994. **89**(9): p. 1077-1083.
100. Beebe, D.K. and Walley, E. *Smokable methamphetamine ('ice'): an old drug in a different form*. Am Fam Physician, 1995. **51**(2): p. 449-453.
101. Schifano, F., Corkery, J.M., and Cuffolo, G. *Smokable ("ice", "crystal meth") and non smokable amphetamine-type stimulants: clinical pharmacological and epidemiological issues, with special reference to the UK*. Ann Ist Super Sanita, 2007. **43**(1): p. 110-115.
102. Cho, A.K. and Melega, W.P. *Patterns of methamphetamine abuse and their consequences*. J Addict Dis, 2002. **21**(1): p. 21-34.
103. McKetin, R., McLaren, J., and Kelly, E. *The Sydney methamphetamine market: patterns of supply, use, personal harms and social consequences*. NDLERF Monograph Series No. 13. 2005. National Drug and Alcohol Research Centre, University of NSW. Sydney.
104. Matsumoto, T. *[Clinical features of recent methamphetamine abusers: comparison between smoking abusers and injection abusers]*. Seishin Shinkeigaku Zasshi, 2000. **102**(5): p. 498-513.

105. Richards, J.R. and Brofeldt, B.T. *Patterns of tooth wear associated with methamphetamine use*. J Periodontol, 2000. **71**(8): p. 1371-1374.
106. Domier, C.P., Simon, S.L., Rawson, R.A., Huber, A., and Ling, W. *A comparison of injecting and noninjecting methamphetamine users*. J Psychoactive Drugs, 2000. **32**(2): p. 229-232.
107. Hall, W., Hando, J., Darke, S., and Ross, J. *Psychological morbidity and route of administration among amphetamine users in Sydney, Australia*. Addiction, 1996. **91**(1): p. 81-87.
108. Matsumoto, T., Kamijo, A., Miyakawa, T., Endo, K., Yabana, T., Kishimoto, H., Okudaira, K., Iseki, E., Sakai, T., and Kosaka, K. *Methamphetamine in Japan: the consequences of methamphetamine abuse as a function of route of administration*. Addiction, 2002. **97**(7): p. 809-817.
109. Miller, C.L., Kerr, T., Fischer, B., Zhang, R., and Wood, E. *Methamphetamine injection independently predicts hepatitis C infection among street-involved youth in a Canadian setting*. J Adolesc Health, 2009. **44**(3): p. 302-304.
110. Gonzales, R., Marinelli-Casey, P., Shoptaw, S., Ang, A., and Rawson, R.A. *Hepatitis C virus infection among methamphetamine-dependent individuals in outpatient treatment*. J Subst Abuse Treat, 2006. **31**(2): p. 195-202.
111. Hser, Y.I., Huang, D., Brecht, M.L., Li, L., and Evans, E. *Contrasting trajectories of heroin, cocaine, and methamphetamine use*. J Addict Dis, 2008. **27**(3): p. 13-21.
112. Cunningham, J.A. *Untreated remissions from drug use: the predominant pathway*. Addict Behav, 1999. **24**(2): p. 267-270.
113. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Trajectories of Methamphetamine Use in the Rural South: A Longitudinal Qualitative Study*. Human Organization, 2008. **67**(2): p. 181-193.
114. Hser, Y.I., Evans, E., Huang, D., Brecht, M.L., and Li, L. *Comparing the dynamic course of heroin, cocaine, and methamphetamine use over 10 years*. Addict Behav, 2008. **33**(12): p. 1581-1589.
115. McKetin, R., Sutherland, R., Ross, J., Najman, J., Mamun, A., Baker, A., Mattick, R., and Rosenfield, J. *Methamphetamine Treatment Evaluation Study (MATES): Three-year outcomes from the Sydney site*. NDARC Technical Report No. 312. 2010. National Drug and Alcohol Research Centre, UNSW. Sydney.
116. Calabria, B., Degenhardt, L., Briegleb, C., Vos, T., Hall, W., Lynskey, M., Callaghan, B., Rana, U., and McLaren, J. *Systematic review of prospective studies investigating "remission" from amphetamine, cannabis, cocaine or opioid dependence*. Addict Behav, 2010. **35**(8): p. 741-749.

117. McLellan, A.T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., Pettinati, H., and Argeriou, M. *The Fifth Edition of the Addiction Severity Index*. J Subst Abuse Treat, 1992. **9**(3): p. 199-213.
118. Darke, S., Ross, J., and Cohen, J. *The use of benzodiazepines among regular amphetamine users*. Addiction, 1994. **89**(12): p. 1683-1690.
119. Christian, D.R., Huber, A., Brecht, M.L., McCann, M.J., Marinelli-Casey, P., Lord, R.H., Reiber, C., Lu, T.H., Project, T.M.T., and Galloway, G.P. *Methamphetamine Users Entering Treatment: Characteristics of the Methamphetamine Treatment Project Sample*. Subst Use Misuse, 2007. **42**(14): p. 2207-2222.
120. Barrett, S.P., Gross, S.R., Garand, I., and Pihl, R.O. *Patterns of simultaneous polysubstance use in Canadian rave attendees*. Subst Use Misuse, 2005. **40**(9-10): p. 1525-1537.
121. Semple, S.J., Strathdee, S.A., Zians, J., and Patterson, T.L. *Sexual Risk Behavior Associated with Co-administration of Methamphetamine and Other Drugs in a Sample of HIV-Positive Men Who Have Sex with Men*. The American Journal on Addictions, 2010. **18**: p. 65-72.
122. Clemens, K.J., McGregor, I.S., Hunt, G.E., and Cornish, J.L. *MDMA, methamphetamine and their combination: possible lessons for party drug users from recent preclinical research*. Drug Alcohol Rev, 2007. **26**(1): p. 9-15.
123. Degenhardt, L., Darke, S., and Dillon, P. *GHB use among Australians: characteristics, use patterns and associated harm*. Drug Alcohol Depend, 2002. **67**(1): p. 89-94.
124. Chalmers, J., Bradford, D., and Jones, C. *The effect of methamphetamine and heroin price on polydrug use: A behavioural economics analysis in Sydney, Australia*. Int J Drug Policy, 2010. **21**(5): p. 381-389.
125. Topp, L., Day, C., and Degenhardt, L. *Changes in patterns of drug injection concurrent with a sustained reduction in the availability of heroin in Australia*. Drug Alcohol Depend, 2003. **70**(3): p. 275-286.
126. Darke, S., Kaye, S., and Ross, J. *Transitions between the injection of heroin and amphetamines*. Addiction, 1999. **94**(12): p. 1795-1803.
127. Williamson, S., Gossop, M., Powis, B., Griffiths, P., Fountain, J., and Strang, J. *Adverse effects of stimulant drugs in a community sample of drug users*. Drug Alcohol Depend, 1997. **44**(2-3): p. 87-94.
128. Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S.A., Tyndall, M., Wiessing, L., and Wodak, A. *The global epidemiology of methamphetamine injection: A review of the evidence on use and associations with HIV and other harm*. 2007. National Drug and Alcohol Research Centre, UNSW. Sydney.

129. Ovenden, C. and Loxley, W. *Bingeing on psychostimulants in Australia: Do we know what it means (and does it matter)?* Addiction Research, 1996. **4**(1): p. 33-43.
130. Semple, S.J., Strathdee, S.A., Zians, J., and Patterson, T.L. *Social and behavioral characteristics of HIV-positive MSM who trade sex for methamphetamine.* Am J Drug Alcohol Abuse, 2010. **36**(6): p. 325-331.
131. Cheng, W.S., Garfein, R.S., Semple, S.J., Strathdee, S.A., Zians, J.K., and Patterson, T.L. *Binge use and sex and drug use behaviors among HIV(-), heterosexual methamphetamine users in San Diego.* Subst Use Misuse, 2010. **45**(1-2): p. 116-133.
132. Sommers, I., Baskin, D., and Baskin-Sommers, A. *Methamphetamine use among young adults: Health and social consequences.* Addictive Behaviors, 2006. **31**(8): p. 1469-1476.
133. Segal, D.S. and Kuczenski, R. *Repeated binge exposures to amphetamine and methamphetamine: behavioral and neurochemical characterization.* J Pharmacol Exp Ther, 1997. **282**(2): p. 561-573.
134. Semple, S.J., Patterson, T.L., and Grant, I. *Binge use of methamphetamine among HIV-positive men who have sex with men: pilot data and HIV prevention implications.* AIDS Educ Prev, 2003. **15**(2): p. 133-147.
135. Chen, C.K., Lin, S.K., Sham, P.C., Ball, D., Loh, E.W., Hsiao, C.C., Chiang, Y.L., Ree, S.C., Lee, C.H., and Murray, R.M. *Pre-morbid characteristics and co-morbidity of methamphetamine users with and without psychosis.* Psychological Medicine, 2003. **33**(8): p. 1407-1414.
136. Mahoney, J.J., 3rd, Kalechstein, A.D., De La Garza, R., 2nd, and Newton, T.F. *Presence and persistence of psychotic symptoms in cocaine- versus methamphetamine-dependent participants.* Am J Addict, 2008. **17**(2): p. 83-98.
137. Copeland, A.L. and Sorensen, J.L. *Differences between methamphetamine users and cocaine users in treatment.* Drug Alcohol Depend, 2001. **62**: p. 91-95.
138. Hadland, S.E., Marshall, B.D.L., Kerr, T., Qi, J., Montaner, J.S., and Wood, E. *Depressive Symptoms and Patterns of Drug Use Among Street Youth.* J Adolesc Health, 2011. **48**: p. 585-590.
139. Huber, A., Ling, W., Shoptaw, S., Gulati, V., Brethen, P., and Rawson, R. *Integrating Treatments for Methamphetamine Abuse: A Psychosocial Perspective.* J Addict Dis, 1997. **16**(4): p. 41-50.
140. Rawson, R.A., Gonzales, R., Obert, J.L., McCann, M.J., and Brethen, P. *Methamphetamine use among treatment-seeking adolescents in Southern California: Participant characteristics and treatment response.* J Subst Abuse Treat, 2005. **29**: p. 67-74.

141. Booth, B.M., Leukefeld, C., Falck, R., Wang, J., and Carlson, R. *Correlates of rural methamphetamine and cocaine users: results from a multistate community study*. J Stud Alcohol, 2006. **67**(4): p. 493-501.
142. Curtis, E.K. *Meth mouth: a review of methamphetamine abuse and its oral manifestations*. Gen Dent, 2006. **54**: p. 125-129.
143. Shetty, V., Mooney, L.J., Zigler, C.M., Belin, T.R., Murphy, D., and Rawson, R. *The relationship between methamphetamine use and increased dental disease*. J Am Dent Assoc, 2010. **141**(3): p. 307-318.
144. Rusyniak, D.E. *Neurologic manifestations of chronic methamphetamine abuse*. Neurol Clin, 2011. **29**(3): p. 641-655.
145. Cohen, A.L., Shuler, C., McAllister, S., Fosheim, G.E., Brown, M.G., Abercrombie, D., Anderson, K., McDougal, L.K., Drenzek, C., Arnold, K., Jernigan, D., and Gorwitz, R. *Methamphetamine use and methicillin-resistant Staphylococcus aureus skin infections*. Emerg Infect Dis, 2007. **13**: p. 1707-1713.
146. Liu, S.W., Lien, M.H., and Fenske, N.A. *The effects of alcohol and drug abuse on the skin*. Clin Dermatol, 2010. **28**(4): p. 391-399.
147. Topp, L. and Mattick, R.P. *Validation of the amphetamine dependence syndrome and the SAmDQ*. Addiction, 1997. **92**(2): p. 151-162.
148. Darke, S., Kaye, S., McKetin, R., and Duflou, J. *Major physical and psychological harms of methamphetamine use*. Drug Alcohol Rev, 2008. **27**(3): p. 253-262.
149. Sheridan, J., Bennett, S., Coggan, C., Wheeler, A., and McMillan, K. *Injury associated with methamphetamine use: A review of the literature*. Harm Reduction Journal, 2006. **3**(14): p. 1-8.
150. Bang-Ping, J. *Sexual dysfunction in men who abuse illicit drugs: a preliminary report*. J Sex Med, 2009. **6**(4): p. 1072-1080.
151. Frosch, D., Shoptaw, S., Huber, A., Rawson, R.A., and Ling, W. *Sexual HIV risk among gay and bisexual male methamphetamine abusers*. J Subst Abuse Treat, 1996. **13**(6): p. 483-486.
152. Vearrier, D., Greenberg, M.I., Miller, S.N., Okaneku, J.T., and Haggerty, D.A. *Methamphetamine: History, Pathophysiology, Adverse Health Effects, Current Trends, and Hazards Associated with the Clandestine Manufacture of Methamphetamine*. Disease-a-Month, 2012. **58**(2): p. 38-89.
153. Kaye, S., McKetin, R., Duflou, J., and Darke, S. *Methamphetamine and cardiovascular pathology: a review of the evidence*. Addiction, 2007. **102**(8): p. 1204-1211.
154. Ho, E.L., Josephson, S.A., Lee, H.S., and Smith, W.S. *Cerebrovascular complications of methamphetamine abuse*. Neurocrit Care, 2009. **10**(3): p. 295-305.

155. Chang, L., Alicata, D., Ernst, T., and Volkow, N. *Structural and metabolic brain changes in the striatum associated with methamphetamine abuse*. *Addiction*, 2007. **102 Suppl 1**: p. 16-32.
156. Silva, A.P., Martins, T., Baptista, S., Goncalves, J., Agasse, F., and Malva, J.O. *Brain injury associated with widely abused amphetamines: neuroinflammation, neurogenesis and blood-brain barrier*. *Curr Drug Abuse Rev*, 2010. **3**(4): p. 239-254.
157. Kiyatkin, E.A. and Sharma, H.S. *Acute methamphetamine intoxication: brain hyperthermia, blood-brain barrier, brain edema, and morphological cell abnormalities*. *Int Rev Neurobiol*, 2009. **88**: p. 65-100.
158. Krasnova, I.N. and Cadet, J.L. *Methamphetamine toxicity and messengers of death*. *Brain Res Rev*, 2009. **60**(2): p. 379-407.
159. Hart, C.L., Marvin, C.B., Silver, R., and Smith, E.E. *Is cognitive functioning impaired in methamphetamine users? A critical review*. *Neuropsychopharmacology*, 2012. **37**(3): p. 586-608.
160. Berman, S., O'Neill, J., Fears, S., Bartzokis, G., and London, E.D. *Abuse of amphetamines and structural abnormalities in the brain*. *Ann N Y Acad Sci*, 2008. **1141**: p. 195-220.
161. Callaghan, R.C., Cunningham, J.K., Sykes, J., and Kish, S.J. *Increased risk of Parkinson's disease in individuals hospitalized with conditions related to the use of methamphetamine or other amphetamine-type drugs*. *Drug Alcohol Depend*, 2012. **120**(1-3): p. 35-40.
162. Callaghan, R.C., Cunningham, J.K., Sajeev, G., and Kish, S.J. *Incidence of Parkinson's disease among hospital patients with methamphetamine-use disorders*. *Mov Disord*, 2010. **25**(14): p. 2333-2339.
163. Christine, C.W., Garwood, E.R., Schrock, L.E., Austin, D.E., and McCulloch, C.E. *Parkinsonism in patients with a history of amphetamine exposure*. *Mov Disord*, 2010. **25**(2): p. 228-231.
164. Grant, K.M., LeVan, T.D., Wells, S.M., Li, M., Stoltenberg, S.F., Gendelman, H.E., Carlo, G., and Bevins, R.A. *Methamphetamine-associated psychosis*. *J Neuroimmune Pharmacol*, 2012. **7**: p. 113-139.
165. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R., and Methamphetamine Treatment, P. *Identifying methamphetamine users at risk for major depressive disorder: findings from the methamphetamine treatment project at three-year follow-up*. *Am J Addict*, 2008. **17**(2): p. 99-102.
166. Dyer, K.R. and Cruickshank, C.C. *Depression and other psychological health problems among methamphetamine dependent patients in treatment: Implications for assessment and treatment outcome*. *Australian Psychologist*, 2005. **40**(2): p. 96-108.



167. Baker, A., Bucci, S., Lewin, T.J., Kay-Lambkin, F., Constable, P.M., and Carr, V.J. *Cognitive-behavioural therapy for substance use disorders in people with psychotic disorders: Randomised controlled trial*. Br J Psychiatry, 2006. **188**: p. 439-448.
168. Dawe, S. and McKetin, R., *The psychiatric comorbidity of psychostimulant use*, in *Models of intervention and care for psychostimulant users NDS Monograph No 32, 2nd edn*. 2004, Commonwealth of Australia: Canberra.
169. Salo, R., Flower, K., Kielstein, A., Leamon, M.H., Nordahl, T.E., and Galloway, G.P. *Psychiatric comorbidity in methamphetamine dependence*. Psychiatry Res, 2011. **186**(2-3): p. 356-361.
170. Petit, A., Karila, L., Chalmin, F., and Lejoyeux, M. *Methamphetamine Addiction: A Review of the Literature*. Addiction Research and Theory, 2012. **S1**: p. 1-6.
171. McKetin, R., Lubman, D.I., Lee, N.M., Ross, J.E., and Slade, T.N. *Major depression among methamphetamine users entering drug treatment programs*. Med J Aust, 2011. **195**(3): p. S51-5.
172. Curran, C., Byrappa, N., and McBride, A. *Stimulant psychosis: systematic review*. Br J Psychiatry, 2004. **185**: p. 196-204.
173. Glasner-Edwards, S., Marinelli-Casey, P., Hillhouse, M., Ang, A., Mooney, L.J., Rawson, R., and Methamphetamine Treatment Project Corporate, A. *Depression among methamphetamine users: association with outcomes from the Methamphetamine Treatment Project at 3-year follow-up*. J Nerv Ment Dis, 2009. **197**(4): p. 225-231.
174. Glasner-Edwards, S., Mooney, L.J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R., and Methamphetamine Treatment Project Corporate, A. *Clinical course and outcomes of methamphetamine-dependent adults with psychosis*. J Subst Abuse Treat, 2008. **35**(4): p. 445-450.
175. Kay-Lambkin, F.J., Baker, A.L., Lee, N.M., Jenner, L., and Lewin, T.J. *The influence of depression on treatment for methamphetamine use*. Med J Aust, 2011. **195**(3): p. S38-43.
176. Wermuth, L. *Methamphetamine Use: Hazards and Social Influences*. Journal of Drug Education, 2000. **30**(4): p. 423-433.
177. Kim, R.J. and Jackson, D.S. *A comparison of adolescent methamphetamine and other substance users in Hawai'i*. Hawaii Medical Journal, 2008. **67**(11): p. 294-300, 302.
178. Milloy, M.-J., Kerr, T., Buxton, J., Montaner, J., and Wood, E. *Methamphetamine use and rates of incarceration among street-involved youth in a Canadian setting: a cross-sectional analysis*. Substance Abuse, Treatment, Prevention, and Policy, 2009. **4**(17): p. 1-6.
179. Wilkins, C. and Sweetsur, P. *The association between spending on methamphetamine/amphetamine and cannabis for personal use and earnings from*

- acquisitive crime among police detainees in New Zealand*. *Addiction*, 2011. **106**(4): p. 789-797.
180. Plüddemann, A., Flisher, A.J., McKetin, R., Parry, C.D., and Lombard, C.J. *A prospective study of methamphetamine use as a predictor of high school non-attendance in Cape Town, South Africa*. *Substance Abuse Treatment, Prevention and Policy*, 2010. **5**(25): p. 1-7.
  181. Henry, B.L., Minassian, A., and Perry, W. *Effect of methamphetamine dependence on everyday functional ability*. *Addictive Behaviors*, 2010. **35**: p. 593-598.
  182. Kaye, S., Darke, S., Duflou, J., and McKetin, R. *Methamphetamine-related fatalities in Australia: demographics, circumstances, toxicology and major organ pathology*. *Addiction*, 2008. **103**(8): p. 1353-1360.
  183. Logan, B.K., Fligner, C.L., and Haddix, T. *Cause and manner of death in fatalities involving methamphetamine*. *J Forensic Sci*, 1998. **43**(1): p. 28-34.
  184. Bartu, A., Freeman, N.C., Gawthorne, G.S., Codde, J.P., and Holman, C.D. *Mortality in a cohort of opiate and amphetamine users in Perth, Western Australia*. *Addiction*, 2004. **99**(1): p. 53-60.
  185. Arendt, M., Munk-Jorgensen, P., Sher, L., and Jensen, S.O. *Mortality among individuals with cannabis, cocaine, amphetamine, MDMA, and opioid use disorders: a nationwide follow-up study of Danish substance users in treatment*. *Drug Alcohol Depend*, 2011. **114**(2-3): p. 134-139.
  186. Degenhardt, L., Roxburgh, A., and Barker, B. *Underlying causes of cocaine, amphetamine and opioid related deaths in Australia*. *J Clin Forensic Med*, 2005. **12**(4): p. 187-195.
  187. Callor, W.B., Petersen, E., Gray, D., Grey, T., Lamoreaux, T., and Bennett, P.J. *Preliminary findings of noncompliance with psychotropic medication and prevalence of methamphetamine intoxication associated with suicide completion*. *Crisis*, 2005. **26**(2): p. 78-84.
  188. McKetin, R. and Lubman, D.I. *Heavy stimulant use remains a significant health concern for Australia (Editorial)*. *Med J Aust*, 2011. **195**(10): p. 565-566.
  189. Rajasingham, R., Mimiaga, M.J., White, J.M., Pinkston, M.M., Baden, R.P., and Mitty, J.A. *A Systematic Review of Behavioral and Treatment Outcome Studies Among HIV-Infected Men Who Have Sex with Men Who Abuse Crystal Methamphetamine*. *AIDS Patient Care STDS*, 2012. **26**(1): p. 36-52.
  190. Freeman, P., Walker, B.C., Harris, D.R., Garofalo, R., Willard, N., and Ellen, J.M. *Methamphetamine Use and Risk for HIV Among Young Men Who Have Sex With Men in 8 US Cities*. *Archives of Pediatrics and Adolescent Medicine*, 2011. **165**(8): p. 736-740.

191. Hirshfield, S., Remien, R.H., Walavalkar, I., and Chiasson, M.A. *Crystal methamphetamine use predicts incident STD infection among men who have sex with men recruited online: a nested case-control study*. J Med Internet Res, 2004. **6**(4): p. e41.
192. Gustavsen, I., Morland, J., and Bramness, J.G. *Impairment related to blood amphetamine and/or methamphetamine concentrations in suspected drugged drivers*. Accid Anal Prev, 2006. **38**: p. 490-495.
193. Lillsunde, P. and Gunnar, T. *Drugs and driving: the Finnish perspective*. Bull Narc, 2005. **57**(1-2): p. 213-229.
194. Drummer, O.H., Gerostamoulos, D., Chu, M., Swann, P., Boorman, M., and Cairns, I. *Drugs in oral fluid in randomly selected drivers*. Forensic Sci Int, 2007. **170**(2-3): p. 105-110.
195. American College of Obstetricians Gynecologists Committee on Health Care for Underserved Women. *Committee Opinion No. 479: Methamphetamine abuse in women of reproductive age*. Obstet Gynecol, 2011. **117**(3): p. 751-755.
196. Smith, L.M., LaGasse, L.L., Derauf, C., Grant, P., Shah, R., Arria, A., Huestis, M., Haning, W., Strauss, A., Della Grotta, S., Liu, J., and Lester, B.M. *The infant development, environment, and lifestyle study: effects of prenatal methamphetamine exposure, polydrug exposure, and poverty on intrauterine growth*. Pediatrics, 2006. **118**(3): p. 1149-1156.
197. *Illegal meth labs: cleanup raises health and environmental concerns*. J Environ Health, 2003. **65**: p. 50.
198. Pal, R., Mallavarapu, M., Naidu, R., and Kirkbride, P. *Illicit Drug Laboratories and the Environment*. 2008. National Drug Law Enforcement Research Fund. Hobart, Tasmania.
199. Burke, B.A., Lewis, R.W., 2nd, Latenser, B.A., Chung, J.Y., Willoughby, C., Kealey, G.P., and Wibbenmeyer, L.A. *Methamphetamine-related burns in the cornbelt*. J Burn Care Res, 2008. **29**(4): p. 574-579.
200. O'Neill, T.B., Rawlins, J.M., Rea, S., and Wood, F.M. *Methamphetamine laboratory-related burns in Western Australia--why the explosion?* Burns, 2011. **37**(6): p. 1044-1048.
201. Klee, H. and Morris, J. *Crime and drug misuse: Economic and psychological aspects of the criminal activities of heroin and amphetamine injectors*. Addiction Research, 1994. **1**(4): p. 377-386.
202. The Age. *Man on 'ice' before fatal shooting*, The Age. 2010: Melbourne, Australia.
203. Hills, B. and Kaila, J. *Meth-use spike among criminals*, Herald Sun. 2012: Melbourne, Australia.
204. Herald Sun. *Fears of new ice age*, Herald Sun. 2007: Melbourne, Australia.
205. Munro, I. *The ice age*, The Age. 2007: Melbourne, Australia.

206. Mullany, A. *Ecstasy use in WA among highest in world*, Perth Now. 2011: Perth, Australia.
207. Devine, M. *It's time to clean up our streets and stop the violence*, Herald Sun. 2012: Melbourne, Australia.
208. Perrin, D. *Society: Who benefits from drugs?*, News Weekly. 2004:
209. Littlely, B. *Rise in Adelaide's dirty drugs contributing to rise in violent crime, police and health experts say*, Herald Sun. 2012: Melbourne, Australia.
210. Darke, S., Torok, M., Kaye, S., Ross, J., and McKetin, R. *Comparative rates of violent crime among regular methamphetamine and opioid users: offending and victimization*. *Addiction*, 2010. **105**(5): p. 916-919.
211. Cartier, J., Farabee, D., and Prendergast, M.L. *Methamphetamine Use, Self-Reported Violent Crime, and Recidivism Among Offenders in California Who Abuse Substances*. *Journal of Interpersonal Violence*, 2006. **21**(4): p. 435-445.
212. Wright, S. and Klee, H. *Violent Crime, Aggression and Amphetamine: what are the implications for drug treatment services?* *Drugs: education, prevention and policy*, 2001. **8**(1): p. 73-90.
213. Zweben, J.E., Cohen, J.B., Christian, D., Galloway, G.P., Salinardi, M., Parent, D., and Iguchi, M. *Psychiatric Symptoms in Methamphetamine Users*. *American Journal on Addictions*, 2004. **13**(2): p. 181-190.
214. Ernst, A.A., Weiss, S.J., Enright-Smith, S., Hilton, E., and Byrd, E.C. *Perpetrators of intimate partner violence use significantly more methamphetamine, cocaine, and alcohol than victims: a report by victims*. *Am J Emerg Med*, 2008. **26**(5): p. 592-596.
215. McKetin, R., McLaren, J., Riddell, S., and Robins, L. *The relationship between methamphetamine use and violent behaviour*. *Crime and Justice Bulletin: Contemporary Issues in Crime and Justice*. 2006. NSW Bureau of Crime Statistics and Research. Sydney.
216. Vincent, N., Shoobridge, J., Ask, A., Allsop, S., and Ali, R. *Characteristics of amphetamine users seeking information, help and treatment in Adelaide, South Australia*. *Drug Alcohol Rev*, 1999. **18**: p. 63-73.
217. Hando, J., Topp, L., and Hall, W. *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. *Drug Alcohol Depend*, 1997. **46**: p. 105-113.
218. Kelly, E., McKetin, R., and McLaren, J. *Health Service Utilisation among Regular Methamphetamine Users*. 2005. National Drug and Alcohol Research Centre. Sydney.
219. Saltman, D.C., Newman, C.E., Mao, L., Kippax, S.C., and Kidd, M.R. *Experiences in managing problematic crystal methamphetamine use and associated depression in gay*

- men and HIV positive men: in-depth interviews with general practitioners in Sydney, Australia.* BMC Family Practice, 2008. **9**(45): p. 1-7.
220. Degenhardt, L., Roxburgh, A., and McKetin, R. *Hospital separations for cannabis- and methamphetamine-related psychotic episodes in Australia.* Med J Aust, 2007. **186**(7): p. 342-345.
  221. Leamon, M.H., Gibson, D.R., Canning, R.D., and Benjamin, L. *Hospitalization of patients with cocaine and amphetamine use disorders from a psychiatric emergency service.* Psychiatr Serv, 2002. **53**(11): p. 1461-1466.
  222. Gray, S.D., Fatovich, D.M., McCoubrie, D.L., and Daly, F.F. *Amphetamine-related presentations to an inner-city tertiary emergency department: a prospective evaluation.* Med J Aust, 2007. **186**(7): p. 336-339.
  223. Richards, J.R., Bretz, S.W., Johnson, E.B., Turnipseed, S.D., Brofeldt, B.T., and Derlet, R.W. *Methamphetamine Abuse and Emergency Department Utilization.* Western Journal of Medicine, 1999. **170**(4): p. 198-202.
  224. Tominaga, G.T., Garcia, G., Dzierba, A., and Wong, J. *Toll of Methamphetamine on the Trauma System.* Archives of Surgery, 2004. **139**(8): p. 844-847.
  225. Hendrickson, R.G., Cloutier, R., and McConnell, K.J. *Methamphetamine-related emergency department utilization and cost.* Acad Emerg Med, 2008. **15**(1): p. 23-31.
  226. Swanson, S.M., Sise, C.B., Sise, M.J., Sack, D.I., Holbrook, T.L., and Paci, G.M. *The scourge of methamphetamine: impact on a level I trauma center.* J Trauma, 2007. **63**(3): p. 531-537.
  227. Kerr, T., Wood, E., Grafstein, E., Ishida, T., Shannon, K., Lai, C., Montaner, J., and Tyndall, M.W. *High rates of primary care and emergency department use among injection drug users in Vancouver.* J Public Health (Oxf), 2005. **27**(1): p. 62-66.
  228. London, J.A., Utter, G.H., Battistella, F., and Wisner, D. *Methamphetamine use is associated with increased hospital resource consumption among minimally injured trauma patients.* J Trauma, 2009. **66**(2): p. 485-490.
  229. Pennay, A.E. and Lee, N.K. *Barriers to methamphetamine withdrawal treatment in Australia: findings from a survey of AOD service providers.* Drug Alcohol Rev, 2009. **28**(6): p. 636-640.
  230. Klee, H., Wright, S., and Morris, J. *Amphetamine Users in Treatment: Factors Associated with Sustained Abstinence from Street Drugs.* Addiction Research, 1999. **7**(3): p. 239-265.
  231. Wallace, C., Galloway, T., McKetin, R., Kelly, E., and Leary, J. *Methamphetamine use, dependence and treatment access in rural and regional North Coast of New South Wales, Australia.* Drug Alcohol Rev, 2009. **28**: p. 592-599.

232. Kamieniecki, G., Vincent, N., Allsop, S., and Lintzeris, N. *Models of intervention and care for psychostimulant users*. Monograph Series No. 32. 1998. National Centre for Education and Training on Addiction. Canberra, ACT.
233. Klee, H. and Morris, J. *Factors That Lead Young Amphetamine Misusers to Seek Help: implications for drug prevention and harm reduction*. Drugs: education, prevention and policy, 1994. **1**(3): p. 289-297.
234. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Barriers to formal drug abuse treatment in the rural south: a preliminary ethnographic assessment*. J Psychoactive Drugs, 2008. **40**(2): p. 121-129.
235. Shearer, J. and Gowing, L.R. *Pharmacotherapies for problematic psychostimulant use: a review of current research*. Drug Alcohol Rev, 2004. **23**: p. 203-211.
236. Ciketic, S., Hayatbakhsh, M.R., Doran, C.M., Najman, J.M., and McKetin, R. *A review of psychological and pharmacological treatment options for methamphetamine dependence*. Journal of Substance Use, 2012. **17**(4): p. 363-383.
237. Lintzeris, N., Holgate, F., and Dunlop, A. *Addressing dependent amphetamine use: a place for prescription*. Drug Alcohol Rev, 1996. **15**: p. 189-195.
238. McKetin, R., Kelly, E., and Indig, D. *Characteristics of treatment provided for amphetamine use in New South Wales, Australia*. Drug Alcohol Rev, 2005. **24**(5): p. 433-436.
239. Rawson, R.A., Gonzales, R., and Brethen, P. *Treatment of methamphetamine use disorders: an update*. J Subst Abuse Treat, 2002. **23**: p. 145-150.
240. Wu, L.J., Altshuler, S.J., Short, R.A., and Roll, J.M. *Predicting drug court outcome among amphetamine-using participants*. J Subst Abuse Treat, 2012. **42**(4): p. 373-382.
241. Simon, S.L., Dacey, J., Glynn, S., Rawson, R., and Ling, W. *The effect of relapse on cognition in abstinent methamphetamine abusers*. J Subst Abuse Treat, 2004. **27**(1): p. 59-66.
242. Shearer, J. *Psychosocial approaches to psychostimulant dependence: a systematic review*. J Subst Abuse Treat, 2007. **32**(1): p. 41-52.
243. Pennay, A.E. and Lee, N.K. *Putting the call out for more research: the poor evidence base for treating methamphetamine withdrawal*. Drug Alcohol Rev, 2011. **30**(2): p. 216-222.
244. Brecht, M.L., von Mayrhauser, C., and Anglin, M.D. *Predictors of Relapse After Treatment for Methamphetamine Use*. J Psychoactive Drugs, 2000. **32**(2): p. 211-220.
245. Hartz, D.T., Frederick-Osborne, S.L., and Galloway, G.P. *Craving predicts use during treatment for methamphetamine dependence: a prospective, repeated-measures, within-subject analysis*. Drug Alcohol Depend, 2001. **63**(3): p. 269-76.

246. Zorick, T., Sugar, C.A., Hellemann, G., Shoptaw, S., and London, E.D. *Poor response to sertraline in methamphetamine dependence is associated with sustained craving for methamphetamine*. Drug Alcohol Depend, 2011. **118**(2-3): p. 500-503.
247. Campos, M. and Shoptaw, S. *Evidence-based treatments for methamphetamine abuse*. Focus, 2005. **20**(6): p. 5-6.
248. McKetin, R., Najman, J.M., Baker, A., Lubman, D.I., Dawe, S., Ali, R., Lee, N.K., Mattick, R.P., and Mamun, A. *Evaluating the impact of community-based treatment options on methamphetamine use: findings from the Methamphetamine Treatment Evaluation Study (MATES)*. Addiction, 2012. **Early online**.
249. Shoptaw, S.J., Kao, U., and Ling, W. *Treatment for amphetamine psychosis*. Cochrane Database Syst Rev, 2009(1): p. CD003026.
250. Boeri, M.W., Tyndall, B.D., and Woodall, D.R. *Suburban Poverty: Barriers to Services and Injury Prevention among Marginalized Women who Use Methamphetamine*. Western Journal of Emergency Medicine, 2011. **12**(3): p. 284-292.
251. McKetin, R. and Kelly, E. *Socio-demographic factors associated with methamphetamine treatment contact among dependent methamphetamine users in Sydney, Australia*. Drug Alcohol Rev, 2007. **26**: p. 161-168.
252. Gunter, T.D., Black, D.W., Zwick, J., and Arndt, S. *Drug and alcohol treatment services effective for methamphetamine abuse*. Ann Clin Psychiatry, 2004. **16**(4): p. 195-200.
253. Shoptaw, S., Peck, J., Reback, C.J., and Rotheram-Fuller, E. *Psychiatric and substance dependence comorbidities, sexually transmitted diseases, and risk behaviors among methamphetamine-dependent gay and bisexual men seeking outpatient drug abuse treatment*. J Psychoactive Drugs, 2003. **35 Suppl 1**: p. 161-168.
254. Nguyen, P., Dietze, P., and Lloyd, B. *Victorian Trends in Ecstasy and Related Drug Markets 2011: Findings from the Ecstasy and related Drugs Reporting System (EDRS)*. Australian Drug Trends Series No. 85. 2012. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
255. Kirwan, A., Dietze, P., and Lloyd, B. *Victorian Drug Trends 2011: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trends Series No. 76. 2012. National Drug and Alcohol Research Centre, University of New South Wales.
256. Australian Bureau of Statistics. *3218.0 - Regional Population Growth, Australia, 2009-10*. 2011. ABS. Canberra.
257. Cogger, S., McKetin, R., Ross, J., and Najman, J. *Methamphetamine Treatment Evaluation Study (MATES): Findings from the Brisbane Site*. Technical Report No. 295. 2008. National Drug and Alcohol Research Centre. Sydney.

258. Baker, A., Boggs, T.G., and Lewin, T.J. *Randomized controlled trial of brief cognitive-behavioural interventions among regular users of amphetamine*. *Addiction*, 2001. **96**(9): p. 1279-1287.
259. Gaffney, A., Jones, W., Sweeney, J., and Payne, J. *Drug use monitoring in Australia: 2008 annual report on drug use among police detainees*. 2010. Australian Institute of Criminology. Canberra.
260. Baker, A. and Dawe, S. *Amphetamine use and co-occurring psychological problems: Review of the literature and implications for treatment*. *Australian Psychologist*, 2005. **40**(2): p. 88-95.
261. Greenwell, L. and Brecht, M. *Self-Reported Health Status Among Treated Methamphetamine Users*. *American Journal of Drug and Alcohol Abuse*, 2003. **29**(1): p. 75-104.
262. Degenhardt, L., Baker, A., and Maher, L. *Methamphetamine: geographic areas and populations at risk, and emerging evidence for effective interventions (Editorial)*. *Drug Alcohol Rev*, 2008. **27**(3): p. 217-219.
263. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2008-09: report on the National Minimum Data Set*. Drug treatment series no. 10. Cat no. HSE 92. 2010. AIHW. Canberra.
264. Ross, J. and Miller, S., *Hidden use of amphetamine in metropolitan Melbourne*, in *Proceedings of the 1994 autumn school of studies on alcohol and drugs*, R. Godding and G. Whelan, Editors. 1994, Department of Drug and Alcohol Studies, St Vincent's Hospital: Melbourne. p. 49-52.
265. Reddel, S.E., Horyniak, D., Dietze, P., and McElwee, P. *Victorian Drug Trends 2010: Findings from the Illicit Drug Reporting System (IDRS)*. Australian Drug Trends Series No. 58. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
266. Aitken, C., Brough, R., and Crofts, N. *Injecting drug use and blood-borne viruses: a comparison of rural and urban Victoria, 1990-95*. *Drug Alcohol Rev*, 1999. **18**: p. 47-52.
267. Feigin, A., Dietze, P., and Lloyd, B. *Victorian Trends in Ecstasy and Related Drug Markets 2010: Findings from the Ecstasy and related Drugs Reporting System (EDRS)*. Australian Drug Trends Series No. 67. 2011. National Drug and Alcohol Research Centre, University of New South Wales. Sydney.
268. Victorian Government Department of Health. *The Victorian Drug Statistics Handbook: Patterns of drug use and related harm in Victoria for the period July 2008 to June 2009*. Report Number 12. 2011. Mental Health, Drugs and Regions Division, Victorian Government Department of Health. Melbourne.
269. Australian Crime Commission. *Illicit Drug Data Report: 2009-10*. 2011. ACC. Canberra.



270. Topp, L. and Mattick, R.P. *Choosing a cutoff on the Severity of Dependence Scale (SDS) for amphetamine users*. *Addiction*, 1997. **92**(7): p. 839-845.
271. Heckathorn, D.D. *Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations*. *Social Problems*, 1997. **44**(2): p. 174-199.
272. Fry, C.L., Hall, W., Ritter, A., and Jenkinson, R. *The ethics of paying drug users who participate in research: A review and practical recommendations*. *Journal of Empirical Research on Human Research Ethics*, 2006. **1**(4): p. 21-36.
273. Darke, S., Hall, W., Wodak, A., Heather, N., and Ward, J. *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index*. *British Journal of Addiction*, 1992. **87**: p. 733-742.
274. Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., and Strang, J. *The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users*. *Addiction*, 1995. **90**(5): p. 607-614.
275. Kessler, R.C. *Kessler Psychological Distress Scale (K10)*. 1996. Harvard Medical School. Boston, MA.
276. Australian Bureau of Statistics. *Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, Australia*. 2001. ABS. Canberra.
277. Bush, K., Kivlahan, D.R., McDonnell, M.B., Fihn, S.D., and Bradley, K.A. *The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking*. *Archives of Internal Medicine*, 1998. **158**: p. 1789-1795.
278. Australian Crime Commission. *Illicit Drug Data Report: 2008-09*. 2010. ACC. Canberra.
279. Hayatbakhsh, M.R., Najman, J.M., Bor, W., and Williams, G.M. *Predictors of young adults' amphetamine use and disorders: a prospective study*. *Drug Alcohol Rev*, 2009. **28**(3): p. 275-283.
280. Darke, S. and Hall, W. *Levels and correlates of polydrug use among heroin users and regular amphetamine users*. *Drug Alcohol Depend*, 1995. **39**(3): p. 231-235.
281. Wright, S. and Klee, H. *A Profile of Amphetamine Users Who Present to Treatment Services and Do Not Return*. *Drugs: education, prevention and policy*, 1999. **6**(2): p. 227-241.
282. Deady, M. *A Review of Screening, Assessment and Outcome Measures for Drug and Alcohol Settings*. 2009. Network of Alcohol & other Drug Agencies (NADA).
283. Semaan, S., Lauby, J., and Liebman, J. *Street and Network Sampling in Evaluation Studies of HIV Risk-Reduction Interventions*. *AIDS Rev*, 2002. **4**: p. 213-223.
284. Paquette, D.M., Bryant, J., and De Wit, J. *Use of respondent-driven sampling to enhance understanding of injecting networks: a study of people who inject drugs in Sydney, Australia*. *Int J Drug Policy*, 2011. **22**(4): p. 267-73.

285. Cretzmeyer, M., Vaughan Sarrazin, M., Huber, D.L., Block, R.I., and Hall, J.A. *Treatment of methamphetamine abuse: research findings and clinical directions*. J Subst Abuse Treat, 2003. **24**: p. 267-277.
286. Australian National Council on Drugs. *Methamphetamines: Position Paper*. 2007. ANCD. Canberra.
287. Greenfield, S.F., Brooks, A.J., Gordon, S.M., Green, C.A., Kropp, F., McHugh, R.K., Lincoln, M., Hien, D., and Miele, G.M. *Substance abuse treatment entry, retention, and outcome in women: A review of the literature*. Drug Alcohol Depend, 2007. **86**: p. 1-21.
288. Holt, M., Treloar, C., McMillan, K., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users with Mental Health Comorbidities and Complex Vulnerabilities*. Monograph Series No. 61. 2007. Australian Government Department of Health and Ageing. Canberra.
289. Neale, J., Tompkins, C., and Sheard, L. *Barriers to accessing generic health and social care services: a qualitative study of injecting drug users*. Health and Social Care in the Community, 2008. **16**(2): p. 147-154.
290. Wisdom, J.P., Cavaleri, M., Gogel, L., and Nacht, M. *Barriers and facilitators to adolescent drug treatment: Youth, family, and staff reports*. Addiction Research and Theory, 2011. **19**(2): p. 179-188.
291. Butler, R. and Sheridan, J. *Innocent parties or devious drug users: the views of primary healthcare practitioners with respect to those who misuse prescription drugs*. Harm Reduction Journal, 2010. **7**(21): p. 1-11.
292. Dietze, P., Richards, J., Rumbold, G., Aitken, C., Day, C., McGregor, C., and Ritter, A. *Treatment utilisation by heroin-dependent persons in Australia: Implications for treatment service systems*. 2003. Turning Point Alcohol and Drug Centre. Fitzroy.
293. Treloar, C., Abelson, J., Cao, W., Brener, L., Kippax, S., Schultz, L., Schultz, M., and Bath, N. *Barriers and Incentives to Treatment for Illicit Drug Users*. 2004. Australian Government Department of Health and Ageing. Canberra.
294. Farrell, M., Howes, S., Griffiths, P., Williamson, S., and Taylor, C. *Stimulant Needs Assessment Project*. Report to the Department of Health. 1998. National Addiction Centre. London.
295. Semple, S.J., Grant, I., and Patterson, T.L. *Utilization of Drug Treatment Programs by Methamphetamine Users: The Role of Social Stigma*. Am J Addict, 2005. **14**(4): p. 367-380.
296. Edlund, M.J., Unutzer, J., and Curran, G.M. *Perceived need for alcohol, drug, and mental health treatment*. Social psychiatry and psychiatric epidemiology, 2006. **41**: p. 480-487.

297. Falck, R.S., Wang, J., Carlson, R.G., Krishnan, L.L., Leukefeld, C., and Booth, B.M. *Perceived need for substance abuse treatment among illicit stimulant drug users in rural areas of Ohio, Arkansas, and Kentucky*. Drug Alcohol Depend, 2007. **91**: p. 107-114.
298. Hser, Y.-I., Evans, E., and Huang, Y.C. *Treatment outcomes among women and men methamphetamine abusers in California*. J Subst Abuse Treat, 2005. **28**(1): p. 77-85.
299. Mahoney, J.J., Hawkins, R.Y., De La Garza, R., Kalenchstein, A.D., and Newton, T.F. *Relationship between gender and psychotic symptoms in cocaine-dependent and methamphetamine-dependent participants*. Gender Medicine, 2010. **7**(5): p. 414-421.
300. Cohen, J.B., Dickow, A., Homer, K., Zweben, J.E., Balabis, J., Vandersloot, D., and Reiber, C. *Abuse and Violence History of Men and Women in Treatment for Methamphetamine Dependence*. The American Journal on Addictions, 2003. **12**: p. 377-385.
301. Dluzen, D.E. and Liu, B. *Gender differences in methamphetamine use and responses: a review*. Gend Med, 2008. **5**(1): p. 24-35.
302. Wright, S. and Klee, H. *Developing drug services for amphetamine users: taking account of gender-specific factors*. Journal of Substance Use, 2000. **5**: p. 122-130.
303. Wright, S., Klee, H., and Reid, P. *Attitudes of Amphetamine Users Towards Treatment Services*. Drugs: education, prevention and policy, 1999. **6**(1): p. 71-86.
304. Cohen, J.B., Greenberg, R., Uri, J., Halpin, M., and Zweben, J.E. *Women with methamphetamine dependence: research on etiology and treatment*. J Psychoactive Drugs, 2007. **Suppl 4**: p. 347-351.
305. Lindsay, B., Albrecht, J., and Terplan, M. *Against professional advice: treatment attrition among pregnant methamphetamine users*. Substance Abuse and Rehabilitation, 2011. **2**(1): p. 189-195.
306. Leonard, W., Dowsett, G., Slavin, S., Mitchell, A., and Pitts, M. *Crystal Clear: The social determinants of gay men's use of crystal methamphetamine in Victoria*. Monograph Series Number 67. 2008. La Trobe University, The Australian Research Centre in Sex, Health & Society. Melbourne.
307. Halkitis, P.N., Green, K.A., and Mourgues, P. *Longitudinal investigation of methamphetamine use among gay and bisexual men in New York City: findings from Project BUMPS*. J Urban Health, 2005. **82**(1 Suppl 1): p. i18-25.
308. Drugs and Crime Prevention Committee. *Inquiry into Amphetamine and 'Party Drug' Use in Victoria - Final Report*. 2004. DCPC, Parliament of Victoria. Melbourne.
309. Dickerson, D.L., Spear, S., Marinelli-Casey, P., Rawson, R., Li, L., and Hser, Y.I. *American indians/alaska natives and substance abuse treatment outcomes: positive signs and continuing challenges*. J Addict Dis, 2011. **30**(1): p. 63-74.

310. Lende, D.H., Leonard, T., Sterk, C.E., and Elifson, K. *Functional methamphetamine use: The insider's perspective*. *Addiction Research & Theory*, 2007. **15**(5): p. 465-477.
311. Bruehl, A.M., Lende, D.H., Schwartz, M., Sterk, C.E., and Elifson, K. *Craving and control: methamphetamine users' narratives*. *J Psychoactive Drugs*, 2006. **Suppl 3**: p. 385-392.
312. Maglione, M., Chao, B., and Anglin, M.D. *Correlates of outpatient drug treatment drop-out among methamphetamine users*. *J Psychoactive Drugs*, 2000. **32**(2): p. 221-228.
313. Lee, N., Johns, L., Jenkinson, R., Johnston, J., Connolly, K., Hall, K., and Cash, R. *Clinical treatment guidelines for alcohol and drug clinicians. No. 14: Methamphetamine dependence and treatment*. 2007. Turning Point Alcohol and Drug Centre. Fitzroy, Victoria.
314. Rawson, R.A., Gonzales, R., Marinelli-Casey, P., and Ang, A. *Methamphetamine dependence: a closer look at treatment response and clinical characteristics associated with route of administration in outpatient treatment*. *Am J Addict*, 2007. **16**(4): p. 291-299.
315. Brecht, M., Greenwell, L., and Anglin, M.D. *Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002)*. *J Subst Abuse Treat*, 2005. **29**: p. 295-306.
316. Hillhouse, M.P., Marinelli-Casey, P., Gonzales, R., Ang, A., Rawson, R.A., and Authors, T.M.T.P.C. *Predicting in-treatment performance and post-treatment outcomes in methamphetamine users*. *Addiction*, 2007. **102**(Suppl. 1): p. 84-95.
317. Wodak, A. and Cooney, A. *Do needle syringe programs reduce HIV infection among injecting drug users: a comprehensive review of the international evidence*. *Subst Use Misuse*, 2006. **41**(6-7): p. 777-813.
318. Victorian Department of Human Services. *National Needle and Syringe Programs Strategic Framework 2010-2014*. 2010. Victorian DHS. Melbourne.
319. Akiyama, K. *Longitudinal clinical course following pharmacological treatment of methamphetamine psychosis which persists after long-term abstinence*. *Ann N Y Acad Sci*, 2006. **1074**: p. 125-134.
320. Kresina, T.F., Normand, J., Khalsa, J., Mitty, J., Flanigan, T., and Francis, H. *Addressing the need for treatment paradigms for drug-abusing patients with multiple morbidities*. *Clin Infect Dis*, 2004. **38 Suppl 5**: p. S398-401.
321. Reback, C.J., Peck, J.A., Fletcher, J.B., Nuno, M., and Dierst-Davies, R. *Lifetime substance use and HIV sexual risk behaviors predict treatment response to contingency management among homeless, substance-dependent MSM*. *J Psychoactive Drugs*, 2012. **44**(2): p. 166-172.

322. Scott, C.K., Foss, M.A., and Dennis, M.L. *Factors influencing initial and longer-term responses to substance abuse treatment: a path analysis*. Evaluation and Program Planning, 2003. **26**: p. 287-295.
323. Hser, Y.-I., Maglione, M.A., Joshi, V., and Chao, B. *Effects of Treatment Program and Client Characteristics on Client Treatment Retention*. 1998. Center for Substance Abuse Treatment, National Evaluation Data and Technical Assistance Center. Los Angeles, California.
324. Pennay, A., Ferris, J., Reed, M., Devaney, M., and Lee, N. *Evaluation of 'Access Point' Specialist Methamphetamine Clinic*. 2010. Turning Point Alcohol and Drug Centre. Fitzroy, Melbourne.
325. Klee, H., Carnwath, T., Merrill, J., and Morris, J. *Amphetamine misuse and treatment: an exploration of individual and policy impediments to effective service delivery*. 1995. Centre for Social Research on Health and Substance Abuse, Manchester Metropolitan University. Manchester, UK.
326. Morgan, P., Beck, J., Joe, K., McDonnell, D., and Guterrez, R. *Ice and Other Methamphetamine Use. Final Report to the National Institute on Drug Abuse*. 1994. National Institute of Health. Rockville, MD.
327. Sun, A.P. *Relapse among substance-abusing women: components and processes*. Subst Use Misuse, 2007. **42**(1): p. 1-21.
328. Yen, C.F. and Chang, Y.P. *Relapse antecedents for methamphetamine use and related factors in Taiwanese adolescents*. Psychiatry Clin Neurosci, 2005. **59**(1): p. 77-82.
329. Karila, L., Weinstein, A., Aubin, H.J., Benyamina, A., Reynaud, M., and Batki, S.L. *Pharmacological approaches to methamphetamine dependence: a focused review*. Br J Clin Pharmacol, 2010. **69**(6): p. 578-592.
330. Elkashef, A., Vocci, F., Hanson, G., White, J., Wickes, W., and Tiihonen, J. *Pharmacotherapy of methamphetamine addiction: an update*. Subst Abus, 2008. **29**(3): p. 31-49.
331. Brackins, T., Brahm, N.C., and Kissack, J.C. *Treatments for methamphetamine abuse: a literature review for the clinician*. J Pharm Pract, 2011. **24**(6): p. 541-550.
332. Moeller, F.G., Schmitz, J.M., Herin, D., and Kjome, K.L. *Use of stimulants to treat cocaine and methamphetamine abuse*. Curr Psychiatry Rep, 2008. **10**(5): p. 385-391.
333. Merrill, J., McBride, A., Pates, R., Peters, L., Tetlow, A., Roberts, C., Arnole, K., Crean, J., Lomax, S., and Deakin, B. *Dexamphetamine Substitution as a Treatment of Amphetamine Dependence: a Two-Centre Randomised Controlled Trial: Executive Summary*. 2004. UK Department of Health Drug Misuse Research Initiative.

334. Longo, M., Wickes, W., Smout, M., Harrison, S., Cahill, S., and White, J.M. *Randomized controlled trial of dexamphetamine maintenance for the treatment of methamphetamine dependence*. *Addiction*, 2009. **105**: p. 146-154.
335. Shearer, J., Wodak, A., Mattick, R.P., Van Beek, I., Lewis, J., Hall, W., and Dolan, K. *Pilot randomized controlled study of dexamphetamine substitution for amphetamine dependence*. *Addiction*, 2001. **96**: p. 1289-1296.
336. Srisurapanont, M., Jarusuraisin, N., and Kittirattanapaiboon, P. *Treatment for amphetamine dependence and abuse*. *Cochrane Database of Systematic Reviews*, 2001(4): p. CD003022.
337. Shoptaw, S.J., Kao, U., Heinzerling, K., and Ling, W. *Treatment for amphetamine withdrawal*. *Cochrane Database Syst Rev*, 2009(2): p. CD003021.
338. Lee, N., Pennay, A., Hester, R., McKetin, R., Nielsen, S., and Ferris, J. *A pilot randomised controlled trial of modafinil during acute methamphetamine withdrawal: Feasibility, tolerability and clinical outcomes*. *Drug Alcohol Rev*, 2012.
339. Baker, A. and Lee, N.K. *A review of psychosocial interventions for amphetamine use*. *Drug Alcohol Rev*, 2003. **22**: p. 323-335.
340. Smout, M.F., Longo, M., Harrison, S., Minniti, R., Cahill, S., Wickes, W., and White, J.M. *The Psychostimulant Check-Up: A pilot study of a brief intervention to reduce illicit stimulant use*. *Drug Alcohol Rev*, 2010. **29**: p. 169-176.
341. Shearer, J., Wodak, A., Mattick, R.P., Van Beek, I., Lewis, J., Hall, W., and Dolan, K. *A randomised controlled trial of the feasibility of monitoring controlled prescribing of dexamphetamine*. NDARC Technical Report No. 75. 1999. National Drug and Alcohol Research Centre, UNSW. Sydney.
342. Smith, T.L., Volpe, F.R., Hashima, J.N., and Schuckit, M.A. *Impact of a stimulant-focused enhanced program on the outcome of alcohol- and/or stimulant-dependent men*. *Alcohol Clin Exp Res*, 1999. **23**(11): p. 1772-1779.
343. Gerada, C. *Drug misuse: a review of treatments*. *Clinical Medicine*, 2005. **5**(1): p. 69-73.
344. Brecht, M.L., Greenwell, L., von Mayrhauser, C., and Anglin, M.D. *Two-year outcomes of treatment for methamphetamine use*. *J Psychoactive Drugs*, 2006. **Suppl 3**: p. 415-426.
345. Lee, N.K. and Rawson, R.A. *A systematic review of cognitive and behavioural therapies for methamphetamine dependence*. *Drug Alcohol Rev*, 2008. **27**: p. 309-317.
346. Gossop, M., Marsden, J., and Stewart, D. *Treatment outcomes of stimulant misusers: one year follow-up results from the National Treatment Outcome Research Study (NTORS)*. *Addict Behav*, 2000. **25**(4): p. 509-522.
347. Rawson, R.A., Marinelli-Casey, P., Anglin, M.D., Dickow, A., Frazier, Y., Gallagher, C., Galloway, G.P., Herrell, J., Huber, A., McCann, M.J., Obert, J., Pennell, S., Reiber, C., Vandersloot, D., Zweben, J., and Methamphetamine Treatment Project Corporate

- Authors. *A multi-site comparison of psychosocial approaches for the treatment of methamphetamine dependence*. *Addiction*, 2004. **99**(6): p. 708-717.
348. Knapp, W.P., Soares, B.G., Farrel, M., and Lima, M.S. *Psychosocial interventions for cocaine and psychostimulant amphetamines related disorders*. *Cochrane Database Syst Rev*, 2007. **3**(CD003023).
  349. Victorian Government Department of Human Services. *Victorian amphetamine-type stimulant (ATS) and related drugs strategy 2009-2012*. 2008. State Government of Victoria. Melbourne.
  350. Kay-Lambkin, F. *Technology and innovation in the psychosocial treatment of amphetamine use, risk and dependence*. *Drug Alcohol Rev*, 2008. **27**: p. 318-325.
  351. Walley, A.Y., Phillips, K.A., and Gordon, A.J. *The patients in recovery (PIR) perspective: teaching physicians about methamphetamine*. *Subst Abus*, 2008. **29**(4): p. 61-64.
  352. Shearer, J., *Treatment Responses to Problematic Methamphetamine Use: The Australian Experience*, in *Interventions for Amphetamine Misuse*, R. Pates and D. Riley, Editors. 2010, Blackwell Publishing Ltd. p. 115-128.
  353. Pearson, D.D.R. *Victorian Auditor-General's Report: Managing Drug and Alcohol Prevention and Treatment Services*. 2011. Victorian Auditor-General's Office. Melbourne.
  354. Australian General Practice Network. *Management of patients with psychostimulant use problems: Guidelines for general practitioners*. 2007. Australian Government Department of Health and Ageing. Canberra.
  355. Torok, M., Darke, S., Kaye, S., Ross, J., and McKetin, R. *Comparative rates of violent crime amongst methamphetamine and opioid users: Victimisation and offending*. Monograph Series No. 32. 2008. National Drug Law Enforcement Research Fund (NDLERF). Hobart, Tasmania.
  356. Australian Institute of Health and Welfare. *Alcohol and other drug treatment services in Australia 2004–05: report on the National Minimum Data Set*. Drug Treatment Series no. 5. AIHW cat. no. HSE 43. 2006. AIHW. Canberra.
  357. Quinn, B., Stoové, M., Papanastasiou, C., and Dietze, P. *Methamphetamine use in Melbourne, Australia: baseline characteristics of a prospective methamphetamine-using cohort and correlates of methamphetamine dependence*. *Journal Substance Use*, 2012. **Early online**: p. 1-14.
  358. Mitchell, P.H., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., and Berkman, L.F. *A short social support measure for patients recovering from myocardial infarction: the ENRICHD Social Support Inventory*. *J Cardiopulm Rehabil*, 2003. **23**(6): p. 398-403.

359. Hosmer, D.W. and Lemeshow, S., *Applied Logistic Regression*. 2nd ed. 2000, New York: Wiley.
360. Monk, R.L. and Heim, D. *Self-image bias in drug use attributions*. Psychol Addict Behav, 2011. **25**(4): p. 645-51.
361. Winhusen, T., Stitzer, M., Woody, G., Brigham, G., Kropp, F., Ghitza, U., Lindblad, R., Adinoff, B., Green, C., Sharma, G., and Somoza, E. *Design considerations for a study to evaluate the impact of smoking cessation treatment on stimulant use outcomes in stimulant-dependent individuals*. Contemp Clin Trials, 2012. **33**(1): p. 197-205.
362. Heim, D., Davies, J.B., Cheyne, B., and Smallwood, J. *Addiction as a Functional Representation*. Journal of Community & Applied Social Psychology, 2001. **11**: p. 57-62.
363. Daniulaityte, R., Carlson, R.G., and Kenne, D.R. *Methamphetamine use in Dayton, Ohio: preliminary findings from the Ohio Substance Abuse Monitoring Network*. J Psychoactive Drugs, 2007. **39**(3): p. 211-221.
364. Mechanic, D. *Is the prevalence of mental disorders a good measure of the need for services?* Health Aff (Millwood), 2003. **22**(5): p. 8-20.
365. Bobrova, N., Rhodes, T., Power, R., Alcorn, R., Neifeld, E., Krasiukov, N., Latyshevskaya, N., and Maksimova, S. *Barriers to accessing drug treatment in Russia: a qualitative study among injecting drug users in two cities*. Drug Alcohol Depend, 2006. **82 Suppl 1**: p. S57-63.
366. Borders, T.F., Booth, B.M., Falck, R.S., Leukefeld, C., Wang, J., and Carlson, R.G. *Longitudinal changes in drug use severity and physical health-related quality of life among untreated stimulant users*. Addict Behav, 2009. **34**(11): p. 959-964.
367. Degenhardt, L. and Hall, W. *Extent of illicit drug use and dependence, and their contribution to the global burden of disease*. Lancet, 2012. **379**(9810): p. 55-70.
368. Gonzales, R., Ang, A., Marinelli-Casey, P., Glik, D.C., Iguchi, M.Y., and Rawson, R.A. *Health-related quality of life trajectories of methamphetamine-dependent individuals as a function of treatment completion and continued care over a 1-year period*. J Subst Abuse Treat, 2009. **37**(4): p. 353-361.
369. Colfax, G., Santos, G.M., Chu, P., Vittinghoff, E., Pluddemann, A., Kumar, S., and Hart, C. *Amphetamine-group substances and HIV*. Lancet, 2010. **376**(9739): p. 458-74.
370. Gossop, M., Marsden, J., Stewart, D., and Kidd, T. *The National Treatment Outcome Research Study (NTORS): 4-5 year follow-up results*. Addiction, 2003. **98**(3): p. 291-303.
371. Rawson, R.A., Huber, A., Brethen, P., Obert, J., Gulati, V., Shoptaw, S., and Ling, W. *Status of methamphetamine users 2-5 years after outpatient treatment*. J Addict Dis, 2002. **21**(1): p. 107-119.



372. Murphy, D.A., Hser, Y.I., Huang, D., Brecht, M.L., and Herbeck, D.M. *Self-report of Longitudinal Substance Use: A Comparison of the UCLA Natural History Interview and the Addiction Severity Index*. J Drug Issues, 2010. **40**(2): p. 495-516.
373. Gottlieb, B.H. and Bergen, A.E. *Social support concepts and measures*. Journal of Psychosomatic Research, 2010. **69**(5): p. 511-520.
374. Cui, J. *QIC program and model selection in GEE analyses*. The Stata Journal, 2007. **7**(2): p. 209-220.
375. Baker, A., Lee, N.K., Claire, M., Lewin, T.J., Grant, T., Pohlman, S., Saunders, J.B., Kay-Lambkin, F., Constable, P., Jenner, L., and Carr, V.J. *Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction*. Addiction, 2005. **100**(3): p. 367-378.
376. Brecht, M.L., Huang, D., Evans, E., and Hser, Y.I. *Polydrug use and implications for longitudinal research: ten-year trajectories for heroin, cocaine, and methamphetamine users*. Drug Alcohol Depend, 2008. **96**(3): p. 193-201.
377. Fairbairn, N., Wood, E., Stoltz, J., Li, K., Montaner, J., and Kerr, T. *Crystal methamphetamine use associated with non-fatal overdose among a cohort of injection drug users in Vancouver*. Public Health, 2008. **122**(1): p. 70-78.
378. Platt, J.J. *Vocational Rehabilitation of Drug Abusers*. Psychol Bull, 1995. **117**(3): p. 416-433.
379. Silverman, K., Wong, C.J., Needham, M., Diemer, K.N., Knealing, T., Crone-Todd, D., Fingerhood, M., Nuzzo, P., and Kolodner, K. *A randomized trial of employment-based reinforcement of cocaine abstinence in injection drug users*. Journal of Applied Behavior Analysis, 2007. **40**(3): p. 387-410.
380. Hser, Y.-I., Grella, C.E., Hsieh, S.-C., Anglin, M.D., and Brown, B.S. *Prior treatment experience related to process and outcomes in DATOS*. Drug Alcohol Depend, 1999. **57**(2): p. 137-150.
381. Wasserman, D.A., Stewart, A.L., and Delucchi, K.L. *Social support and abstinence from opiates and cocaine during opioid maintenance treatment*. Drug Alcohol Depend, 2001. **65**(1): p. 65-75.
382. Simpson, D.D. and Joe, G.W. *Motivation as a predictor of early dropout from drug abuse treatment*. Psychotherapy: Theory, Research, Practice, Training, 1993. **30**(2): p. 357-368.
383. Joe, G.W., Simpson, D.D., and Broome, K.M. *Effects of readiness for drug abuse treatment on client retention and assessment of process*. Addiction, 1998. **93**(8): p. 1177-1190.
384. Shah, N.G., Galai, N., Celentano, D.D., Vlahov, D., and Strathdee, S.A. *Longitudinal predictors of injection cessation and subsequent relapse among a cohort of injection drug users in Baltimore, MD, 1988–2000*. Drug Alcohol Depend, 2006. **83**(2): p. 147-156.

385. Gonzales, R., Ang, A., McCann, M.J., and Rawson, R.A. *An emerging problem: methamphetamine abuse among treatment seeking youth*. *Subst Abus*, 2008. **29**(2): p. 71-80.
386. Grant, B.F. and Dawson, D.A. *Age of onset of drug use and its association with DSM-IV drug abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey*. *Journal of Substance Abuse*, 1998. **10**(2): p. 163-173.
387. Nyamathi, A., Dixon, E.L., Shoptaw, S., Marfisee, M., Gelberg, L., Williams, S., Dominick, S., and Leake, B. *Profile of lifetime methamphetamine use among homeless adults in Los Angeles*. *Drug Alcohol Depend*, 2008. **92**: p. 277-281.
388. Boeri, M.W., Sterk, C.E., Badora, M., and Elifson, K.W. *Poly-drug use among ecstasy users: Separate, synergistic, and indiscriminate patterns*. *J Drug Issues*, 2008. **38**(2): p. 517-541.
389. Semple, S.J., Patterson, T.L., and Grant, I. *A comparison of injection and non-injection methamphetamine-using HIV positive men who have sex with men*. *Drug Alcohol Depend*, 2004. **76**(2): p. 203-212.
390. Harris, P.M. *Attrition Revisited*. *American Journal of Evaluation*, 1998. **19**(3): p. 293-305.
391. Szklo, M. *Population-based Cohort Studies*. *Epidemiologic Reviews*, 1998. **20**(1): p. 81-90.
392. Haring, R., Alte, D., Völzke, H., Sauer, S., Wallaschofski, H., John, U., and Schmidt, C.O. *Extended recruitment efforts minimize attrition but not necessarily bias*. *Journal of Clinical Epidemiology*, 2009. **62**: p. 252-260.
393. Baker, A., Lee, N.K., and Jenner, L. *Models of intervention and care for psychostimulant users, 2nd Edition*. 2004. Australian Government Department of Health and Ageing. Canberra.
394. Callaghan, R.C., Brands, B., Taylor, L., and Lentz, T. *The clinical characteristics of adolescents reporting methamphetamine as their primary drug of choice: an examination of youth admitted to inpatient substance-abuse treatment in northern British Columbia, Canada, 2001-2005*. *J Adolesc Health*, 2007. **40**(3): p. 286-289.
395. Hser, Y.-I., Huang, D., Chou, C.-P., Teruya, C., and Anglin, M.D. *Longitudinal Patterns of Treatment Utilization and Outcomes Among Methamphetamine Abusers: A Growth Curve Modeling Approach*. *J Drug Issues*, 2003. **33**(4): p. 921-938.
396. Marshall, B.D., Grafstein, E., Buxton, J.A., Qi, J., Wood, E., Shoveller, J.A., and Kerr, T. *Frequent methamphetamine injection predicts emergency department utilization among street-involved youth*. *Public Health*, 2012. **126**(1): p. 47-53.
397. Carlson, R.G., Sexton, R., Wang, J., Falck, R., Leukefeld, C.G., and Booth, B.M. *Predictors of Substance Abuse Treatment Entry Among Rural Illicit Stimulant Users in Ohio, Arkansas, and Kentucky*. *Substance Abuse*, 2010. **31**: p. 1-7.

398. Oser, C.B., Leukefeld, C.G., Tindall, M.S., Garrity, T.F., Carlson, R.G., Falck, R., Wang, J., and Booth, B.M. *Rural drug users: factors associated with substance abuse treatment utilization*. Int J Offender Ther Comp Criminol, 2011. **55**(4): p. 567-586.
399. Hadjizacharia, P., Green, D.J., Plurad, D., Chan, L.S., Inaba, K., Shulman, I., and Demetriades, D. *Methamphetamines in trauma: effect on injury patterns and outcome*. J Trauma, 2009. **66**(3): p. 895-898.
400. Pasic, J., Russo, J.E., Ries, R.K., and Roy-Byrne, P.P. *Methamphetamine users in the psychiatric emergency services: a case-control study*. Am J Drug Alcohol Abuse, 2007. **33**(5): p. 675-686.
401. Schermer, C.R. and Wisner, D.H. *Methamphetamine use in trauma patients: a population-based study*. J Am Coll Surg, 1999. **189**(5): p. 442-449.
402. Bunting, P.J., Fulde, G.W., and Forster, S.L. *Comparison of crystalline methamphetamine ("ice") users and other patients with toxicology-related problems presenting to a hospital emergency department*. Med J Aust, 2007. **187**(10): p. 564-566.
403. Leamon, M.H., Canning, R.D., and Benjamin, L. *The impact of amphetamine-related disorders on community psychiatric emergency services: 1993-1997*. Am J Addict, 2000. **9**(1): p. 70-78.
404. Hettema, J., Steele, J., and Miller, W.R. *Motivational interviewing*. Annu Rev Clin Psychol, 2005. **1**: p. 91-111.
405. Huang, Y.S., Tang, T.C., Lin, C.H., and Yen, C.F. *Effects of motivational enhancement therapy on readiness to change MDMA and methamphetamine use behaviors in Taiwanese adolescents*. Subst Use Misuse, 2011. **46**(4): p. 411-416.
406. Galloway, G.P., Polcin, D., Kielstein, A., Brown, M., and Mendelson, J. *A nine session manual of motivational enhancement therapy for methamphetamine dependence: adherence and efficacy*. J Psychoactive Drugs, 2007. **Suppl 4**: p. 393-400.
407. Digiusto, E. and Treloar, C. *Equity of access to treatment, and barriers to treatment for illicit drug use in Australia*. Addiction, 2007. **102**: p. 958-969.
408. Bower, P. and Gilbody, S. *Stepped care in psychological therapies: access, effectiveness and efficiency*. British Journal of Psychiatry, 2005. **186**: p. 11-17.
409. Kay-Lambkin, F.J., Baker, A.L., McKetin, R., and Lee, N. *Stepping through treatment: Reflections on an adaptive treatment strategy among methamphetamine users with depression*. Drug Alcohol Rev, 2010. **29**: p. 475-482.
410. Smedslund, G., Berg, R.C., Hammerstrom, K.T., Steiro, A., Leiknes, K.A., Dahl, H.M., and Karlsen, K. *Motivational interviewing for substance abuse*. Cochrane Database Syst Rev, 2011(5): p. CD008063.

411. Rawson, R.A., McCann, M.J., Flammino, F., Shoptaw, S., Miotto, K., Reiber, C., and Ling, W. *A comparison of contingency management and cognitive-behavioral approaches for stimulant-dependent individuals*. *Addiction*, 2006. **101**(2): p. 267-274.
412. Callaghan, R.C., Tavares, J., Taylor, L., and Veldhuizen, S. *A national survey of primary methamphetamine-related admissions to youth residential substance abuse treatment facilities in Canada, 2005 to 2006*. *Can J Psychiatry*, 2007. **52**(10): p. 684-688.
413. Chamberlain, J., McDonald, S., and Torgensen, K. *Methamphetamine: tools and partnerships to fight the threat*. *J Law Med Ethics*, 2004. **32**(4 Suppl): p. 104-105.
414. Donovan, D.M. and Wells, E.A. *'Tweaking 12-Step': the potential role of 12-Step self-help group involvement in methamphetamine recovery*. *Addiction*, 2007. **102**((Suppl. 1)): p. 121-129.
415. Russell, L.C., Sharp, B., and Gilbertson, B. *Acupuncture for addicted patients with chronic histories of arrest: A pilot study of the Consortium Treatment Center*. *J Subst Abuse Treat*, 2000. **19**(2): p. 199-205.
416. Shoptaw, S., Reback, C.J., Peck, J.A., Yang, X., Rotheram-Fuller, E., Larkins, S., Veniegas, R.C., Freese, T.E., and Hucks-Ortiz, C. *Behavioral treatment approaches for methamphetamine dependence and HIV-related sexual risk behaviors among urban gay and bisexual men*. *Drug Alcohol Depend*, 2005. **78**(2): p. 125-134.
417. Landovitz, R.J., Fletcher, J.B., Inzhakova, G., Lake, J.E., Shoptaw, S., and Reback, C.J. *A novel combination HIV prevention strategy: post-exposure prophylaxis with contingency management for substance abuse treatment among methamphetamine-using men who have sex with men*. *AIDS Patient Care STDS*, 2012. **26**(6): p. 320-328.
418. Shoptaw, S., Reback, C.J., Larkins, S., Wang, P.C., Rotheram-Fuller, E., Dang, J., and Yang, X. *Outcomes using two tailored behavioral treatments for substance abuse in urban gay and bisexual men*. *J Subst Abuse Treat*, 2008. **35**(3): p. 285-293.
419. Wenzel, S.L., Green, H.D., Jr., Tucker, J.S., Golinelli, D., Kennedy, D.P., Ryan, G., and Zhou, A. *The social context of homeless women's alcohol and drug use*. *Drug Alcohol Depend*, 2009. **105**(1-2): p. 16-23.
420. Ozaki, S. *[Current situation of substance abuse/dependence in psychiatric hospital settings]*. *Nihon Arukoru Yakubutsu Igakkai Zasshi*, 2004. **39**(1): p. 35-40.
421. Collins, C.L., Kerr, T., Tyndall, M.W., Marsh, D.C., Kretz, P.S., Montaner, J.S., and Wood, E. *Rationale to evaluate medically supervised safer smoking facilities for non-injection illicit drug users*. *Can J Public Health*, 2005. **96**(5): p. 344-347.
422. Hungerbuehler, I., Buecheli, A., and Schaub, M. *Drug Checking: A prevention measure for a heterogeneous group with high consumption frequency and polydrug use - evaluation of zurich's drug checking services*. *Harm Reduction Journal*, 2011. **8**(16): p. 1-6.

423. Carroll, K.M. *Relapse prevention as a psychosocial treatment: a review of controlled clinical trials*. *Exp Clin Psychopharmacology*, 1996. **4**: p. 46-54.
424. Halkitis, P.N., Palamar, J.J., and Mukherjee, P.P. *Poly-club-drug use among gay and bisexual men: a longitudinal analysis*. *Drug Alcohol Depend*, 2007. **89**(2-3): p. 153-160.
425. Roll, J.M., Petry, N.M., Stitzer, M.L., Brecht, M.L., Peirce, J.M., McCann, M.J., Blaine, J., MacDonald, M., DiMaria, J., Lucero, L., and Kellogg, S. *Contingency management for the treatment of methamphetamine use disorders*. *Am J Psychiatry*, 2006. **163**(11): p. 1993-1999.
426. Higgins, S.T. *Extending contingency management to the treatment of methamphetamine use disorders*. *Am J Psychiatry*, 2006. **163**(11): p. 1870-1872.
427. Reback, C.J., Peck, J.A., Dierst-Davies, R., Nuno, M., Kamien, J.B., and Amass, L. *Contingency management among homeless, out-of-treatment men who have sex with men*. *J Subst Abuse Treat*, 2010. **39**(3): p. 255-263.
428. Roll, J.M. *Contingency management: an evidence-based component of methamphetamine use disorder treatments*. *Addiction*, 2007. **102**(Suppl. 1): p. 114-120.
429. Stitzer, M.L., Petry, N.M., and Peirce, J. *Motivational incentives research in the National Drug Abuse Treatment Clinical Trials Network*. *J Subst Abuse Treat*, 2010. **38 Suppl 1**: p. S61-69.
430. Menza, T.W., Jameson, D.R., Hughes, J.P., Colfax, G.N., Shoptaw, S., and Golden, M.R. *Contingency management to reduce methamphetamine use and sexual risk among men who have sex with men: a randomized controlled trial*. *BMC Public Health*, 2010. **10**: p. 774.
431. Lee, N., Nielsen, S., Ferris, J., Pennay, A., Devaney, M., and Reed, M. *Australian Treatment Outcome Study: Amphetamines*. 2009. Turning Point Alcohol & Drug Centre. Fitzroy, Australia.
432. Bolton, J. *How can we reduce the stigma of mental illness?* *British Medical Journal*, 2003. **326**(7386): p. S57.
433. German, D., Sherman, S.G., Srirojn, B., Thomson, N., Aramrattana, A., and Celentano, D.D. *Motivations for methamphetamine cessation among young people in northern Thailand*. *Addiction*, 2006. **101**: p. 1143-1152.
434. Murphy, P.N., Wareing, M., and Fisk, J.E. *Users' perceptions of the risks and effects of taking ecstasy (MDMA): a questionnaire study*. *Journal of Psychopharmacology*, 2006. **20**(3): p. 447-455.
435. Ramirez, R., Hinman, A., Sterling, S., Weisner, C., and Campbell, C. *Peer influences on adolescent alcohol and other drug use outcomes*. *J Nurs Scholarsh*, 2012. **44**(1): p. 36-44.

436. Ravarino, J.M., Gardner, M.K., Hill, R.D., and Lundberg, K. *Effectiveness of pretreatment interim support group attendance in facilitating treatment enrollment among methamphetamine abusers*. *Addict Behav*, 2008. **33**(2): p. 336-341.
437. Sherman, S.G., Sutcliffe, C., Srijohn, B., Latkin, C.A., Aramratanna, A., and Celentano, D.D. *Evaluation of a peer network intervention trial among young methamphetamine users in Chiang Mai, Thailand*. *Social Science & Medicine*, 2009. **68**(1): p. 69-79.
438. Klee, H. *A new target in behavioural research: amphetamine misuse*. *British Journal of Addiction*, 1992. **87**: p. 439-446.
439. Klee, H. and Reid, P. *Amphetamine-Misusing Groups: A Feasibility Study of the Use of Peer Group Leaders for Drug Prevention Work among their Associates*. Home Office Drugs Prevention Initiative Paper 3. 1995. Home Office. London.
440. Brecht, M.L., Anglin, M.D., and Dylan, M. *Coerced treatment for methamphetamine abuse: differential patient characteristics and outcomes*. *Am J Drug Alcohol Abuse*, 2005. **31**(2): p. 337-356.
441. Marinelli-Casey, P., Gonzales, R., Hillhouse, M., Ang, A., Zweben, J., Cohen, J., Hora, P.F., Rawson, R.A., and Methamphetamine Treatment Project Corporate, A. *Drug court treatment for methamphetamine dependence: treatment response and posttreatment outcomes*. *J Subst Abuse Treat*, 2008. **34**(2): p. 242-248.
442. Brecht, M.L. and Urada, D. *Treatment outcomes for methamphetamine users: California Proposition 36 and comparison clients*. *J Psychoactive Drugs*, 2011. **Suppl 7**: p. 68-76.
443. Evans, E., Longshore, D., Prendergast, M., and Urada, D. *Evaluation of the Substance Abuse and Crime Prevention Act: client characteristics, treatment completion and re-offending three years after implementation*. *J Psychoactive Drugs*, 2006. **Suppl 3**: p. 357-367.
444. Listwan, S.J., Shaffer, D.K., and Hartman, J.L. *Combating Methamphetamine Use in the Community: The Efficacy of the Drug Court Model*. *Crime & Delinquency*, 2009. **55**(4): p. 627-644.
445. Anglin, M.D., Urada, D., Brecht, M.L., Hawken, A., Rawson, R., and Longshore, D. *Criminal justice intreatment admissions for methamphetamine use in California: a focus on Proposition 36*. *J Psychoactive Drugs*, 2007. **Suppl 4**: p. 367-81.
446. Dunlop, A., Tulloch, B., McKetin, R., Adam, T., Baker, A., and Wodak, A. *Preliminary evaluation of the NSW stimulant treatment program*. 2008. NSW Department of Health. Sydney.
447. Korte, J.E., Hiott, F.B., Brady, K.T., Malcolm, R.J., and See, R.E. *Distinctive characteristics of methamphetamine users presenting at public clinics: steep rise in South Carolina, United States, 2000-2005*. *Drug Alcohol Depend*, 2011. **115**(1-2): p. 9-15.

448. Quinn, B., Stoové, M., and Dietze, P. *One-year changes in methamphetamine use, dependence and remission in a community-recruited cohort*. Drug Alcohol Depend, Submitted.
449. Hindler, C., Nazareth, I., King, M., Cohen, J., Farmer, R., and Gerada, C. *Drug users' views on general practitioners*. BMJ, 1995. **310**(6975): p. 302.
450. McGeary, K.A. and French, M.T. *Illicit Drug Use and Emergency Room Utilization*. HSR: Health Services Research, 2000. **35**(1): p. 153-169.
451. Darke, S., Ross, J., Teesson, M., and Lynskey, M. *Health service utilization and benzodiazepine use among heroin users: findings from the Australian Treatment Outcome Study (ATOS)*. Addiction, 2003. **98**(8): p. 1129-1135.
452. Leonard, L., DeRubeis, E., Pelude, L., Medd, E., Birkett, N., and Seto, J. *"I inject less as I have easier access to pipes": injecting, and sharing of crack-smoking materials, decline as safer crack-smoking resources are distributed*. Int J Drug Policy, 2008. **19**(3): p. 255-264.
453. Bogle, K.E. and Smith, B.H. *Illicit methylphenidate use: a review of prevalence, availability, pharmacology, and consequences*. Curr Drug Abuse Rev, 2009. **2**(2): p. 157-76.
454. Jaffe, C., Bush, K.R., Straits-Troster, K., Meredith, C., Romwall, L., Rosenbaum, G., Cherrier, M., and Saxon, A.J. *A comparison of methamphetamine-dependent inpatients childhood attention deficit hyperactivity disorder symptomatology*. J Addict Dis, 2005. **24**(3): p. 133-52.
455. Sexton, R.L., Carlson, R.G., Leukefeld, C.G., and Booth, B.M. *Methamphetamine use and adverse consequences in the rural southern United States: an ethnographic overview*. J Psychoactive Drugs, 2006. **Suppl 3**: p. 393-404.
456. Cohen, J. *Life in the fast lane: HIV and meth*. Science, 2012. **337**(6091): p. 176-7.
457. Beyrer, C., Razak, M.H., Jittiwutikarn, J., Suriyanon, V., Vongchak, T., Srirak, N., Kawichai, S., Tovanabutra, S., Rungruengthanakit, K., Sawanpanyalert, P., Sripaipan, T., and Celentano, D.D. *Methamphetamine users in northern Thailand: changing demographics and risks for HIV and STD among treatment-seeking substance abusers*. Int J STD AIDS, 2004. **15**(10): p. 697-704.
458. National Drug and Alcohol Research Centre. *IDRS and EDRS Key Findings: Drug Trends Conference Handout*, National Drug Trends Conference. 2012. National Drug and Alcohol Research Centre, UNSW: Sydney.
459. Topp, L., Hudson, S.L., and Maher, L. *Mental health symptoms among street-based psychostimulant injectors in Sydney's Kings Cross*. Subst Use Misuse, 2010. **45**(7-8): p. 1180-200.

460. Slavin, S. *Crystal methamphetamine use and HIV risk*. Social Research Briefs, 2004(4): p. 1-4.
461. Parkes, S.A., Saewyc, E.M., Cox, D.N., and MacKay, L.J. *Relationship Between Body Image and Stimulant Use Among Canadian Adolescents*. J Adolesc Health, 2008. **43**: p. 616-618.
462. Rhodes, T. *Risk theory in epidemic times: sex, drugs and the social organisation of 'risk behaviour'*. Sociology of Health & Illness, 1997. **19**(2): p. 208-227.
463. Singleton, W.T. and Hoyden, J., *Risk and Decisions*. 1994, Chichester: Wiley.
464. Wynne, B., *Risk and social learning: reification to engagement*, in *Social Theories of Risk*, S. Krinsky and D. Golding, Editors. 1992, Praeger: Westport, CT.
465. Nielsen, S., Bruno, R., Lintzeris, N., Fischer, J., Carruthers, S., and Stoové, M. *Pharmaceutical opioid analgesic and heroin dependence: how do treatment-seeking clients differ in Australia?* Drug Alcohol Rev, 2011. **30**(3): p. 291-9.
466. Huang, Y.-S., Tang, T.-C., Lin, C.-H., and Yen, C.-F. *Effects of Motivational Enhancement Therapy on Readiness to Change MDMA and Methamphetamine Use Behaviors in Taiwanese Adolescents*. Substance Use and Misuse, 2011. **46**(4): p. 411-416.
467. Shakeshaft, A.P., Bowman, J.A., and Sanson-Fisher, R.W. *Community-based drug and alcohol counselling: who attends and why?* Drug Alcohol Rev, 2002. **21**(2): p. 153-62.
468. Dawe, S., Loxton, N.J., Hides, L., Kavanagh, D.J., and Mattick, R.P. *Review of diagnostic screening instruments for alcohol and other drug use and other psychiatric disorders*. 2002. Commonwealth Department of Health and Ageing. Canberra.
469. Janca, A., Robins, L.N., Cottler, L.B., and Early, T.S. *Clinical observation of assessment using the Composite International Diagnostic Interview (CIDI). An analysis of the CIDI Field Trials--Wave II at the St Louis site*. Br J Psychiatry, 1992. **160**: p. 815-8.
470. World Health Organization. *Composite International Diagnostic Interview (version 1.1)*. 1993.
471. Biener, L. and Abrams, D.B. *The Contemplation Ladder: validation of a measure of readiness to consider smoking cessation*. Health Psychology, 1991. **10**: p. 360-365.



# Appendices

## Appendix One: Alprazolam use among PWID in Melbourne

### Drug and Alcohol REVIEW



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#### BRIEF COMMUNICATION

### The use of alprazolam by people who inject drugs in Melbourne, Australia

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#### Abstract

**Introduction and Aims.** In Australia, people who inject drugs (PWID) commonly report the use of benzodiazepines (BZDs). This paper explores the emerging use of alprazolam among PWID in Melbourne, Australia. **Design and Methods.** This study reports on 3 years of data collected through the Victorian Illicit Drug Reporting System (2008–2010). Structured interviews were conducted with 451 PWID and analysed using odds ratios and  $\chi^2$ -tests for trends over time. **Results.** While the proportion of PWID reporting recent BZD use remained stable over time, the proportion reporting alprazolam to be their most commonly used BZD fluctuated, peaking in 2009. Alprazolam users were significantly more likely to report using illicit BZDs and to report recent BZD injection compared with users of other BZDs. Alprazolam use was associated with the sale of drugs for cash, but not with other criminal activities. **Discussion and Conclusion.** The fluctuations in alprazolam use over time may be reflective of medical practitioners ceasing to prescribe alprazolam in response to reports of associated harms; however, this may in turn be driving the illicit alprazolam market. While the data do not indicate a clear association between alprazolam use and harms, considering the potential severity of associated harms and the association between alprazolam use and anterograde amnesia, patterns of alprazolam use among PWID should be closely monitored. Potential changes to prescribing practice should consider unintended consequences, such as replacement with other BZD types, or illicitly obtained BZDs. [Horyniak D, Reddel S, Quinn B, Dietze P. The use of alprazolam by people who inject drugs in Melbourne, Australia. *Drug Alcohol Rev* 2012;31:585–590]

**Key words:** injecting drug use, benzodiazepine, alprazolam.

#### Introduction

Benzodiazepines (BZDs), predominantly used in the treatment of anxiety, are among the most widely used drug classes in the world [1–3]. Use of BZDs by people who inject drugs (PWID) has been reported in Australia [4–7] and elsewhere [8–15], presumably to achieve increased intoxication and manage drug withdrawal [16–18].

Around two-thirds of Australian PWID accessed through the Illicit Drug Reporting System (IDRS) report recent (mostly oral) BZD use, with similar pro-

portions reporting licit and illicit use [19–21]. While diazepam has been the most commonly used BZD among PWID in the IDRS samples [5,6], IDRS data in 2008 and 2009 suggested that the use of alprazolam among PWID in Melbourne may be increasing [22,23].

Alprazolam is a short-acting BZD, indicated for use in the treatment of anxiety (short-term), and panic disorders [24]. In Australia, alprazolam is recommended only for treatment of ‘panic disorder where other treatments have failed or are inappropriate’, with antidepressants recommended as first-line therapy [25,26]. Under the Pharmaceutical Benefits Scheme,

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authority (approval by Medicare Australia) must be obtained by medical practitioners prior to prescription of alprazolam [25].

Recently, Needle and Syringe Program staff accessed through the IDRS in Melbourne have reported increasing antisocial behaviour, particularly opportunistic criminal activity, believed to be associated with alprazolam use [22]. Clinical studies have shown alprazolam to be associated with drug-induced anterograde amnesia (the inability to create new memories after drug consumption, with no effect on recall of prior events) and aggressive behaviour [27–33], which may be related to reports of antisocial behaviour.

These findings prompted the Medical Practitioner's Board of Victoria (MPBV) to issue a warning in June 2009 to all registered practitioners in the state that 'alprazolam is more subject to non-medical use, and causes a disproportionately high level of serious harm, than other benzodiazepines', recommending that 'alprazolam should only be prescribed where there is a clear indication for its use' [34].

In this study, we examined 3 years of drug user survey data from the IDRS to describe patterns of alprazolam use and associated harms among PWID in Melbourne, Australia, in the context of publicly available prescribing data.

## Methods

### *Illicit Drug Reporting System*

IDRS methodology has been described in detail elsewhere [35]. In this study, we used 3 years of PWID survey data from the Victorian IDRS (2008–2010). Participants were recruited using convenience sampling through Needle and Syringe Programs in five regions of Melbourne between June and August each year. Participants were aged 18 or above, had injected drugs at least monthly in the 6 months preceding interview, and had resided in Melbourne for the past year. They were reimbursed \$40 for their time and out-of-pocket expenses, in accordance with accepted practices. We analysed questions related to the main type of BZD reported as having been recently used in the context of demographic, drug use and harms questions.

Ethics approval for this study was obtained from the Victorian Department of Human Services (2008), Alfred Hospital (2009–2010) and Peninsula Health (2008–2010).

### *Prescriptions data*

Prescriptions data for alprazolam and diazepam were obtained from Medicare Australia [25], and used in

conjunction with population data from the Australian Bureau of Statistics [36] to calculate crude BZD prescription rates for the state of Victoria.

### *Statistical analysis*

Data were analysed using odds ratios (OR) and 95% confidence intervals (95% CI) for categorical variables, Wilcoxon rank sum tests for non-parametric continuous variables, and  $\chi^2$ -tests for trends over time, with a significance level of  $P = 0.05$ . All analyses were conducted in Stata V.11 (Statacorp LP, College Station, TX, USA).

## Results

A total of 451 PWID were interviewed over the 3 years. The median age of participants was 35 years (range: 19–58 years), 71% were male, and 54% were prescribed Opioid Substitution Therapy (OST, predominantly methadone) at the time of interview. The sample characteristics were stable, but in 2009 there were more female participants ( $P < 0.05$ ), and smaller numbers reporting heroin as their drug of choice ( $P < 0.05$ ), compared with other years (Table 1).

Both lifetime and recent (last 6 months) BZD use were common, reported by 91% and 74% of participants respectively. Only 6% of participants reported recent BZD injection. Similar numbers of participants reported using solely illicitly obtained BZDs (35%), solely licit BZDs (26%) and a combination of both licit and illicit (39%). Among those who reported using both licitly and illicitly obtained BZDs, 60% reported using primarily licitly obtained BZDs, with these participants reporting BZD use at a significantly higher frequency compared with illicit BZD users [median: 180 days, interquartile range (IQR): 48–180 days vs. median: 12 days, IQR: 4–48 days] ( $P < 0.05$ ). Patterns and frequency of BZD use remained stable over time.

Ninety-one per cent of all recent BZD users ( $n = 304$ ) reported their main type of BZD used, of whom two-thirds reported most commonly using diazepam. The percentage of participants who most commonly used alprazolam peaked in 2009 (35%), before decreasing significantly in 2010 (22%,  $P = 0.05$ ). Among those who reported mostly using alprazolam ( $n = 81$ ), the percentage who reported predominantly using illicitly obtained alprazolam ranged from 46% (2008) to 71% (2010).

Table 2 displays the main demographic and drug use characteristics of participants who predominantly used alprazolam compared with users of other BZDs. Univariate analysis indicated that alprazolam users were more than three times more likely than other



**Table 1.** Demographic characteristics and patterns of BZD use among Illicit Drug Reporting System participants, 2008–2010

	2008 n = 150 n (%)	2009 n = 150 n (%)	2010 n = 151 n (%)	Total n = 451 n (%)
Male gender	120* (80.0)	94 (62.7)	106 (70.2)	320 (71.0)
Median age (range)	35 (21–56)	35 (19–56)	35 (20–58)	35 (19–58)
Live in stable accommodation	101 (67.3)	80 (53.3)	52 (34.4)	233 (51.7)
Australian-born	104 (69.3)	132 (88.0)	132 (88.0)	369 (81.8)
Identify as ATSI	5 (3.3)	9 (6.0)	13 (8.6)	27 (6.0)
Median highest grade of school completed (range)	10 (3–12)	10 (3–12)	10 (6–12)	10 (3–12)
Unemployed	129 (86.0)	125 (83.3)	134 (88.7)	388 (86.0)
Currently prescribed OST	84 (56.0)	85 (56.7)	75 (49.7)	244 (54.1)
Ever in prison	78 (52.0)	82 (55.0)	86 (57.3)	246 (54.8)
Median age first injected (range)	17 (7–48)	17 (7–47)	17 (11–38)	17 (7–48)
Drug of choice: heroin	109 (72.7)	84 (56.0)	103 (68.2)	296 (65.6)
Ever used BZDs	132 (88.0)	143 (95.3)	135 (89.4)	410 (90.9)
Recently used BZDs	104 (69.3)	120 (80.0)	111 (73.5)	335 (74.3)
Main form of BZD used	n = 103	n = 116	n = 109	n = 328
Licit	68 (66.0)	69 (59.5)	60 (55.1)	197 (60.1)
Illicit	35 (34.0)	47 (40.5)	49 (45.0)	131 (39.9)
Main brand of BZD used	n = 97	n = 107	n = 100	n = 304
Alprazolam	22 (22.7)	37 (34.6)	22 (22.0)	81 (26.6)
Diazepam	62 (63.9)	63 (58.9)	67 (67.0)	192 (63.2)
Other	13 (13.4)	7 (6.5)	11 (11.0)	31 (10.2)

\*Includes one participant who identified as transgender. ATSI, Aboriginal or Torres Strait Islander; BZD, benzodiazepine; OST, Opioid Substitution Therapy.

**Table 2.** Characteristics of alprazolam users compared with other BZD users, 2008–2010

	Alprazolam Users n = 81 n (%)	Other BZD Users n = 223 n (%)	Unadjusted OR (95% CI)
Male gender	53 (65.4)	151 (67.4)	0.90 (0.51–1.61)
Median age (range)	33 (20–51)	35 (21–58)	—
Stable accommodation	38 (46.9)	107 (48.0)	0.96 (0.56–1.65)
Australian-born	70 (86.4)	186 (83.4)	1.27 (0.59–2.91)
Unemployed	67 (82.7)	192 (86.1)	0.77 (0.37–1.67)
Currently prescribed OST	54 (66.7)	111 (49.8)	2.02 (1.15–3.60)*
Mainly used illicit BZDs	47 (59.5)	66 (29.6)	3.49 (1.98–6.18)*
Median days used illicit BZDs (IQR)	21 (6–48)	11 (4–35)	—
Recent BZD injection	12 (14.8)	11 (4.9)	3.35 (1.28–8.80)*
Recent heroin overdose	10 (12.4)	21 (9.4)	1.35 (0.54–3.18)
Ever in prison	44 (55.0)	114 (51.4)	1.16 (0.67–2.00)
Arrested in last 12 months	40 (49.4)	110 (49.6)	0.99 (0.58–1.71)
Committed property crime (last month)	22 (27.2)	49 (22.0)	1.32 (0.70–2.45)
Committed violent crime (last month)	6 (7.4)	16 (7.2)	1.04 (0.32–2.91)
Sold drugs for cash profit (last month)	34 (42.0)	60 (26.9)	1.97 (1.11–3.45)*
Committed fraud (last month)	3 (3.7)	8 (3.6)	1.03 (0.17–4.44)
Recent mental health problem	43 (53.1)	144 (64.9)	0.61 (0.35–1.06)

\* $P < 0.05$ . BZD, benzodiazepine; CI, confidence interval; IQR, interquartile range; OR, odds ratio; OST, Opioid Substitution Therapy.

BZD users to report both recent illicit BZD use (OR: 3.49, 95% CI: 1.98–6.18) and recent BZD injection (OR: 3.35, 95% CI: 1.28–8.80). Among those participants who reported recent illicit BZD use, alprazolam

users used more frequently than other BZD users (median: 21 days, IQR: 6–48 days vs. median: 11 days, IQR: 4–35 days). There were no significant differences across groups in patterns of use of other

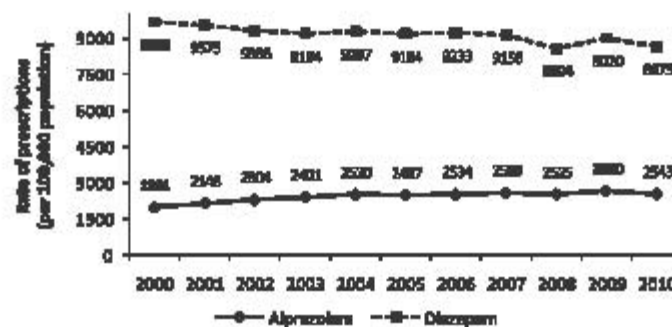


Figure 1. Alprazolam and diazepam prescription rate, Victoria, 2000–2010.

drugs; however, alprazolam users were significantly more likely than other BZD users to report being prescribed OST.

While alprazolam users were no more likely than other BZD users to report lifetime history of incarceration, arrest in the past 12 months, recent property crime or recent violent crime, they were twice as likely as other BZD users to report selling drugs for a cash profit in the past month (OR: 1.97, 95% CI: 1.11–3.45) (Table 2).

Prescriptions data show that the rate of alprazolam prescription in Victoria increased by 28% over the past decade, peaking in 2009 (Figure 1). In contrast, while the rate of diazepam prescriptions remained consistently higher than that of alprazolam, there was an overall 10% decrease in diazepam prescriptions over the same period.

## Discussion

Reports of alprazolam use among PWID fluctuated over time, with use peaking in 2009. This trend is also reflected in the general population, with a decade-long increase in alprazolam prescriptions also peaking in 2009. The decrease in alprazolam use seen in 2010 may reflect the influence of MPBV's warning, which led to the implementation of guidelines within some service providers to limit the prescription of alprazolam to PWID, particularly those receiving OST [22].

While the percentage of BZD users who reported predominantly using illicit BZDs overall remained stable, there was a significant association between alprazolam use and illicit BZD use. This may reflect decreasing access to prescribed alprazolam, potentially as a consequence of changes to prescribing practices within services. A similar effect was observed in Tasmania, where regulatory changes to alprazolam prescribing, including restricting alprazolam prescribing among

patients receiving opioid medications, led to a reduction in prescribed alprazolam use, but had no impact on the use of diverted alprazolam [37]. While a rapid response in policy and practice is integral in preventing escalation of potentially harmful drug practices, it is important that unintended consequences, such as reliance on the illicit market, should be considered prior to implementation.

Alprazolam users were twice as likely as other BZD users to report being prescribed OST at the time of interview. Given that BZDs act as respiratory depressants, the risk of overdose among alprazolam users on OST is of significant concern [38–41]. Recent analysis of forensic data indicated that more than half of all heroin-related deaths in Victoria over the last two decades involved BZDs [42], with a large increase in the involvement of alprazolam since 2000 [43].

We did not observe an association between alprazolam use and antisocial behaviour in our sample. While alprazolam users were significantly more likely than other BZD users to report recent sale of drugs for a cash profit, this may reflect the burgeoning illicit alprazolam market. Alprazolam users, however, were no more likely than other BZD users to report other criminal activities. Clinical trials, however, have shown that alprazolam-treated patients display higher levels of aggression compared with a placebo [28,44], with alprazolam-related aggression tending to be recognised by others, but not by the patients themselves [44]. This raises the possibility that perpetration of crime might be underreported in our sample, as participants may perceive violence committed under the influence of alprazolam differently from other violence committed. Further, given that alprazolam causes anterograde amnesia, perpetration of crime may be underreported because participants did not recall incidents which may have taken place while intoxicated. In the context of Melbourne's illicit drug markets, where demand for



alprazolam continues despite changes in availability, the potential for unrecognised violence remains.

### Conclusion

This study reports on the emergence of alprazolam use among PWID in Melbourne. While our data do not indicate a clear association between alprazolam use and specific harms, given the potential severity of alprazolam-related harms described in the literature, patterns of alprazolam use among PWID should continue to be closely monitored. The addition of detailed questions in drug trends monitoring studies relating to alprazolam use, market characteristics and related harms is recommended, as our study only focused on those reporting alprazolam as the main BZD they had used. Comparison of trends in BZD prescribing and use across jurisdictions will also help to further understand the impact of MPBV's warning on alprazolam use in Victoria. Furthermore, potential changes to prescribing practice should consider unintended consequences, such as replacement with other drug types or illicitly obtained drugs.

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### References

- [1] Dupont R. Abuse of benzodiazepines: the problems and the solutions. *Am J Drug Alcohol Abuse* 1988;14:1-69.
- [2] Neutel CL. The epidemiology of long-term benzodiazepine use. *Int Rev Psychiatry* 2005;17:189-97.
- [3] Demyttenaere K, Bonnewyn A, Bruffaerts R, *et al*. Clinical factors influencing the prescription of antidepressants and benzodiazepines: results from the European study of the epidemiology of mental disorders (ESEMED). *J Affect Disord* 2008;110:84-93.
- [4] Darke S, Topp L, Ross J. The injection of methadone and benzodiazepines among Sydney injecting drug users 1996-2000: 5-year monitoring of trends from the Illicit Drug Reporting System. *Drug Alcohol Rev* 2002;21:27-32.
- [5] Darke SG, Ross JE, Hall WD. Benzodiazepine use among injecting heroin users. *Med J Aust* 1995;162:645-7.
- [6] Fry CL, Bruno RB. Recent trends in benzodiazepine use by injecting drug users in Victoria and Tasmania. *Drug Alcohol Rev* 2002;21:363-7.
- [7] Smith A, Tett S, Hall W. The contribution of injecting drug users in Sydney, Melbourne and Brisbane to rising benzodiazepine use in Australia 2000 to 2006. *Aust N Z J Public Health* 2010;34:315-19.
- [8] Werb D, Hayashi K, Fairbairn N, *et al*. Drug use patterns among Thai illicit drug injectors amidst increased police presence. *Subst Abuse Treat Prev Policy* 2009;4:16.
- [9] Evans JL, Hahn JA, Lum PJ, Stein ES, Page K. Predictors of injection drug use cessation and relapse in a prospective cohort of young injection drug users in San Francisco, CA (UFO Study). *Drug Alcohol Depend* 2009;101:152-7.
- [10] Strang J, Griffiths P, Abbey J, Gossop M. Survey of use of injected benzodiazepines among drug users in Britain. *BMJ* 1994;308:1082.
- [11] Forsyth AJ, Farquhar D, Gemmell M, Shewan D, Davies JB. The dual use of opioids and temazepam by drug injectors in Glasgow (Scotland). *Drug Alcohol Depend* 1993;32:277-80.
- [12] Lavelle TL, Hammersley R, Forsyth A. The use of buprenorphine and temazepam by drug injectors. *J Addict Dis* 1991;10:5-14.
- [13] Braumness JG, Kornor H. Benzodiazepine prescription for patients in opioid maintenance treatment in Norway. *Drug Alcohol Depend* 2007;90:203-9.
- [14] San L, Tato J, Torrens M, Castillo C, Farre M, Cami J. Flunitrazepam consumption among heroin addicts admitted for in-patient detoxification. *Drug Alcohol Depend* 1993;32:281-6.
- [15] Fernandez Sobrino AM, Fernandez Rodriguez V, Lopez Castro J. [Benzodiazepine use in a sample of patients on a treatment program with opiate derivatives (PTDO)]. *Adicciones* 2009;21:143-6.
- [16] Dwyer R. Privileging pleasure: temazepam injection in a heroin marketplace. *Int J Drug Policy* 2008;19:367-74.
- [17] Degenhardt L, Day C, Dietze P, *et al*. Effects of a sustained heroin shortage in three Australian States. *Addiction* 2005;100:908-20.
- [18] Fry C, Smith B, Bruno R, O'Keefe B, Miller P. Benzodiazepine and pharmaceutical opioid misuse and their relationship to crime: an examination of illicit prescription drug markets in Melbourne, Hobart and Darwin. Hobart: Turning Point Alcohol and Drug Centre & University of Tasmania, 2007.
- [19] Stafford J, Burns L. Australian drug trends 2009: findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends Series No. 37. Sydney: National Drug and Alcohol Research Centre, University of New South Wales, 2010.
- [20] Stafford J, Sindich N, Burns L. Australian drug trends 2008: findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends No. 19. Sydney: National Drug and Alcohol Research Centre, University of New South Wales, 2009.
- [21] Black E, Roxburgh A, Degenhardt L, *et al*. Australian drug trends 2007: findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends Series No. 1: Sydney: National Drug and Alcohol Research Centre, University of New South Wales, 2008.

- [22] Horyniak D, Dietze P, McIlwhee P. Victorian drug trends 2009: findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends Series No. 40. Melbourne: Burnet Institute, Turning Point Alcohol and Drug Centre & National Drug and Alcohol Research Centre, University of New South Wales, 2010.
- [23] Quinn B. Victorian drug trends 2008: findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trends Series No. 22. Melbourne: Burnet Institute & National Drug and Alcohol Research Centre, University of New South Wales, 2009.
- [24] UBM Medica. MIMS Online. 2011. Available at: <http://www.mims.com/USA/drug/info/alprazolam/> (accessed 3 August 2011).
- [25] Medicare Australia. Pharmaceutical Benefits Scheme. 2011. Available at: [https://www.medicareaustralia.gov.au/statistics/pbs\\_item.shtml](https://www.medicareaustralia.gov.au/statistics/pbs_item.shtml) (accessed 1 March 2011).
- [26] The Royal Australian and New Zealand College of Psychiatrists. Panic disorder and agoraphobia: Australian treatment guide for consumers and carers. Melbourne: The Royal Australian and New Zealand College of Psychiatrists, 2009.
- [27] Verster JC, Volkerts ER, Verbaten MN. Effects of alprazolam on driving ability, memory functioning and psychomotor performance: a randomized, placebo-controlled study. *Neuropsychopharmacology* 2002;27:260–9.
- [28] Noyes R Jr, DuPont RL Jr, Pecknold JC, et al. Alprazolam in panic disorder and agoraphobia: results from a multicenter trial. II. Patient acceptance, side effects, and safety. *Arch Gen Psychiatry* 1988;45:423–8.
- [29] French AP. Dangerously aggressive behavior as a side effect of alprazolam. *Am J Psychiatry* 1989;146:276.
- [30] DeVane CL, Ware MR, Lydiard RB. Pharmacokinetics, pharmacodynamics, and treatment issues of benzodiazepines: alprazolam, adinazolam, and clonazepam. *Psychopharmacol Bull* 1991;27:463–73.
- [31] Curran HV, Bond A, O'Sullivan G, et al. Memory functions, alprazolam and exposure therapy: a controlled longitudinal study of agoraphobia with panic disorder. *Psychol Med* 1994;24:969–76.
- [32] Lane SD, Tcheremissine OV, Liewing LM, Nouvion S, Cherek DR. Acute effects of alprazolam on risky decision making in humans. *Psychopharmacology (Berl)* 2005;181:364–73.
- [33] Nielsen S, Bruno R, Carruthers S, Fischer J, Lintzeris N, Stoove M. Investigation of pharmaceutical misuse amongst drug treatment clients. Melbourne: Turning Point Alcohol and Drug Centre, 2008.
- [34] Medical Practitioners Board of Victoria. Warning: Alprazolam (Xanax, Kalma, Zambhexal), Bulletin. June 2009, page 11.
- [35] Hando J, Darke S, O'Brien S, Maher L, Hall W. The development of an early warning system to detect trends in illicit drug use in Australia: the Illicit Drug Reporting System. *Addict Res* 1998;6:97–113.
- [36] Australian Bureau of Statistics. Regional Population Growth Australia Report 3218.0. 2010. Available at: <http://www.abs.gov.au/ausstats> (accessed 1 March 2011).
- [37] De Graaff B, Bruno R. Alprazolam use in Tasmania: is policy change kicking goals or behinds? APSAD Conference; Canberra, Australia, 2010.
- [38] Darke S, Ross J, Hall W. Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction* 1996;91:405–11.
- [39] Kerr T, Fairbairn N, Tyndall M, et al. Predictors of non-fatal overdose among a cohort of polysubstance-using injection drug users. *Drug Alcohol Depend* 2007;87:39–45.
- [40] McGregor C, Darke S, Ali R, Christie P. Experience of non-fatal overdose among heroin users in Adelaide, Australia: circumstances and risk perceptions. *Addiction* 1998;93:701–11.
- [41] Green TC, Grau LE, Carver HW, Kinzly M, Heimer R. Epidemiologic trends and geographic patterns of fatal opioid intoxications in Connecticut, USA: 1997–2007. *Drug Alcohol Depend* 2011;115(3):221–8.
- [42] Woods J, Gerostamoulos D, Drummer OH. Heroin deaths in Victoria 2007/2008. Melbourne: Victorian Institute of Forensic Medicine and Department of Forensic Medicine, Monash University, 2009.
- [43] Rintoul AC, Nielsen S, Drummer OH, Dobbin M. Benzodiazepine supply and heroin-related deaths in Victoria: the success of flunitrazepam regulation compared with escalating deaths involving alprazolam. APSAD Conference; Canberra, Australia, 2010.
- [44] Bond AJ, Curran HV, Bruce MS, O'Sullivan G, Shine P. Behavioural aggression in panic disorder after 8 weeks' treatment with alprazolam. *J Affect Disord* 1995;35:117–23.



## Appendix Two: Epidemiology of ecstasy use and harms in Australia

### The Epidemiology of Ecstasy Use and Harms in Australia

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#### Key Words

Ecstasy • Australia • 3,4-Methylenedioxymethamphetamine

#### Abstract

**Aims:** This paper examines the epidemiology of ecstasy use and harm in Australia using multiple data sources. **Design:** The data included (1) Australian Customs Service 3,4-methylenedioxymethamphetamine (MDMA) detections; (2) the National Drug Strategy Household and Australian Secondary Student Alcohol and Drug Surveys; (3) data from Australia's ecstasy and Related Drugs Reporting System; (4) the number of recorded police incidents for ecstasy possession and distribution collated by the N.S.W. Bureau of Crime Statistics and Research; (5) the number of calls to the Alcohol and Drug Information Service and Family Drug Support relating to ecstasy; (6) the Alcohol and Other Drug Treatment Services National Minimum Dataset on number of treatment episodes for ecstasy, and (7) N.S.W. Division of Analytical Laboratories toxicology data on number of deaths where MDMA was detected. **Findings:** Recent ecstasy use among adults in the general population has increased, whereas among secondary students it has remained low and stable. The patterns of ecstasy consumption among regular ecstasy users have changed over time. Polydrug use and use for extended periods of time (>48 h) remain common among this group. Frequent ecstasy use is associated with a range of risk behaviours and other

problems, which tend to be attributed to a number of drugs along with ecstasy. Few ecstasy users present for treatment for problems related to their ecstasy consumption. **Conclusions:** Messages and interventions to reduce the risks associated with polydrug use and patterns of extended periods of use are clearly warranted. These messages should be delivered outside of traditional health care settings, as few of these users are engaged with such services.

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#### Introduction

There have been shifts in illicit drug markets in recent years, with the most notable being the increase in production, availability and consumption of psychostimulant drugs such as methamphetamine and 3,4-methylenedioxymethamphetamine (MDMA) – 'ecstasy' [1, 2]. Although some have estimated that the global MDMA production has recently decreased due to declines in European manufacture, the production has increased [3, 4]. Geographic differences exist in ecstasy use: in 2006, an estimated 0.2% of the global population aged 15–64 years had used ecstasy in the past 12 months [3], ranging from 0.1% in Eastern Europe to 0.9% in West and Central Europe [5], 0.8% in North America [3] and >3% in Australia [3].

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General population surveys can be important for making estimates of the population using drugs but are limited in their capacity to provide in-depth information on drug-related harms, particularly acute harms that may require swift policy responses. Surveys of sentinel groups of drug users may help generate more detailed information about current drug markets, trends in patterns of use and associated harms [6]. For example, changes in patterns of ecstasy use have been documented among sentinel groups of drug users in the UK, where the proportion reporting recent (past month) ecstasy use declined over a 5-year period, but the proportion reporting use of >4 tablets per occasion more than doubled [7].

Nonetheless, studies involving sentinel groups of users alone may not indicate how widespread drug use trends are. It is therefore important to place these trends into a broader context, including detailed information about the group of users being investigated, the size of drug markets and secondary indicators of drug-related harms. In order to develop evidence-based drug policy it is essential to consider all of these factors. Although the importance of routine monitoring of illicit drug markets to inform policy decisions is increasingly recognised [8, 9], the monitoring of drugs such as ecstasy has been relatively uncommon (c.f. [6, 7]), with many data collections lagging in their documentation of ecstasy-related harms.

An array of data sources in Australia have the capacity to monitor trends in illicit drug markets [10]. Recent work has explored the epidemiology of methamphetamine use and harm with such data sources [11]; however, no research to date has examined this array of data sources in relation to changes in ecstasy use and related harm. The aim of the current paper is to discuss the epidemiology of ecstasy consumption and harm over time in Australia, with a focus upon sentinel groups of regular ecstasy users (REU) recruited for the Ecstasy and Related Drugs Reporting System (EDRS) [6]. These trends will be considered in the broader context of other indicators of ecstasy markets, population level use and harm in order to determine the significance and implications of these findings.

## Methods

Multiple datasets are integrated in this paper. These are regularly collated as part of the EDRS (formerly the Party Drugs Initiative), which has monitored ecstasy and related drug markets since 2000 in New South Wales (N.S.W.), Australia, and nationally since 2003 (for more details see [12–16]).

### National Level Indicators

#### Drug Seizures

Australian Customs Service data on the weight in kilograms and number of MDMA seizures detected at the Australian border are presented for the period 1995/96 to 2006/07.

#### Drug Purity

Australian Crime Commission data on the median purity of seizures analysed by state and territory law enforcement agencies are presented for the period 1999/2000 to 2005/06. The Australian Crime Commission provides data on state/territory police and Australian Federal Police seizure data, including the number and weight of seizures. In 1999/2000, the purity was reported as ecstasy seizures. Since 2000/01, MDMA seizures have been reported under 'phenethylamines'. Ecstasy belongs to the phenethylamine family of drugs. Other drugs such as 4-bromo-2,5-dimethoxyamphetamine, 2,5-dimethoxy-4-methylamphetamine, 3,4-methylenedioxymphetamine, 3,4-methylenedioxyethylamphetamine, paramethoxyamphetamine and 4-methylthioamphetamine also belong to the phenethylamine family [17] and seizures of these drugs are included in the seizure data from 2000/01. The purity levels presented are indicative only, as not all illicit drug seizures are analysed in Australia; in some instances, seized drugs will be analysed only in a contested court matter. The purity figures, therefore, relate to an unrepresentative sample of the illicit drugs available in Australia. Notwithstanding this limitation, the purity figures provided remain the most objective measure of changes in purity levels available in Australia.

#### Drug Use

*National Drug Strategy Household Survey.* The National Drug Strategy Household Survey (NDSHS) has been conducted triennially across Australia since 1985 [18]. The NDSHS employs a multistage stratified sampling methodology designed to provide a close-to-random sample of households to obtain data on drug and alcohol use in the general Australian population aged 14 years and older. The prevalence among the general population of lifetime and preceding 12 month ecstasy use is presented.

More detailed analyses of the 2004 NDSHS data were also conducted. Respondents who reported using ecstasy at least monthly in the 12 months preceding interview and were aged 16 years or older ( $n = 178$ ) were extracted from the entire sample for these analyses, to enable meaningful comparisons with the ecstasy users recruited for the EDRS (refer to the section on REU regarding sampling methodology). Weighting of the NDSHS data corrects for imbalances arising in sampling design and execution. The NDSHS is designed to be representative of the Australian population.

*Secondary School Students' Survey Data.* Data from the Australian School Students Alcohol and Drug Survey are presented from 1996 to 2005. The Australian School Students Alcohol and Drug Survey is conducted triennially, and approximately 20,000 students aged 12–17 years participate in each survey [19–22]. Students are randomly surveyed across government, catholic and independent secondary schools in all states and territories. Although intended to be representative of all adolescents attending high school, there may be some bias introduced in this collection due to student absence on the survey day. The prevalences of lifetime and preceding year ecstasy use among this group are presented.



**REU Surveys.** National data from the EDRS for the period 2003–2007 are presented. Each year approximately 100 REU in each state and territory are interviewed (totalling approximately 800 annually), reflecting predetermined quotas. Details of the methods and demographic characteristics of each sample are available elsewhere [12–16]. REU are defined as those who have used tablets sold as ‘ecstasy’ at least monthly during the 6 months preceding interview. The method of recruitment for the EDRS has remained consistent across years and jurisdictions [23]. The structured interview schedule was based on an instrument devised during the feasibility trial [6], collecting information on drug use and harm, as well as the market characteristics of ecstasy’s price, purity and availability. The EDRS is a targeted sample of REU and is not intended to be representative of all REU.

#### Drug-Related Harms

**The Alcohol and Other Drug Treatment Services National Minimum Dataset.** Data from the Alcohol and Other Drug Treatment Services National Minimum Data Set are presented for the period 2002/03 to 2005/06. These data, managed by the Australian Institute of Health and Welfare, represent the number of closed treatment episodes where ecstasy is the primary drug of concern. They are based on closed treatment episodes; accordingly some episodes may be excluded if the person did not finish treatment in the given time frame.

#### N.S.W. Indicators

Detailed information on some ecstasy-related harms is not collected at a systematic level nationally. In addition, many of the national collections do not separate MDMA from amphetamine-type stimulants. As an indication of the extent of ecstasy-related harms, datasets available in N.S.W., the most populous jurisdiction in Australia, are presented.

**Drug-Related Deaths.** Data on the number of suspected drug-related deaths in N.S.W. where MDMA was detected post mortem are presented for the period 1996 to 2006. These data are extracted from the Forensic Toxicology Laboratory Database at the Division of Analytical Laboratories in N.S.W.

**Telephone Calls to Drug Helplines.** Data from the N.S.W. Alcohol and Drug Information Service (ADIS) and the N.S.W. Family Drug Support (FDS) Service are presented for the period July 1996 to June 2006 and April 2000 to June 2006, respectively. ADIS and FDS both provide a telephone information and referral service, and the data presented reflect calls received in N.S.W. in which ecstasy was mentioned.

**Law Enforcement Incidents.** Data from the N.S.W. Bureau of Crime Statistics and Research (BOCSAR) on the number of recorded police incidents for ‘ecstasy’ possession/use, dealing and trafficking are presented for the period 1997–2007.

#### Data Analysis

Descriptive statistics were used for all data sources. Quantitative data obtained from the EDRS REU interviews across time were analysed using SPSS for Windows, release 13.0 [24]. Continuous variables with skewed distributions were assessed by the Mann-Whitney U test. Categorical variables were analysed using  $\chi^2$ , odds ratios (OR) and 95% confidence intervals (95% CI) are reported.  $\chi^2$  tests of association were used to compare trends across time.

## Results

### Prevalence and Patterns of Ecstasy Use in Australia Use among the General Population

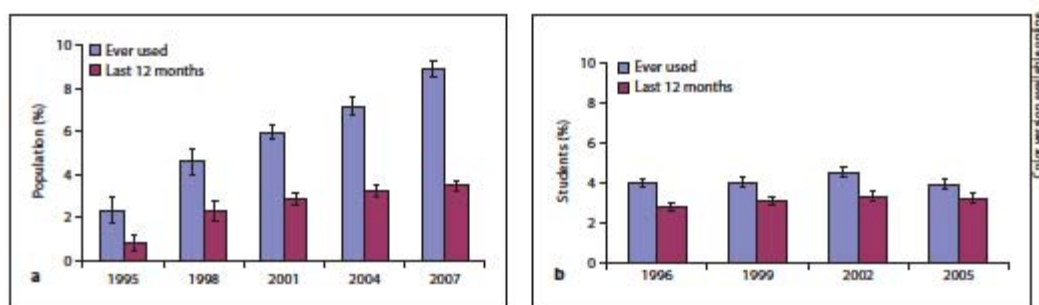
In 2007, 8.9% of the general population reported ever using ecstasy, with 3.5% reporting past-year use [25]; these estimates have increased over the past 12 years (fig. 1a). By contrast, lifetime and past-year ecstasy use among secondary school students has remained low and relatively stable between 1996 and 2005 [19, 22] at approximately 4 and 3%, respectively (fig. 1b).

### Patterns of Use among REU

Table 1 shows patterns of ecstasy use among REU sampled for the EDRS. The mean age of first ecstasy use remained relatively unchanged between 2003 and 2007. In 2007, it was 19 years. The average frequency of ecstasy use among REU has fluctuated over this time and was less frequent among the 2007 sample than the 2003 sample, whereas the median number of ecstasy tablets taken in a ‘typical’ session increased slightly from 1.5 tablets in 2003 to 2 from 2004 onwards. No EDRS participant mentioned daily ecstasy use in any year of the study.

Large proportions of the samples across time have reported typically using other drugs with ecstasy, with alcohol, cannabis and methamphetamine powder the most commonly consumed; these drugs, as well as benzodiazepines, were also frequently reported as drugs used during the ‘comedown’ period (period following acute intoxication with ecstasy). The proportions reporting ‘binge’ use (having taken drugs for >48 h without sleep) fluctuated across time, with approximately half (44%) having done so in 2007 (a lower level than in 2003). Ecstasy, methamphetamine, alcohol and cannabis were the drugs most commonly used during these extended periods of drug taking. The proportion of the sample nominating ecstasy as their drug of choice declined over time (52% in 2003 vs. 39% in 2007; OR = 0.6, 95% CI = 0.5–0.7), with a corresponding increase in the proportion reporting alcohol as their drug of choice (3% in 2003 vs. 13% in 2007; OR = 4.4, 95% CI = 2.8–6.8) [26]. Other drug use among the samples was prevalent, with the majority of the 2007 sample reporting recent (preceding 6 months) alcohol (96%), cannabis (81%) and methamphetamine (71%) consumption.

Some might argue that the use of a targeted snowball sampling technique might lead to interviews with unrepresentative groups of REU. To examine this possibility, comparisons were made between ecstasy users sampled in this way and those sampled using representative



**Fig. 1. a** Lifetime and past-year ecstasy use among the general population aged 14 years and older, Australia. Source: NDSHS. **b** Lifetime and past-year ecstasy use among the secondary school students aged 12–17 years, Australia. Source: Australian Secondary Students Alcohol and Drug Survey.

**Table 1.** Patterns of ecstasy and other drug use among regular ecstasy users, Australia, 2003–2007

Variable	2003 (n = 809)	2004 (n = 852)	2005 (n = 810)	2006 (n = 752)	2007 (n = 742)
Mean age first used ecstasy, years	20 (11–55)	19 (12–53)	19 (11–59)	19 (12–55)	19 (12–45)
Median days used ecstasy past 6 months	12	15	15	12	12
Use ecstasy weekly or more, %	33	37	34	31	27
Ecstasy 'favourite' drug, %	52	50	51	45	39
Median ecstasy tablets in 'typical' session	1.5	2	2	2	2
Typically use other drugs in conjunction with ecstasy, %	91	93	93	93	94
'Binged' on drugs past 6 months	51	42	49	49	44
Binged on ecstasy <sup>a</sup> , %	88	88	93	90	93
Other drug use past 6 months <sup>c</sup> , %					
Alcohol	92	95	97	96	96
Cannabis	85	81	84	83	81
Methamphetamine	84	83	84	82	71

Figures in parentheses are ranges. Source: EDRS regular ecstasy user interviews 2003–2007.

<sup>a</sup> Binge use is defined as use for >48 h without sleep.

<sup>b</sup> Among those reporting binge patterns of use.

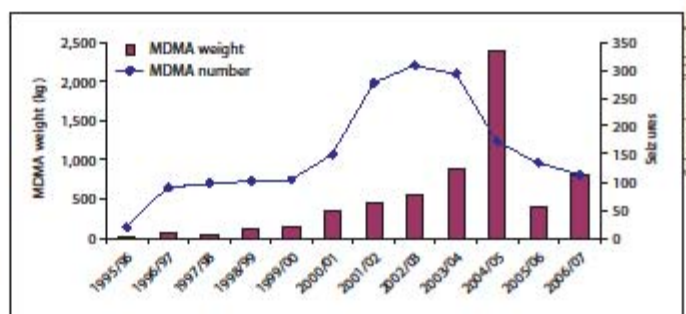
<sup>c</sup> Only the 3 most commonly reported drugs are presented.

surveys of the general population (the Australian NDSHS). Table 2 shows comparisons in patterns of use between REU from the general population from the 2007 NDSHS (defined as those using at least once a month in the preceding 12 months) and REU recruited for the 2007 EDRS (those using at least once a month in the preceding 6 months; it is acknowledged that these definitions are not entirely equivalent). Both samples typically began consumption around 19 or 20 years of

age. A higher proportion of the EDRS sample reported ecstasy as their drug of choice compared to those in the general population, possibly reflecting the recruitment strategy for the sentinel REU cohort in the EDRS. Ecstasy was used in a wide range of contexts across both samples, and there were no differences in the proportion reporting injecting drug use or the types of drug they injected. For users in both samples, swallowing remains by far the most common route of administration. The



**Fig. 2.** Number and weight of detections of MDMA at the Australian border, 1995/96 to 2006/07. Source: Australian Customs Service.



**Table 2.** Patterns of ecstasy use among different populations

	NDSHS regular ecstasy user sample (n = 178)	Regular ecstasy users (n = 740)
Mean age of first ecstasy use, years	20 (19.6–20.9)	19.3 (18.9–19.6)
Range	12–48	12–45
Ecstasy favourite drug, %	23 (16–31)	39 (36–43)
Weekly or more use, %	30 (22–38)	27 (23–30)
Daily or more use, %	0.3 (0.1–2.3)	0
Ever injected any drug, %	24 (15–33)	21 (18–24)
Recently injected, %		
Methamphetamine	9 (4–14)	12 (10–15)
Ecstasy	2 (0–4)	4 (3–6)
Heroin	2 (0–4)	4 (3–6)
Use other drugs with ecstasy, %	95 (92–99)	94 (92–96)
Location of recent use, %		
Nightclub	75 (68–83)	76 (73–79)
Friend's home	64 (55–72)	49 (46–53)
Private party	70 (62–78)	49 (45–52)
Own home	47 (38–57)	48 (44–52)
Raves	78 (71–86)	46 (43–50)

Figures in parentheses represent 95% CI.

vast majority of both samples reported taking other drugs in conjunction with ecstasy.

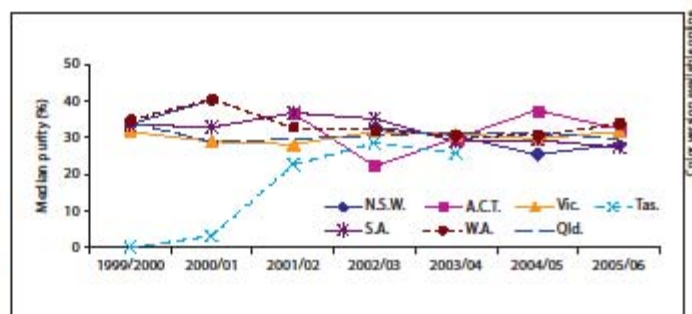
#### *Ecstasy Availability, Price and Purity in Australia*

Over the past decade, the weight of MDMA seizures detected at the Australian border has increased dramatically (fig. 2), whereas the number of seizures has declined since 2002/03. The increasing size of seized MDMA shipments suggests that MDMA is imported through larger-scale trafficking networks (pers. commun., Australian Customs Service, 2005; see also [27]). The relatively small number of detections of precursor drugs for the manu-

facture of MDMA also indicates that the majority of MDMA-based tablets consumed in Australia are imported [28].

According to the 2007 REU, the median price of an ecstasy tablet ranged from AUD 30 to 50 across jurisdictions. In N.S.W., where data have been collected for a longer time period, a decline in the average price of an ecstasy tablet has been observed: it was reported as a median of AUD 40 in 2000 compared to AUD 30 in 2007; this decline was significant ( $U = 866$ ;  $p < 0.001$ ). The majority of REU across states and territories in 2007 reported that ecstasy was 'easy' or 'very easy' to obtain [26].

**Fig. 3.** Median purity of state police phenethylamine seizures by jurisdictions, 1999/2000 to 2005/06. Source: Australian Bureau of Criminal Intelligence (2000–2002), Australian Crime Commission (2003–2007).



The median purity of state and territory police seizures that were analysed indicates that the purity of MDMA (phenethylamine-containing) seizures has remained relatively stable at around 30% purity (fig. 3). A significant minority of tablets sold as ecstasy seized in Victoria do not contain any MDMA at all [29].

REU participants in the EDRS are asked a range of questions including the number of people from whom they purchased ecstasy in the 6 months prior to the interview and for whom they purchased tablets. Among those who reported buying ecstasy in 2007, it was obtained from a median of 3 people (SD = 4; range = 1–50). REU reported purchasing a median of 5 tablets on each occasion (SD = 17; range = 1–350); 70% typically bought ecstasy for themselves and others, indicating that the majority of ecstasy users were engaging in supply of an illicit drug to other consumers.

#### Ecstasy-Related Harms

##### Treatment Presentations and Telephone Helpline Calls

The number of treatment episodes where the principal drug of concern was ecstasy has steadily increased, primarily among males, over the 4-year period from 2002/03 to 2005/06 (fig. 4a). The number of calls in N.S.W. to ADIS and FDS about ecstasy fluctuated at very low levels across the period (fig. 4b).

##### Recorded Police Incidents for Possession/Use and Dealing/Trafficking of Ecstasy

The number of N.S.W. police incidents recorded for ecstasy possession/use has steadily increased (fig. 4c). The number of incidents for dealing/trafficking ecstasy has declined since late 2005. Both of these figures are likely to also reflect changes in police activity.

#### Deaths Where MDMA Was Detected

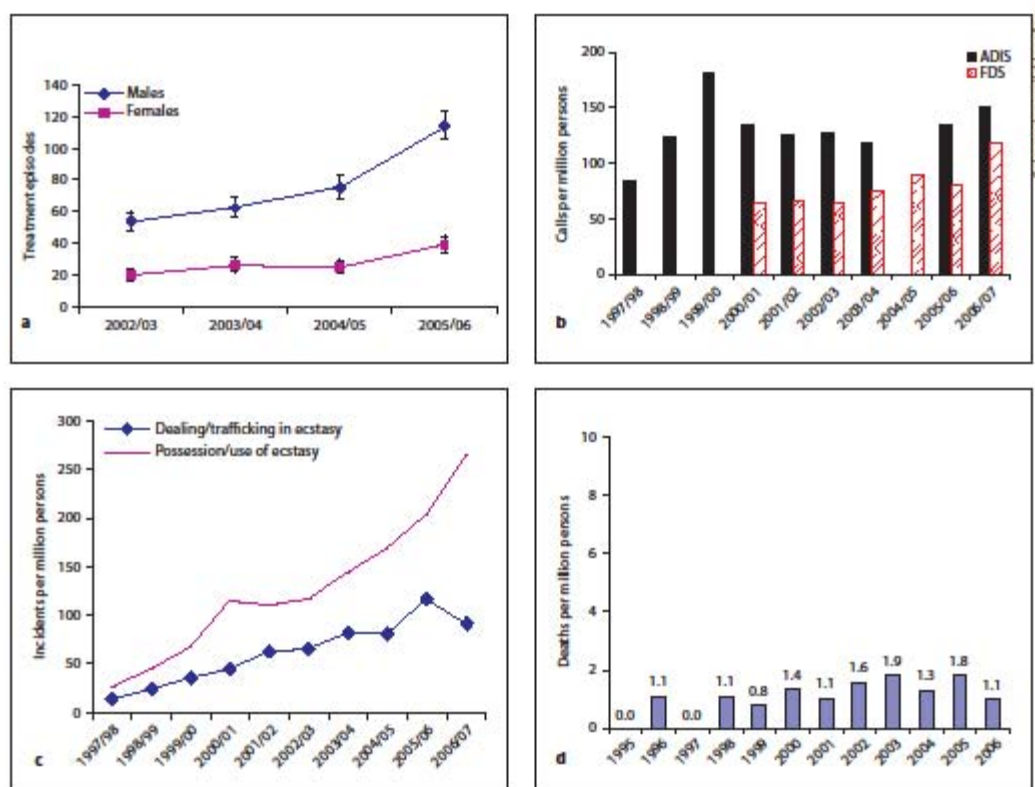
The number of suspected drug-related deaths in N.S.W. where MDMA was detected is small, with <10 deaths being recorded each year between 1995 and 2006. (fig. 4d). Detection of MDMA does not imply that MDMA was causally related to the death, and where MDMA was a causal factor, it is likely that other drugs were also involved.

#### Harms Reported by REU

Table 3 shows a comparison of self-reported harms among REU from the EDRS in 2007 who reported weekly or more frequent ecstasy use (referred to as 'frequent users') versus those mentioning less than weekly use ('less frequent users'). Whereas there were no demographic differences between the frequent and less frequent users, there were some variations in drug use patterns (table 3).

Frequent users were significantly more likely to report taking drugs for a period of 48 h or more without sleep than less frequent users. They were also significantly more likely to have ever injected a drug. Although there was no difference in median days of alcohol use in the preceding 6 months, frequent users reported significantly more days of cannabis and methamphetamine consumption than less frequent users. Frequent ecstasy users were significantly more likely to have engaged in crime in the past month (most notably dealing for profit followed by property crime) and to have been arrested in the past 12 months than less frequent users.

Compared with less frequent users, frequent ecstasy users were significantly more likely to have attended a health professional for a drug-related problem in the preceding 6 months (table 3), most commonly a general



**Fig. 4.** Indicators of ecstasy-related harms per million persons, 1997–2007. **a** Number of treatment episodes where ecstasy was the primary drug of concern, Australia. Source: National Alcohol and Other Drug Treatment Services National Minimum Data Set, Australian Institute of Health and Welfare. The National Alcohol and Other Drug Treatment Services National Minimum Data Set is based on closed treatment episodes and accordingly, some episodes may be excluded if they did not finish in the given period. Figures are presented by the commencement date for treatment.

**b** Number of 'ecstasy' calls to telephone helplines, N.S.W. Source: N.S.W. ADIS and N.S.W. FDS. ADIS data were not available for the period July to October 2004. FDS data were not available for the period May to June 2006. **c** Number of recorded police incidents, N.S.W. Source: N.S.W. Bureau of Crime Statistics and Research. **d** Number of deaths where MDMA was detected, N.S.W. Source: Forensic Toxicology Laboratory database, Division of Analytical Laboratories. Numbers relate to deaths in which ecstasy was detected, however, there may have also been other drugs present.

medical practitioner (GP). These proportions were very small in both groups. The most commonly reported drug of concern was alcohol followed by ecstasy. There were no differences in the proportions self-reporting 'overdoses' on either stimulant or depressant drugs in the preceding 12 months (table 3).

A notable proportion of REU reported that their drug use had recurrently interfered with their role responsi-

bilities, with frequent users (49%) significantly more likely than less frequent users (34%) to mention such problems (table 3). A significantly higher proportion of frequent (18%) than less frequent users (10%) that experienced these problems attributed them to their ecstasy consumption. However, consistent with poly-drug use patterns among both groups, these problems were also attributed to a range of other drugs (table 3).



**Table 3.** Demographic characteristics, risk and harm among regular ecstasy users according to frequency of use, 2007

	Less than weekly use (n = 544)	Weekly or more frequent use (n = 197)	Statistic
Male, %	57	61	OR = 1.2; 95% CI = 0.9–1.7
Mean age at time of interview, years	25	25	$t_{739} = 0.306$ ; $p > 0.05$
Median age first tried ecstasy, years	18	18	Mann-Whitney U = 48,531.0, $p > 0.05$
Binged <sup>a</sup> on drugs past 6 months, %	36	66**	OR = 3.5; 95% CI = 2.5–4.9
Median days used alcohol past 6 months <sup>b</sup>	48	48	Mann-Whitney U = 47,538.0, $p > 0.05$
Median days used cannabis past 6 months <sup>b,c</sup>	28	48*	Mann-Whitney U = 32,523.5, $p < 0.05$
Median days used methamphetamine past 6 months <sup>b,c</sup>	6	13**	Mann-Whitney U = 20,752.5, $p < 0.001$
Ever injected any drug, %	19	27*	OR = 1.6; 95% CI = 1.1–2.4
Median age first injected <sup>d</sup> , years	19	18	Mann-Whitney U = 2,477.0, $p > 0.05$
Engaged in any crime past month, %	25	43**	OR = 2.3; 95% CI = 1.6–3.2
Arrested in past 12 months, %	7	15**	OR = 2.3; 95% CI = 1.4–3.7
Overdosed <sup>e</sup> on stimulant drug last 12 months, %	9	13	OR = 1.5; 95% CI = 0.9–2.4
Attributed overdose to ecstasy, %	9	11	OR = 1.2; 95% CI = 0.7–2.1
Attributed overdose to crystal methamphetamine, %	3	5	OR = 1.7; 95% CI = 0.7–3.9
Using at least 1 other drug when overdosed, %	10	14	OR = 1.4; 95% CI = 0.8–2.3
Overdosed <sup>e</sup> on depressant drug past 12 months, %	14	19	OR = 1.4; 95% CI = 0.9–2.1
Attributed overdose to alcohol, %	17	19	OR = 1.2; 95% CI = 0.8–1.8
Attributed overdose to heroin, %	3	4	OR = 1.2; 95% CI = 0.5–2.9
Using at least 1 other drug when overdosed, %	11	17*	OR = 1.7; 95% CI = 1.1–2.7
Accessed health professional for drug-related problem, %	19	29**	OR = 1.7; 95% CI = 1.2–2.5
Recurrently put self/others at risk while under influence, %	28	30	OR = 1.1; 95% CI = 0.8–1.6
Reporting drug use recurrently interfering with responsibility, %	34	49**	OR = 1.9; 95% CI = 1.3–2.6
Attributing to ecstasy, %	10	18**	OR = 1.9; 95% CI = 1.2–3.0
Attributing to alcohol, %	9	6	OR = 0.6; 95% CI = 0.3–1.2
Attributing to cannabis, %	6	7	OR = 1.2; 95% CI = 0.6–2.4
Attributing to crystal methamphetamine, %	3	6	OR = 2.0; 95% CI = 0.9–4.3
Reporting drug use recurrently causing relationship problems, %	23	33*	OR = 1.6; 95% CI = 1.1–2.3
Attributing to ecstasy, %	6	10	OR = 1.7; 95% CI = 1.0–3.0
Attributing to alcohol, %	5	5	OR = 1.0; 95% CI = 0.5–2.2
Attributing to cannabis, %	5	4	OR = 0.8; 95% CI = 0.3–1.8
Attributing to crystal methamphetamine, %	3	6	OR = 2.0; 95% CI = 0.9–4.6

Source: 2007 EDRS interviews with REU. \*  $p < 0.05$ ; \*\*  $p < 0.01$ .  
 Note: Specific p values are available from the authors on request.

<sup>a</sup> 'Binge' use is defined as use for >48 h without sleep.

<sup>b</sup> Among those reporting use in the past 6 months.

<sup>c</sup> Results of Mann-Whitney U test.

<sup>d</sup> Among those who have ever injected any drug.

<sup>e</sup> 'Overdose' was defined as experiencing symptoms consistent with either stimulant toxicity (e.g. nausea and vomiting, chest

pains, tremors, increased body temperature or heart rate, seizure, extreme paranoia, anxiety or panic, hallucinations) or symptoms consistent with a depressant overdose (e.g. reduced level of consciousness, respiratory depression, turning blue, collapsing and being unable to be roused). It should be noted that the following data refer to participants' understandings of these definitions and do not represent medical diagnoses.

A similar trend was evident for those reporting relationship problems. However, there were no significant differences between frequent and less frequent users with regard to proportions reporting that they attributed their relationship problems specifically to their ecstasy use.

## Discussion

This paper examined indicators of the price, purity, availability, use and harm related to ecstasy in Australia in recent years. Population level surveys indicate that the prevalence of ecstasy use among Australian adults has increased over time, whereas among secondary school students it has remained low and stable. This is consistent

with data from the EDRS showing that first ecstasy use typically occurs in early adulthood [30].

The patterns of ecstasy use among samples of REU in Australia have changed over time, with more frequent (>weekly) ecstasy consumption declining in recent years but the average amount of ecstasy used on each occasion increasing somewhat. Substantial proportions of REU reported taking drugs for extended periods without sleep. The proportion of REU indicating ecstasy as their drug of choice has declined over time despite consistent sampling frames and inclusion criteria, and the percentage of these samples reporting alcohol as their drug of choice has increased over time. The extent of polydrug use among this group has been consistently high.

According to self-report data, ecstasy has remained readily available in Australia over the past 8 years. Law enforcement data also suggest that MDMA has become more available, with an increasing volume detected at the Australian border [27, 31]. Domestic production of MDMA appears limited: relatively small numbers of clandestine laboratory detections engaging in MDMA production have been detected [32] and a significant minority of tablets thought to be domestically produced may contain drugs other than MDMA [29]. Since 2003, the reported price of ecstasy has declined in some states/territories, while law enforcement data suggest that the purity of MDMA has remained relatively stable.

Among REU, frequent use – weekly or more often – was associated with increased risk behaviour and general life problems. Frequent ecstasy users were more likely to report engaging in extended periods of drug consumption, more frequent use of other drugs (such as cannabis and methamphetamine), injecting drug use and criminal activity. They were also more likely to report recurrent interference with role responsibilities and social relationships. Ecstasy was the drug most commonly cited in relation to these problems, possibly reflecting the recruitment criterion of regular ecstasy consumption. Frequent ecstasy users were no more likely than less frequent users to report a recent drug overdose. However, among those who had overdosed recently, substantial proportions in both groups reported using at least 1 other drug at the time of overdose. Few reported seeking any kind of treatment for their drug use (whether for acute or more persistent drug-related problems). Among those who did seek treatment, a GP was the most commonly cited source of help.

Consistent with the self-reports of REU, population level indicators suggested low prevalence of help seeking (e.g. treatment and calls to helplines) for ecstasy-related problems. The number of calls to ADIS about ecstasy is

relatively low compared with that for other drugs such as cannabis (data not shown) [33]. Despite recent increases in treatment episodes for ecstasy, these still comprise <1% of all drug-related treatment episodes in Australia [34].

Population level indicators also suggest a low prevalence of more serious harms such as ecstasy-related deaths. Relatively little is known about these deaths, with much of the literature focusing on case studies [35, 36]. Larger-scale reviews conducted in the UK [37] and the USA [38] have focused only on deaths where ecstasy was detected in toxicology, without discussing the role it played in relation to the death. One US review reported that death due to MDMA toxicity alone was relatively rare (2 in a 4-year period) [39] and that pre-existing cardiac pathology and multiple drug toxicity was more common among these deaths. Nevertheless, the variable nature of the contents of MDMA tablets clearly increases the risks of adverse consequences. The data presented in this paper also relate to the detection of MDMA among deceased persons and do not necessarily indicate that MDMA was implicated in the death.

These findings have several implications. First, interventions for this group of drug users need to consider the importance of polydrug use, which is very common among this group [40, 41]. Combining drugs may heighten the risk of both acute and longer-term adverse consequences, and was commonly mentioned among persons reporting a recent overdose. Many interventions and information resources are available on the Internet and through low-threshold services. However, the coverage and effectiveness of these interventions remain to be established, and it is unclear how many ecstasy users would seek out these sources to obtain information.

Although the frequency of use may be declining among ecstasy users in Australia, the amounts consumed per session and the number of people reporting extended ('binge') patterns of drug use seem to be increasing. A potentially serious acute consequence of MDMA use is 'serotonin syndrome', a drug-induced toxic state caused by an excess of serotonin in the central nervous system [42]. Users may place themselves at risk of such consequences by consuming greater amounts of ecstasy over extended periods of time. Previous research among this group has also shown that bingeing and polydrug use are related to a greater likelihood of both physical and psychological problems associated, in part, with ecstasy use [41]. Clear messages about these associations are warranted for this group.



Second, these findings show that few people present for treatment of their ecstasy use in Australia. In addition, many users may not present until they are experiencing more serious problems. This is consistent with US data suggesting that the treatment demand for this drug is comparatively low [40]. In the USA, those who present have a higher likelihood of polydrug use problems and mental health problems [43]. The current findings suggest that GPs may be well placed to conduct brief interventions among this group. However, 1 study found that around half of the GPs interviewed were not confident in their capacity to advise ecstasy users about their consumption [44]. Training of GPs and other health professionals about the harms and risks associated with ecstasy use is clearly required.

Third, injecting drug use was reported by a substantial minority of REU. Harm reduction messages regarding the risks of injecting drug use tend to focus on regular injecting drug users and are most often delivered within specific health care settings. Given that many of the REU interviewed were *not* in contact with such treatment services, innovative strategies are required to implement novel harm reduction interventions that target people who use drugs and also consider risk factors that may be present in the settings where such drug use is likely to occur. A recent evaluation of a peer-led intervention, targeted towards those attending dance parties, has suggested that peers are seen as credible sources of information and that messages delivered are remembered up to 3 months later [45]. There is a need to also work with those in the nightlife entertainment setting to ensure an integrated response to drug use and related problems in nightclubs and large outdoor dance parties [46].

#### Limitations

Several limitations need to be addressed. First, the REU recruited for the EDRS are a sentinel group of users, who are recruited for their ability to report on drug markets, as opposed to providing information on general population levels of use or use patterns, and harms associated with occasional consumption. Although these sentinel groups have demonstrated noteworthy representativeness [47], the current study nonetheless incorporated data from other sources, such as the household survey, hospital admissions and law enforcement data, in an attempt to document a more accurate and comprehensive overview of current ecstasy use and harms in Australia.

Second, analysis of cross-sectional data limits our ability to draw causal inferences from these findings.

Longitudinal studies of cohorts of ecstasy users would provide important information about the chronology of drug use and the development of mental health problems (such as depression and anxiety) as well as documenting the age and cohort effects of ecstasy-related trends.

Finally, the delays inherent in the provision of routine data collections (such as hospital admissions and law enforcement indicators), combined with the fact that these data are not collected primarily for research purposes, limit the capacity to provide timely information on drug-related harms. Nonetheless, these data collections provide an important context in which to place emerging drug trends as documented by Australia's early warning systems. Despite these limitations, Australia has developed a strong capacity to monitor trends in illicit drug markets over the past 10 years [10], as well as the ability to disseminate this information regularly at a national and international level [48].

#### Conclusions

There is clear evidence that ecstasy is relatively cheap and readily available in Australia. It is used by a significant minority of young adults in Australia; extended periods of polydrug use remain prevalent and are associated with a range of harms. REU attributed their drug-related problems to a range of drugs, including ecstasy. Despite this, engagement with services for drug-related problems occurred among only a minority of users, and most users consulted GPs rather than dedicated drug treatment services. These findings highlight a need for interventions using a range of strategies to engage with ecstasy users, and suggest that GP consultations and peer-led interventions represent an opportunity for screening and brief interventions. Messages about the risks of multiple drug use may not be reaching some users and continued efforts need to be made to disseminate knowledge about harms and the risks of new trends.

#### Acknowledgements

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## References

- United Nations Office on Drugs and Crime: Patterns and Trends in Amphetamine-Type Stimulants in East Asia and the Pacific: Findings from the 2006 Regional ATS Questionnaire. Bangkok, United Nations Office on Drugs and Crime Regional Centre for East Asia and the Pacific, 2007.
- United Nations Office on Drugs and Crime: 2004 World Drug Report. Geneva, United Nations, 2004.
- United Nations Office on Drugs and Crime: World Drug Report 2006. Vienna, United Nations, 2007.
- United Nations Office on Drugs and Crime: World Drug Report 2007. Vienna, United Nations, 2008.
- European Monitoring Centre for Drugs and Drug Addiction Annual Report 2006: the State of the Drugs Problem in Europe. Lisbon, EMCDDA, 2006.
- Topp L, et al: Adapting the Illicit Drug Reporting System (IDRS) methodology to examine the feasibility of monitoring trends in party drug markets. *Drug Alcohol Depend* 2004;73:189-197.
- McCambridge J, et al: Five-year trends in patterns of drug use among people who use stimulants in dance contexts in the United Kingdom. *Addiction* 2005;100:1140-1149.
- European Monitoring Centre for Drugs and Drug Addiction: Annual Report 2003: The State of the Drugs Problem in the European Union and Norway. Lisbon, European Monitoring Centre for Drugs and Drug Addiction, 2003.
- Griffiths P, et al: Drug information systems, early warning, and new drug trends: can drug monitoring systems become more sensitive to emerging trends in drug consumption? *Subst Use Misuse* 2000;35:811-844.
- Shand F, et al: The monitoring of drug trends in Australia. *Drug Alcohol Rev* 2003;22:63-74.
- Degenhardt L, et al: The epidemiology of methamphetamine use and harm in Australia. *Drug Alcohol Rev* 2008;27:243-252.
- Black E, et al: Australian Trends in Ecstasy and Related Drug Markets 2007: Findings from the Ecstasy and Related Drugs Reporting System (EDRS). NDARC Monograph. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2008.
- Dunn M, et al: Australian Trends in Ecstasy and Related Drug Markets 2006: Findings from the Ecstasy and Related Drugs Reporting System (EDRS). NDARC Monograph 61. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2007.
- Stafford J, et al: Australian Trends in Ecstasy and Related Drug Markets 2004: Findings from the Party Drugs Initiative (PDI). Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2005.
- Stafford J, et al: Australian Trends in Ecstasy and Related Drug Markets 2005: Findings from the Party Drugs Initiative (PDI). Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2006.
- Breen C, et al: Australian Party Drug Trends 2003: Findings from the Party Drugs Initiative (PDI). Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2004.
- Australian Crime Commission: Australian Illicit Drug Data Report 2005/06. Canberra, Australian Crime Commission, 2007.
- Australian Institute of Health and Welfare: 2004 National Drug Strategy Household Survey: First Results. Canberra, Australian Institute of Health and Welfare, 2005.
- Letcher T, White V: Australian Secondary Students' Use of Over-the-Counter and Illicit Drugs in 1996. Canberra, Centre for Behavioural Research in Cancer Anti-Cancer Council of Victoria, 1999.
- White V: Australian Secondary Students' Use of Over-the-Counter and Illicit Substances in 1999. Canberra, Commonwealth Department of Health and Aged Care, 2001.
- White V, Hayman J: Australian Secondary Students' Use of Over-the-Counter and Illicit Substances in 2002. Canberra, Drug Strategy Branch, Australian Government Department of Health and Ageing, 2004.
- White V, Hayman J: Australian Secondary School Students' Use of Over-the-Counter and Illicit Substances in 2005. Canberra, Drug Strategy Branch, Australian Government Department of Health and Ageing, 2006.
- Dunn M, Degenhardt L: NSW Trends in Ecstasy and Related Drug Markets 2006: Findings from the Ecstasy and Related Drugs Reporting System (EDRS). Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2007.
- SPSS Inc.: SPSS for Windows Version 13.0. Chicago, SPSS Inc, 2004.
- Australian Institute of Health and Welfare: National Drug Strategy Household Survey: First Results, 2008. Canberra, Australian Institute of Health and Welfare, 2007.
- Black E, et al: Australian Trends in ecstasy and Related Drug Markets 2007: Findings from the Ecstasy and Related Drugs Reporting System (EDRS). Australian Drug Series No 10. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2008.
- Rout M: Federal police smash ring importing 4.4 tonnes of ecstasy. *The Australian* Volume, Aug 8, 2008.
- Australian Customs Service: Australian Customs Service Annual Report 2006-07. Canberra, Commonwealth of Australia, 2007.
- Quinn C, Dunn M, Degenhardt L: The illicit tablet market in Victoria. *Ecstasy and Related Drug Trends Bulletin*, December, 2007.
- Black E, et al: Australian Trends in Ecstasy and Related Drug Markets 2007: Findings from the Ecstasy and Related Drugs Reporting System. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2008.
- Australian Crime Commission, Australian Illicit Drug Data Report 2003-04. Canberra, Australian Crime Commission, 2005.
- Australian Crime Commission, Illicit Drug Data Report 2005-06. Canberra, Commonwealth of Australia, 2007.
- Sindicich N, Degenhardt L: New South Wales Drug Trends 2007: Findings from the Illicit Drug Reporting System (IDRS). Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2008.
- Australian Institute of Health and Welfare, Alcohol and other drug treatment services in Australia 2005-06: report on the National Minimum Data Set; in *Drug Treatment Series* No 7. AIHW cat No HSE 53. Canberra, AIHW, 2007.

- 35 Darke S, Degenhardt L, Mattick R: Mortality amongst Illicit Drug Users. Cambridge, Cambridge University Press, 2007.
- 36 Schifano F: A bitter pill. Overview of ecstasy (MDMA, MDA) related fatalities. *Psychopharmacology* 2004;173:242–248.
- 37 Schifano F, et al: Death rates from ecstasy (MDMA, MDA) and polydrug use in England and Wales, 1996–2002. *Hum Psychopharmacol* 2003;18:519–524.
- 38 Patel M, et al: Shedding new light on the 'safe' club drug: methylenedioxymethamphetamine (ecstasy)-related fatalities. *Acad Emerg Med* 2004;11:208–210.
- 39 Gill JR, et al: Ecstasy (MDMA) deaths in New York City: a case series and review of the literature. *J Forensic Sci* 2002;47:121–126.
- 40 Degenhardt L, Dunn M: Ecstasy; in Ross J (ed): *Illicit Drug Use in Australia: Epidemiology, Use Patterns and Associated Harms*, ed 2. Canberra, Commonwealth of Australia, 2007, pp 37–44.
- 41 Topp L, et al: Ecstasy use in Australia: patterns of use and associated harm. *Drug Alcohol Depend* 1999;55:105–115.
- 42 Gillman P: A review of serotonin toxicity data: implications for the mechanisms of antidepressant drug action. *Biol Psychiatry* 2006;59:1046–1051.
- 43 Maxwell JC, Spence RT: Profiles of club drug users in treatment. *Subst Use Misuse* 2005;40:1409–1426.
- 44 Silins E, et al: The Development of Materials on Ecstasy and Related Drugs (ERDs) for Health Care Practitioners. NDARC Technical Report No 287. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2007.
- 45 Bleeker A, et al: The Use of a Peer-Led Intervention to Deliver Harm Reduction Messages to Ecstasy Users. NDARC Technical Report. Sydney, National Drug and Alcohol Research Centre, University of New South Wales, in press.
- 46 Bellis MA, Hughes K, Lowey H: Healthy nightclubs and recreational substance use: from a harm minimisation to a healthy settings approach. *Addict Behav* 2002;27:1025–1035.
- 47 Topp L, Barker B, Degenhardt L: The external validity of results derived from ecstasy users recruited using purposive sampling strategies. *Drug Alcohol Depend* 2004;73:33–40.
- 48 Topp L, McKetin R: Supporting evidence-based policy-making: a case study of the IDRS. *Bull Narcotics* 2003;2:23–30.

## Appendix Three: Baseline and 12-month follow-up surveys

### Methamphetamine use in Melbourne: Baseline Survey (2010)

Interview time/date:

Participant ID:

#### Section A: Demographics

1. Gender:

- Male ☐  
 Female ☐  
 Other (*specify*) \_\_\_\_\_ ☐

2. Date of birth: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ (*format: dd/mm/yyyy*)

3. Where are you currently living?

- No fixed address/homeless ☐  
 Public housing ☐  
 Rented house or flat on your own ☐  
 Rented house or flat shared with others ☐  
 Caravan or serviced site ☐  
 House or flat you own or were paying off ☐  
 Parent's/family home ☐  
 Partner's home ☐  
 Boarding house/hostel/shelter or refuge ☐  
 Staying with a friend or acquaintance ☐  
 Drug treatment residence ☐  
 Other (*specify*) \_\_\_\_\_ ☐

4. Postcode of the suburb you live in (or suburb): \_\_\_\_\_

5. Who are you currently living with (mark all that apply)?

- Alone ☐  
 Spouse/partner ☐  
 Alone with children (how many? \_\_\_\_\_) ☐  
 Spouse/partner with children (how many? \_\_\_\_\_) ☐  
 Friend(s)/acquaintance(s) ☐  
 Parent(s) ☐  
 Sibling(s) ☐  
 Other adult relative(s) ☐  
 Flatmate(s) ☐  
 Boarding/rooming house tenants ☐  
 Other (*specify*) \_\_\_\_\_ ☐

6. Have you been homeless at any time during the last 6 months?

- Yes ☐  
 No ☐

a. If yes, how many times? \_\_\_\_\_ times

7. How many different places have you lived in over the last 6 months?

- 0 ☐  
 1-2 ☐  
 3-4 ☐  
 5+ ☐

8. Country of birth?

- Australia ☐

Other (*specify*) \_\_\_\_\_ ☐

Yes, full time ☐

Yes, part time ☐

a. (If not Australia), what year did you arrive in Australia?

9. What was the main language spoken in the home you grew up in?

10. Are you of Aboriginal and/or Torres Strait Islander origin?

No ☐

Aboriginal ☐

Torres Strait Islander ☐

Aboriginal & Torres Strait Islander ☐

11. Are you currently employed?

No ☐

Yes, full time ☐

Yes, part time/casual ☐

Yes, self employed ☐

Yes, other (*specify*) \_\_\_\_\_ ☐

12. What was the highest grade of school you completed?

Year \_\_\_\_\_

13. Have you completed any qualifications/courses after school?

No ☐

Yes, trade/technical ☐

Yes, university/college ☐

Yes, both ☐

Yes, other (*specify*) \_\_\_\_\_ ☐

14. Are you currently studying?

No ☐

15. What were all your sources of income during the past month (tick all that apply):

No income ☐

Wage or salary ☐

Temporary benefit (*e.g. unemployment, sickness benefits*) ☐

Pension (*e.g. aged, disability*) ☐

Student allowances ☐

Dependent on others ☐

Child support ☐

Criminal activity ☐

Sex work ☐

Other, e.g. begging, busking (*specify*) \_\_\_\_\_ ☐

a. (If income reported) During the past month, what was your MAIN source of income? (mark only one response)

Wage or salary ☐

Temporary benefit (*e.g. unemployment, sickness benefits*) ☐

Pension (*e.g. aged, disability*) ☐

Student allowances ☐

Dependent on others ☐

Child support ☐

Criminal activity ☐

Sex work ☐

Other, e.g. begging, busking (*specify*) \_\_\_\_\_ ☐

16. Which of the following would represent your average weekly income (before tax) in the past 6 months from all sources?

≥ \$2,000 ☐

\$1,600 - \$1,999 ☐

\$1,300 - \$1,599 ☐

- \$1,000 - \$1,299 ☐
- \$800 - \$999 ☐
- \$600 - \$799 ☐
- \$400 - \$599 ☐
- \$250 - \$399 ☐
- \$150 - \$249 ☐
- \$1 - \$149 ☐
- Nil income ☐
- Negative ☐

17. Thinking about the last 4 weeks, on average how much would you have spent each week on?

	\$/week
Accommodation and bills	<input type="text"/>
Food	<input type="text"/>
Child care/support	<input type="text"/>
Transport (including fuel costs)	<input type="text"/>
Paying off debts	<input type="text"/>
Alcohol	<input type="text"/>
Tobacco	<input type="text"/>
Other drugs	<input type="text"/>
Health care (excl. pharmacotherapy)	<input type="text"/>
Education/training	<input type="text"/>
Gambling	<input type="text"/>
Licit pharmacotherapy treatment	<input type="text"/>

18. During the last 4 weeks how have you mostly got around? (mark only one response)

- Your own vehicle ☐
- Driving a vehicle borrowed from family/friends ☐
- On foot ☐
- Pushbike ☐
- Public Transport ☐

- Lift from family/friends ☐
- Transport provided by community worker/organisation ☐
- Other (*specify*)  ☐

19. Do you have private health cover?

- Yes ☐
- No ☐

a. (If yes), Who is this provided by?

- Self ☐
- Employer ☐
- Partner ☐
- Parents ☐
- Other relative(s) (*specify*)  ☐
- Other (*specify*)  ☐

20. Do you have a healthcare card?

- Yes ☐
- No ☐

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**Section B: Drug use history and recent drug use**

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1. What is your main drug of choice? (i.e. favourite or preferred drug, one response only)

Ecstasy	<input type="checkbox"/>
Methamphetamine powder (speed)	<input type="checkbox"/>
Methamphetamine base	<input type="checkbox"/>
Crystal methamphetamine (ice)	<input type="checkbox"/>
Cocaine	<input type="checkbox"/>
LSD	<input type="checkbox"/>
MDA	<input type="checkbox"/>
Ketamine	<input type="checkbox"/>
GHB/GBL/1,4B	<input type="checkbox"/>
Amyl nitrate	<input type="checkbox"/>
Nitrous oxide	<input type="checkbox"/>
Cannabis	<input type="checkbox"/>
Alcohol	<input type="checkbox"/>
Heroin	<input type="checkbox"/>
Other opiates (e.g. morphine, oxycodone)	<input type="checkbox"/>
Benzodiazepines	<input type="checkbox"/>
Pharmaceutical stimulants	<input type="checkbox"/>
Steroids	<input type="checkbox"/>
Methadone	<input type="checkbox"/>
Buprenorphine	<input type="checkbox"/>
Suboxone	<input type="checkbox"/>
Mushrooms	<input type="checkbox"/>
Tobacco	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

2. Have you ever injected any drug?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

- a. (If yes), How old were you when you first injected any drug?  
\_\_\_\_\_ years

3. The following questions are about your recent drug use:

Drug(s)	Ever used?	Used last 6 months?	Injected last 6 months?	Smoked last 6 months?	Snorted last 6 months?	Swallowed last 6 months?	Av. no. days per week used in last month? (incl. days injected)	Av. no. days per week injected in last month?
Speed powder								
Crystal meth/ice								
Methamphetamine base								
Amphetamine liquid								
Pharmaceutical stimulants								
Ecstasy								
Cocaine								
BZDs (e.g. Valium, Xanax, Serepax)								
Heroin								
Methadone								
Buprenorphine								
Suboxone								
Other opiates (e.g. morphine, oxycodone)								
Inhalants								
Hallucinogens (e.g. LSD, magic mushrooms)								
Alcohol								
Tobacco								
Cannabis								
Other illicit drug 1 (specify )								
Other illicit drug 2 (specify )								

### Methamphetamine use

4. What age did you first use any type of methamphetamine?

\_\_\_\_\_ years

5. What was the first type of methamphetamine you ever tried?

Methamphetamine powder (speed) ☐

Methamphetamine base ☐

Crystal methamphetamine (ice) ☐

Amphetamine liquid ☐

6. How did you first use this type of methamphetamine?

Injected ☐

Swallowed ☐

Snorted ☐

Smoked ☐

Shelved/shafted ☐

7. What is the main type of methamphetamine you currently use? (i.e. form most used over last 4 weeks)

Methamphetamine powder (speed) ☐

Methamphetamine base ☐

Crystal methamphetamine (ice) ☐

Amphetamine liquid ☐

8. Why is this your main type of methamphetamine?

Drug effects ☐

Availability ☐

Price ☐

Purity ☐

Other (*specify*) \_\_\_\_\_ ☐

9. How did you use your main type of methamphetamine the first time you used it?

Injected ☐

Swallowed ☐

Snorted ☐

Smoked ☐

Shelved/shafted ☐

10. How have you mainly used your main type of methamphetamine over the last 6 months?

Injected ☐

Swallowed ☐

Snorted ☐

Smoked ☐

Shelved/shafted ☐

11. During the last 6 months, have you usually used other drugs at the same time as methamphetamines? (i.e. while intoxicated, not while coming down)

Yes ☐

No ☐

a. (If yes), What other drugs did you usually use with methamphetamines?

Ecstasy/MDMA (pill or powder form) ☐

Cocaine ☐

LSD ☐

MDA ☐

Ketamine ☐

GHB/GBL/1,4B ☐

Amyl nitrate ☐

Nitrous oxide ☐



Cannabis	<input type="checkbox"/>
Alcohol	<input type="checkbox"/>
Heroin	<input type="checkbox"/>
Other opiates (e.g. morphine, oxycodone)	<input type="checkbox"/>
Benzodiazepines (e.g. Xanax, Valium)	<input type="checkbox"/>
Pharmaceutical stimulants	<input type="checkbox"/>
Steroids	<input type="checkbox"/>
Methadone	<input type="checkbox"/>
Buprenorphine	<input type="checkbox"/>
Suboxone	<input type="checkbox"/>
Mushrooms	<input type="checkbox"/>
Tobacco	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

Pharmaceutical stimulants	<input type="checkbox"/>
Steroids	<input type="checkbox"/>
Methadone	<input type="checkbox"/>
Buprenorphine	<input type="checkbox"/>
Suboxone	<input type="checkbox"/>
Mushrooms	<input type="checkbox"/>
Tobacco	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

2. During the last 6 months, have you usually used other drugs while coming down from methamphetamines?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

- a. (If yes), What other drugs did you usually use when coming down from methamphetamines?

Ecstasy	<input type="checkbox"/>
Cocaine	<input type="checkbox"/>
LSD	<input type="checkbox"/>
MDA	<input type="checkbox"/>
Ketamine	<input type="checkbox"/>
GHB/GBL/1,4B	<input type="checkbox"/>
Amyl nitrate	<input type="checkbox"/>
Nitrous oxide	<input type="checkbox"/>
Cannabis	<input type="checkbox"/>
Alcohol	<input type="checkbox"/>
Heroin	<input type="checkbox"/>
Other opiates	<input type="checkbox"/>
Benzodiazepines	<input type="checkbox"/>

3. In the last 6 months, what were your three main reasons for using your MAIN TYPE of methamphetamine? Did you usually... (*read list and ask participant to choose only the 3 most significant responses, then ask them to choose which is the most important*)

	Yes	Most important
Use methamphetamines to party	<input type="checkbox"/>	<input type="checkbox"/>
Use because you craved it	<input type="checkbox"/>	<input type="checkbox"/>
Use to bond with your partner or friends	<input type="checkbox"/>	<input type="checkbox"/>
Use for sex	<input type="checkbox"/>	<input type="checkbox"/>
Use when you were unhappy	<input type="checkbox"/>	<input type="checkbox"/>
Use because the drug was there	<input type="checkbox"/>	<input type="checkbox"/>
Use because of peer pressure	<input type="checkbox"/>	<input type="checkbox"/>
Use on special occasions	<input type="checkbox"/>	<input type="checkbox"/>
Use because you could afford it	<input type="checkbox"/>	<input type="checkbox"/>
Use out of habit	<input type="checkbox"/>	<input type="checkbox"/>
Use to avoid withdrawal	<input type="checkbox"/>	<input type="checkbox"/>
Use when you've had a few drinks	<input type="checkbox"/>	<input type="checkbox"/>
Use because you like it	<input type="checkbox"/>	<input type="checkbox"/>
Use for pain relief	<input type="checkbox"/>	<input type="checkbox"/>
Use to stay awake for work	<input type="checkbox"/>	<input type="checkbox"/>
Use to stay awake for study	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

4. Where did you spend most of your time while last under the influence of methamphetamines? (one response only)

Own home ☐  
Friends' homes ☐  
Private parties ☐  
Pubs/bars ☐  
Nightclubs ☐  
Day clubs ☐  
Raves/dance parties ☐  
Music festivals ☐  
Outdoors (e.g. camping, beach) ☐  
Other (*specify*) \_\_\_\_\_ ☐

5. Who did you last use methamphetamines with?

No one (alone) ☐  
Regular sex partner ☐  
Friend(s) ☐  
Housemate(s) ☐  
Acquaintance(s) ☐  
Sibling(s) ☐  
Work colleague(s) ☐  
Other (*specify*) \_\_\_\_\_ ☐

6. How did you last use methamphetamines?

Injected ☐  
Smoked ☐  
Snorted/inhaled ☐  
Swallowed ☐  
Shelved/shafted ☐

7. During the past 6 months, did you get into any arguments or fights while using methamphetamines?

Yes ☐  
No ☐

- a. (If yes), How often did you attribute these arguments or fights to your use of methamphetamines?

8. During the past 6 months, have you injured yourself or anyone else while using methamphetamines?

Yes ☐  
No ☐

- a. (If yes), How often did you attribute these injuries to your use of methamphetamines?

9. How often during the past 6 months have you made decisions when using methamphetamines that you later regretted?

Never ☐  
Sometimes ☐  
About half the time ☐  
Most times ☐  
Always ☐

10. Has your methamphetamine use caused any relationship/social problems (such as arguments, mistrust, ending a relationship, violence, kicked out of home) during the past 6 months? (i.e. with a partner, friends, family)

Yes ☐  
No ☐

11. Has your methamphetamine use caused any work/study problems (e.g. trouble concentrating, reduced work performance,

unmotivated, sick leave/not attending, sacked/quit job) during the past 6 months?

Yes ☐  
No ☐

12. Has your methamphetamine use caused any financial problems (e.g. no money for recreation/luxuries, no money for food/rent, in debt/owing money) during the past 6 months?

Yes ☐  
No ☐

13. Has your methamphetamine use caused any legal/police problems (e.g. cautioned by police, arrested, convicted of crime, imprisoned) during the past 6 months?

Yes ☐  
No ☐

14. During the past 6 months has your methamphetamine use had any other negative impact on your health and wellbeing in the days following use?

Yes ☐  
No ☐

a. (If yes), please specify: (mark all that apply)

Reduced/lack of motivation ☐  
Felt depressed ☐  
Felt anxious ☐  
Experienced mood swings ☐  
Experienced memory impairment ☐  
Experienced sleeping problems ☐

Disrupted/alterd my eating patterns ☐  
Felt run down/reduced immunity ☐  
Other (*specify*) \_\_\_\_\_ ☐

15. For you, what is the worst thing about your methamphetamine use?

Comedown/hangover ☐  
Work problems ☐  
Study problems ☐  
Mental harms (*specify*) ☐  
Social harms (*specify*) ☐  
Financial harms (*specify*) ☐  
Physical harms (*specify*) ☐  
Legal/police consequences (*specify*) ☐  
Other (*specify*) \_\_\_\_\_ ☐

**Severity of Dependence Scale**

16. Please answer the following four questions about how often you have felt certain ways about your methamphetamine use during the past 12 months, using the following scale:

**Never/almost  
never**

☐

**Sometimes**

☐

**Often**

☐

**Always/nearly  
always**

☐

During the LAST 12 MONTHS ...

	<b>Never/almost never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always/nearly always</b>
a. Did you ever think your use of methamphetamine was out of control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Did the prospect of missing a hit/dose/fix make you anxious or worried?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Did you worry about your use of methamphetamine?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Did you wish you could stop using?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

e. How difficult would you find it to stop using or go without methamphetamine?

Not difficult ☐

Quite difficult ☐

Very difficult ☐

Impossible ☐

### Harmful Alcohol Use

The following 3 questions ask about your use of alcohol over the last 12 months (*skip if participant has not consumed alcohol in the last year*).

17. How often of you have a drink containing alcohol?

- Never ☐
- Monthly or less ☐
- 2 to 4 times per month ☐
- 2 to 3 times per week ☐
- 4 or more times per week ☐

18. How many drinks containing alcohol do you have on a typical day when you are drinking?

- 1 or 2 ☐
- 3 or 4 ☐
- 5 or 6 ☐
- 7 to 9 ☐
- 10 or more ☐

19. How often do you have six or more drinks on one occasion?

- Never ☐
- Less than monthly ☐
- Monthly ☐
- Weekly ☐
- Daily or almost daily ☐

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### Section C: Methamphetamine Market Characteristics

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1. The last time you purchased any methamphetamines, what type(s) did you

buy?

- Methamphetamine powder (speed) ☐
- Methamphetamine base ☐
- Crystal methamphetamine (ice) ☐

2. What quantity did you purchase and how much did it cost?

Quantity	Measure	Cost (\$)
<hr/>	Lines	<hr/>
<hr/>	Grams	<hr/>
<hr/>	Points	<hr/>
<hr/>	Caps	<hr/>
<hr/>	Ounces	<hr/>
<hr/>	Tabs/pills	<hr/>
<hr/>	Bags	<hr/>
<hr/>	Kilos	<hr/>
<hr/>	Dollars	<hr/>
<hr/>	Drops	<hr/>
<hr/>	Quarters	<hr/>
<hr/>	Rocks	<hr/>

3. What proportion (%) did you use yourself? \_\_\_\_\_ %

4. What proportion (%) did you share with others? \_\_\_\_\_ %

5. What proportion (%) did you sell? \_\_\_\_\_ %

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**Section D: Social Support**

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1. What is your current relationship status?

- Married/de facto ☐  
In a stable relationship but not living together ☐  
No current relationship/single ☐  
Widowed ☐  
Separated/divorced ☐  
Other (*specify*) \_\_\_\_\_ ☐

2. Do you have any children?

- Yes ☐  
No ☐

a. (If yes), How many? \_\_\_\_\_ children

b. Do you currently have access to your children?

- Yes ☐  
No ☐

3. How many close friends do you currently have contact with?

- None ☐  
1-5 ☐  
6-10 ☐  
More than 10 ☐

a. (If  $\geq 1$  friend) How many of these close friends use drugs?

- None ☐  
A few ☐  
Some ☐

- Most ☐  
All ☐

b. How many of these close friends inject drugs?

- None ☐  
A few ☐  
Some ☐  
Most ☐  
All ☐

4. Does your partner use drugs? (if applicable) \_\_\_\_\_

5. Does your partner inject drugs? (if applicable) \_\_\_\_\_

6. Overall, about how many people do you know who inject drugs?  
\_\_\_\_\_

7. About how many of these people would you say you know well?  
\_\_\_\_\_

8. About how many of these people would you regularly inject with?  
\_\_\_\_\_

## 9. Enriched Social Support Inventory

I would like to ask you some questions to understand how you are currently placed with loved ones and mates. These questions are about the support you get from people around you.

During the last month, how often...	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Is there someone available whom you can count on to listen to you when you need to talk?	1	2	3	4	5
Is there someone available to give you good advice about a problem?	1	2	3	4	5
Is there someone available to you who shows you love and affection?	1	2	3	4	5
Is there someone available to help you with daily chores?	1	2	3	4	5
Can you count on anyone to provide you with emotional support? (e.g. talking over problems or helping you make a difficult decision)	1	2	3	4	5
Do you have as much contact as you would like with someone that you feel close to, someone in whom you can trust and confide?	1	2	3	4	5



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## Section E: Mental Health

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### 1. Kessler Psychological Distress Scale (K10)

Please answer the following questions about how often you have felt certain ways in the PAST 4 WEEKS, using the following scale:

All of the time	Most of the time	Some of the time	A little of the time	None of the time
5	4	3	2	1

In the LAST 4 WEEKS, about how often did you feel...

	All	Most	Some	A little	None
Tired out for no good reason?	5	4	3	2	1
Nervous?	5	4	3	2	1
So nervous that nothing could calm you down?	5	4	3	2	1
Hopeless?	5	4	3	2	1
Restless or fidgety?	5	4	3	2	1
So restless that you could not sit still?	5	4	3	2	1
Depressed?	5	4	3	2	1
That everything was an effort?	5	4	3	2	1
So sad that nothing could cheer you up?	5	4	3	2	1
Worthless?	5	4	3	2	1

2. Have you attended a health professional for any mental health problem(s) in the last 6 months?

Yes ☐

No ☐

3. Are you currently taking any sort of prescribed medication(s) (e.g. BZDs, antidepressants, antipsychotics) for mental health issues?

Yes ☐

No ☐

a. (If yes), what medications are you currently taking for your mental health issues, and how often do you take them? If you know the dosage, what is it?

	Name	How often (per day)?	Dosage (mg)?
3.1.1	Medication 1		
3.1.2	Medication 2		
3.1.3	Medication 3		
3.1.4	Medication 4		
3.1.5	Medication 5		

4. Have you ever been prescribed any pharmaceutical stimulants (e.g. Ritalin, dexamphetamine, Duramine)?

	Name	How long prescribed?	How often took (number then measure)?	Reason prescribed?	Dosage (mg)?	Still prescribed?
3.1.6	Pharmaceutical stimulant #1					
3.1.7	Pharmaceutical stimulant #2					
3.1.8	Pharmaceutical stimulant #3					
3.1.9	Pharmaceutical stimulant #4					
3.1.10	Pharmaceutical stimulant #5					

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## Section F: General Health

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### 1. BBVI vaccination and testing

a. Have you ever been vaccinated against Hepatitis B?

- No ☐
- Yes, completed schedule ☐
- Yes, did not complete schedule ☐
- Don't know ☐

b. Have you ever been tested for Hepatitis C?

- Yes ☐
- No ☐
- Don't know ☐

i. (If yes), Approximately how long ago was your last test?

- In the last month ☐
- In the last 6 months ☐
- In the last 12 months ☐
- In the last 18 months ☐
- In the last 24 months (2 years) ☐
- In the last 36 months (3 years) ☐
- More than 3 years ago ☐
- Don't know ☐

ii. (If yes), What was the result of your most recent Hepatitis C test?

- Negative (don't have HCV) ☐
- Positive (have HCV) ☐
- Had virus but cleared it ☐
- Don't know ☐

c. Have you ever been tested for HIV?

- Yes ☐
- No ☐
- Don't know ☐

i. (If yes), Approximately how long ago was your most recent test?

- In the last month ☐
- In the last 6 months ☐
- In the last 12 months ☐
- In the last 18 months ☐
- In the last 24 months (2 years) ☐
- In the last 36 months (3 years) ☐
- More than 3 years ago ☐
- Don't know ☐

ii. (If yes), What was the result of your most recent HIV test?

- Negative (don't have HIV) ☐
- Positive (have HIV) ☐
- Don't know ☐

d. Have you ever been screened for sexually transmitted infections (STIs)? (e.g. swab, urine or other blood test)

- Yes ☐
- No ☐
- Don't know ☐

i. (If yes), Approximately how long ago was your most recent test?

- In the last month ☐
- In the last 6 months ☐
- In the last 12 months ☐
- In the last 18 months ☐
- In the last 24 months (2 years) ☐
- In the last 36 months (3 years) ☐

More than 3 years ago ☐  
 Don't know ☐

ii. (If yes), Were you diagnosed with any STIs? (e.g. Chlamydia, gonorrhoea)

Yes (*specify*) \_\_\_\_\_ ☐  
 No ☐

2. Have you ever experienced any of the following because of your methamphetamine use? If yes, have you experienced any of these in the last 6 months?

	Ever	6 mths
Euphoria or well-being	<input type="checkbox"/>	<input type="checkbox"/>
Overdose/dropped	<input type="checkbox"/>	<input type="checkbox"/>
Severe headaches	<input type="checkbox"/>	<input type="checkbox"/>
Abscesses/infections	<input type="checkbox"/>	<input type="checkbox"/>
Dirty hit	<input type="checkbox"/>	<input type="checkbox"/>
Bruising	<input type="checkbox"/>	<input type="checkbox"/>
Track marks/scarring	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed veins	<input type="checkbox"/>	<input type="checkbox"/>
Nausea	<input type="checkbox"/>	<input type="checkbox"/>
Nasal problems	<input type="checkbox"/>	<input type="checkbox"/>
Sleep deprivation	<input type="checkbox"/>	<input type="checkbox"/>
Paranoia	<input type="checkbox"/>	<input type="checkbox"/>
Violence	<input type="checkbox"/>	<input type="checkbox"/>
Diarrhoea	<input type="checkbox"/>	<input type="checkbox"/>
Constipation	<input type="checkbox"/>	<input type="checkbox"/>
Fluctuations in weight	<input type="checkbox"/>	<input type="checkbox"/>
Dental problems	<input type="checkbox"/>	<input type="checkbox"/>
Chest problems	<input type="checkbox"/>	<input type="checkbox"/>
Cracked lips	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

### Sexual risk behaviours

3. During the last 6 months, have you had penetrative sex with anyone?

Yes ☐  
 No ☐

a. (If yes), how many casual partners have you had penetrative sex with? ('Casual partner' refers to anyone you have had penetrative sex with who is not a regular partner)

One partner ☐  
 Two partners ☐  
 3-5 partners ☐  
 6-10 partners ☐  
 > 10 partners ☐

b. How often did you use condoms/gloves/other protection when you had sex with casual partners during the last 6 months?

Always ☐  
 Mostly ☐  
 Sometimes ☐  
 Rarely ☐  
 Never ☐

### Weight loss

1. Have you ever used methamphetamine to help lose or maintain weight?

Yes ☐  
 No ☐

a. (If yes), Have you used methamphetamine to help lose or maintain weight in the last 6 months?

Yes ☐  
 No ☐

2. Are you concerned about gaining weight if you stop using methamphetamine?

Yes ☐

No ☐

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**Section G: Reducing methamphetamine use/treatment utilisation/barriers to treatment**

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1. Have you ever done anything to reduce your methamphetamine use? (*If no skip to 14*)

Yes ☐

No ☐

2. Have you ever tried reducing your use without anyone else's help? (*If no, go to question 6*)

Yes ☐

No ☐

3. What have you done during the LAST 12 MONTHS to try reducing your use without anyone else's help?

Cutting down/cold turkey ☐

Self-medicating ☐

Geographical health trip ☐

Isolation ☐

Other (*specify*) \_\_\_\_\_ ☐

4. How many times have you tried the following to reduce your methamphetamine use during the LAST 6 MONTHS?

Cutting down/cold turkey ☐

Self-medicating ☐

Geographical health trip ☐

Isolation ☐

Other (*specify*) \_\_\_\_\_ ☐

5. What was the last method you tried to reduce your methamphetamine use?

Cutting down/cold turkey ☐

Self-medicating ☐

Geographical health trip ☐

Isolation ☐

Other (*specify*) \_\_\_\_\_ ☐

6. Why did you attempt to reduce your methamphetamine use without anyone else's help the most recent time? (Check all that apply)

Embarrassed to ask for help ☐

Thought I could reduce use on my own ☐

Couldn't be bothered asking for help ☐

Didn't have anyone to ask for help ☐

Didn't know of any relevant services to ask for help ☐

Relevant services weren't in my area ☐

Couldn't afford help from service ☐

Other (*specify*) ☐

7. What did you want to get out of reducing your use the last time you attempted to do so without anyone else's help? (tick all that apply)

A smaller habit ☐

A substitute drug (like methadone) ☐

Time out/a break from using ☐

Improved/change of lifestyle ☐

Control over drug use ☐

Parents/family off my back ☐

To get out of illicit drug scene ☐

Less hassle from the law ☐

Abstinence ☐

Stability ☐

Improved/better mental health ☐

Improved/better physical health ☐

Control over finances ☐

- Friends off my back ☐
- To reduce criminal activity ☐
- Find a job/increase chances of employment ☐
- Commence/continue education ☐
- Other (*specify*) \_\_\_\_\_ ☐

8. What drugs did you use to self-medicate the last time you did so when attempting to reduce your methamphetamine use? (Tick all that apply)

- Benzodiazepines (*specify*) \_\_\_\_\_ ☐
- Heroin ☐
- Pharmacotherapies (*specify*) \_\_\_\_\_ ☐
- Pharmaceutical opiates (e.g. morphine, oxycodone) (*specify*) \_\_\_\_\_ ☐
- Alcohol ☐
- Cannabis ☐
- Over-the-counter stimulant (e.g. Sudafed) ☐
- Prescription stimulant ☐
- Over-the-counter painkillers ☐
- Other (*specify*) \_\_\_\_\_ ☐

9. Where did you go the last time you went on a geographical/health trip to reduce your methamphetamine use?

- Elsewhere in suburb ☐
- Elsewhere in city ☐
- Country Victoria ☐
- Interstate ☐
- Overseas ☐
- Other (*specify*) \_\_\_\_\_ ☐

10. What drugs (if any) did you use to self-medicate the last time you isolated yourself when attempting to reduce your methamphetamine use? (Check all that apply)

None ☐

- Benzodiazepines (*specify*) \_\_\_\_\_ ☐
- Heroin ☐
- Pharmacotherapies (*specify*) \_\_\_\_\_ ☐
- Pharmaceutical opiates (e.g. morphine, oxycodone) (*specify*) \_\_\_\_\_ ☐
- Alcohol ☐
- Cannabis ☐
- Over-the-counter stimulant (e.g. Sudafed) ☐
- Prescription stimulant ☐
- Over-the-counter painkillers ☐
- Other (*specify*) \_\_\_\_\_ ☐

i. Where did you spend your time when you last isolated yourself to reduce your methamphetamine use? (Tick all that apply)

- Home ☐
- Parents' home ☐
- Friend's home ☐
- Hotel/motel ☐
- Other (*specify*) \_\_\_\_\_ ☐

11. Have you gone to one or more friends for help in reducing your methamphetamine use during the LAST 12 MONTHS?

Yes ☐  
No ☐

a. (If yes), How many times have you done this in the LAST 6 MONTHS? \_\_\_\_\_ times

b. Last time you did this, what sort of help were you seeking?

- Support ☐
- Advice ☐
- Money ☐
- Other (*specify*) \_\_\_\_\_ ☐

No ☐

12. Have you gone to one or more family members for help in reducing your methamphetamine use during the LAST 6 MONTHS?

Yes ☐

No ☐

a. (If yes), How many times have you done this in the LAST 6 MONTHS?

In the last month ☐

In the last 6 months ☐

In the last 12 months ☐

In the last 24 months (2 years) ☐

In the last 36 months (3 years) ☐

More than 3 years ago ☐

b. Last time you did this, what sort of help were you seeking?

Support ☐

Advice ☐

Money ☐

Other (*specify*) \_\_\_\_\_ ☐

c. Which family members have you gone to for help during the LAST 6 MONTHS?

Parent(s) ☐

Sibling(s) ☐

Grandparents(s) ☐

Other relative(s) ☐

13. Have you gone to a self-help group for help in reducing your methamphetamine use?

Yes ☐

a. How many times have you done this in the LAST 6 MONTHS?

\_\_\_\_\_ times

b. What self-help groups have you tried?

\_\_\_\_\_  
\_\_\_\_\_

14. Have you ever had any contact with/undertaken any of the following professional treatment(s) for methamphetamine use? Have you had contact with/undertaken any in the last 6 months? Are you currently involved in any of these treatment(s)? If you're not currently in any treatment, specify which type of treatment you were most recently involved in (if any).

	Ever	6 mths	Current
Individual drug counselling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Group counselling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psychiatrist/psychologist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Residential detox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient detox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community based treatment/home detox	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Residential rehab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacotherapy treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ambulance service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

a. (If haven't EVER contacted/accessed any of these services), Why not? (question asked for each type of treatment)



- Do not know of any relevant services to contact ☐
- Service(s) too expensive ☐
- Service(s) not in my area/too far away ☐
- Haven't had time, but would like to access in future ☐
- Couldn't be bothered ☐
- Service closed when I tried to access it (e.g. weekend) ☐
- It's difficult getting appointments at convenient times ☐
- Embarrassed/uncomfortable about accessing service(s) ☐
- I know/have heard that waiting lists are extensive ☐
- Other (*specify*) \_\_\_\_\_ ☐

b. (If have EVER contacted any of these services), Why did you contact/access those particular ones? (question asked for each type of treatment)

- Referred by friend ☐
- Referred by parent(s) ☐
- Referred by sibling(s) ☐
- Referred by other relative(s) ☐
- Referred by other user ☐
- Referred by partner ☐
- Referred by own worker (specify type of service) ☐
- Referred by service worker (specify service type) ☐
- Other (*specify*) \_\_\_\_\_ ☐

15. What is your current or most recent treatment?

- Individual drug counselling ☐
- Group counselling ☐
- GP ☐
- Psychiatrist/psychologist ☐
- Residential detox ☐
- Outpatient detox ☐
- Community based treatment/home detox ☐
- Residential rehab ☐

- Pharmacotherapy treatment ☐
- Ambulance service ☐
- Other (*specify*) \_\_\_\_\_ ☐

16. During your current or most recent treatment do/did you have support from any of the following?

- Partner ☐
- Parent ☐
- Other family members ☐
- Friends ☐
- Workmates ☐
- Boss ☐
- Counsellor ☐
- Doctor/nurse/health care worker ☐
- Drug user organisation ☐
- Current users ☐
- Telephone help lines ☐
- Internet help ☐
- Other (*specify*) \_\_\_\_\_ ☐

17. Including your current/most recent treatment, approximately how many times have you been in treatment for your methamphetamine use?

\_\_\_\_\_ times

18. Did you complete your last treatment? (i.e. excluding current treatment if applicable)

- Yes ☐
- No ☐

a. (If no), What was your major reason for leaving the program early?

\_\_\_\_\_

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19. Have you ever been banned from a treatment program?

Yes ☐

No ☐

a. (If yes), How many times have you been banned?  
\_\_\_\_\_ times

b. (If yes), Why were you banned from treatment last time?

For drug use ☐

Tobacco use ☐

Alcohol use ☐

Dirty urine test ☐

Verbal/physical abuse ☐

Violence ☐

Sex ☐

Stealing ☐

Gambling ☐

Other (*specify*) \_\_\_\_\_ ☐

c. Last time you were banned, what was the effect of being banned on your drug use?

Stopped using ☐

Decreased drug use ☐

Use remained the same ☐

Increased drug use ☐

Drug use became unmanageable ☐

Other (*specify*) \_\_\_\_\_ ☐

20. Have you ever accessed any of the following medical or other health services in relation to your use of drugs other than methamphetamine? If so, have you accessed them in the last 6 months?

	Ever	6 mths
Individual drug counselling	<input type="checkbox"/>	<input type="checkbox"/>
Group counselling	<input type="checkbox"/>	<input type="checkbox"/>
GP	<input type="checkbox"/>	<input type="checkbox"/>
Psychiatrist/psychologist	<input type="checkbox"/>	<input type="checkbox"/>
Residential detox	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient detox	<input type="checkbox"/>	<input type="checkbox"/>
Community based treatment/home detox	<input type="checkbox"/>	<input type="checkbox"/>
Residential rehab	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacotherapy treatment	<input type="checkbox"/>	<input type="checkbox"/>
Ambulance service	<input type="checkbox"/>	<input type="checkbox"/>
Hospital service	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

21. Have you ever tried to get treatment for your methamphetamine use and not been able to get it?

Yes ☐

No ☐

a. (If yes), On the last occasion that you were unable to get help, what sort of help were you trying to get?

Individual drug counselling	<input type="checkbox"/>
Group counselling	<input type="checkbox"/>
GP	<input type="checkbox"/>
Psychiatrist/psychologist	<input type="checkbox"/>
Self-help group	<input type="checkbox"/>
Residential detox	<input type="checkbox"/>
Outpatient detox	<input type="checkbox"/>
Community based treatment/home detox	<input type="checkbox"/>
Residential rehab	<input type="checkbox"/>
Pharmacotherapy treatment	<input type="checkbox"/>
Treatment for dual diagnosis	<input type="checkbox"/>
Ambulance service	<input type="checkbox"/>

- |                                |                          |
|--------------------------------|--------------------------|
| Hospital service               | <input type="checkbox"/> |
| Information                    | <input type="checkbox"/> |
| Natural therapies              | <input type="checkbox"/> |
| Other ( <i>specify</i> ) _____ | <input type="checkbox"/> |

b. On this occasion what stopped you from getting help? (multiple responses allowed)

- |   |                          |
|---|--------------------------|
| Cost of the program/cost of drugs   | <input type="checkbox"/> |
| Waiting list too long   | <input type="checkbox"/> |
| No places available   | <input type="checkbox"/> |
| Travel problems/no service in the area                                    | <input type="checkbox"/> |
| Unable to meet entry criteria   | <input type="checkbox"/> |
| You heard it was no good from other users                                 | <input type="checkbox"/> |
| Lack of support from health professionals/doctor                          | <input type="checkbox"/> |
| Lack of support from family/friends                                       | <input type="checkbox"/> |
| Treatment offered was not what you wanted                                 | <input type="checkbox"/> |
| Unable to spare the time  | <input type="checkbox"/> |
| Fear of job loss  | <input type="checkbox"/> |
| Fear of children being taken away   | <input type="checkbox"/> |
| Treatment unable to accommodate my children                               | <input type="checkbox"/> |
| Unable to accommodate my partner  | <input type="checkbox"/> |
| Fear of disclosing drug use to others                                     | <input type="checkbox"/> |
| Program did not suit my needs (e.g. daily dosing)                         | <input type="checkbox"/> |
| Banned from the program   | <input type="checkbox"/> |
| Fear of being stigmatised   | <input type="checkbox"/> |
| Unable to meet entry criteria   | <input type="checkbox"/> |
| You heard it was no good from other users                                 | <input type="checkbox"/> |
| Lack of support from health professionals/doctor                          | <input type="checkbox"/> |
| Lack of support from family/friends                                       | <input type="checkbox"/> |
| Treatment offered was not what you wanted                                 | <input type="checkbox"/> |
| Unable to spare the time  | <input type="checkbox"/> |
| Other, e.g. lack of services for methamphetamine users ( <i>specify</i> ) | <input type="checkbox"/> |

\_\_\_\_\_

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**Section H: Injecting risk behaviours**

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1. Has participant injected in last 4 weeks? *(If no, skip to next section)*

Yes ☐  
No ☐

2. How many times in the last month have you used a needle after someone else had already used it?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

a. (If one or more times), How many people have used a needle before you in the last month?

One person ☐  
Two people ☐  
3-5 people ☐  
6-10 people ☐  
More than 10 people ☐

3. How many times in the last month has someone else used a needle after you had already used it?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

4. How many times in the last month have you been injected by someone who had already injected or assisted in someone else's injections?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

5. How many times in the last month have you injected someone else after you had already injected?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

6. Have you used any of the following injecting equipment after someone else had already used it during the last month?

Spoons/mixing containers ☐  
Filters ☐  
Tourniquets ☐  
Water ☐

7. How many times have you reused your own needles in the last month?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

8. Last time you shared needles/syringes during the last 6 months, what was the main reason?

Haven't shared needles/syringes in the last 6 months ☐  
Outlet was too far away/unable to access due to distance ☐  
Outlet was closed (night/weekend) ☐  
Nearby outlet didn't have the equipment I needed ☐  
Couldn't be bothered going to get clean equipment ☐  
Embarrassed to access equipment at nearby outlet ☐  
Withdrawing so was rushed ☐  
Did not know where nearest outlet was ☐  
Other (*specify*) \_\_\_\_\_ ☐

Too many police around service ☐  
Other (*specify*) \_\_\_\_\_ ☐

9. In the last 12 months have you experienced any difficulties when trying to access clean needles?

Yes ☐  
No ☐

10. (If yes), What difficulties did you experience when trying to access clean needles during the last 12 months/Why did you find it hard to access clean needles?

Outlet was too far away/unable to access due to distance ☐  
Outlet was closed (night/weekend) ☐  
Nearby outlet didn't have the equipment I needed ☐  
Couldn't be bothered going to get clean equipment ☐  
Embarrassed to access equipment at nearby outlet ☐  
Withdrawing so was rushed ☐  
Did not know where nearest outlet was ☐  
Worried I would be seen by family/friends ☐  
Worried about being seen as an IDU ☐  
No transport available ☐  
Didn't like service staff ☐

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**Section I: Criminal behaviours/contact with CJS**

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1. Have you been arrested in the last 12 months?

Yes ☐  
No ☐

a. (If yes), How many times? \_\_\_\_\_ times

b. (If yes), What were you arrested for? (multiple responses allowed)

Use/possession ☐  
Dealing/trafficking ☐  
Property crime ☐  
Fraud ☐  
Violent crime ☐  
Driving offence ☐  
Alcohol and driving ☐  
Drugs and driving ☐  
Prostitution ☐  
Parole violation ☐  
Don't know/can't remember ☐  
Other \_\_\_\_\_ ☐

2. Have you been put on an Involuntary Treatment Order for mental health issues in the last 12 months?

Yes ☐  
No ☐

a. (If yes), How many times? \_\_\_\_\_ times

b. (If yes), Specify reason(s)

---

3. During the last month, have you committed a property crime (e.g. shoplifting, break and enter, stealing a car, receiving stolen goods)?

Yes ☐  
No ☐

a. (If yes), On average, how often?

Less than once a week ☐  
Once a week ☐  
More than once a week ☐  
Daily ☐

4. During the last month, have you sold drugs to someone?

Yes ☐  
No ☐

a. (If yes), On average, how often?

Less than once a week ☐  
Once a week ☐  
More than once a week ☐  
Daily ☐

b. (If yes), Was this mostly for cash profit?

Yes ☐  
No ☐

5. During the last month, have you committed fraud?

Yes ☐  
No ☐

a. (If yes), On average, how often?

- Less than once a week ☐
- Once a week ☐
- More than once a week ☐
- Daily ☐

6. During the last month, have you committed a violent crime?

- Yes ☐
- No ☐

a. (If yes), On average, how often?

- Less than once a week ☐
- Once a week ☐
- More than once a week ☐
- Daily ☐

7. Have you ever been in prison?

Yes ☐  
No ☐

a. (If yes), Can you tell me about the times you have been incarcerated in prison, on remand, or in a juvenile justice centre?

a. Where? [1] Prison [2] Remand [3] JJ Centre	b. Year you entered	c. Period of time incarcerated	d. Were you injecting drugs prior to being incarcerated?	e. Did you inject drugs while incarcerated?	f. Did you share injecting equipment while incarcerated?	g. What drugs did you inject while incarcerated?
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	<input type="checkbox"/> No	



**Methamphetamine use in Melbourne: 12-month follow-up survey (2011)**

Interview time/date:

Participant ID:

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**Section A: Demographics**

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21. Date of birth: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ (format: dd/mm/yyyy)

22. Where are you currently living?

- No fixed address/homeless ☐
- Public housing ☐
- Rented house or flat on your own ☐
- Rented house or flat shared with others ☐
- Caravan or serviced site ☐
- House or flat you own or were paying off ☐
- Parent's/family home ☐
- Partner's home ☐
- Boarding house/hostel/shelter or refuge ☐
- Staying with a friend or acquaintance ☐
- Drug treatment residence ☐
- Other (specify) \_\_\_\_\_ ☐

23. Postcode/suburb in which you currently live/reside:

\_\_\_\_\_

24. Who are you currently living with?

- Alone ☐
- Spouse/partner ☐
- Alone with children (how many? \_\_\_\_\_) ☐

- Spouse/partner with children (how many? \_\_\_\_\_) ☐
- Friend(s)/acquaintance(s) ☐
- Parent(s) ☐
- Sibling(s) ☐
- Other adult relative(s) ☐
- Flatmate(s) ☐
- Boarding/rooming house tenants ☐
- Other (specify) \_\_\_\_\_ ☐

25. Have you been homeless at any time during the last 12 months/since baseline?

a. If yes, how many times?

\_\_\_\_\_ times

b. How many different places have you lived in over the last 12 months/since baseline?

- 0 ☐
- 1-2 ☐
- 3-4 ☐
- 5+ ☐

26. Are you currently employed?

- No ☐
- Yes, full time ☐
- Yes, part time/casual ☐
- Yes, self employed ☐
- Yes, other (specify) \_\_\_\_\_ ☐

27. Have you completed any qualifications/courses in the last 12 months/since baseline?

- No ☐

Yes, trade/technical ☐  
 Yes, university/college ☐  
 Yes, other (*specify*) \_\_\_\_\_ ☐

Criminal activity ☐  
 Sex work ☐  
 Other, e.g. begging, busking (*specify*) \_\_\_\_\_ ☐

28. Are you currently studying?

No ☐  
 Yes, full time ☐  
 Yes, part time ☐

29. What were all your sources of income during the past month (tick all that apply):

Wage or salary ☐  
 Temporary benefit (*e.g. unemployment, sickness benefits*) ☐  
 Pension (*e.g. aged, disability*) ☐  
 Student allowances ☐  
 Dependent on others ☐  
 Child support ☐  
 Criminal activity ☐  
 Sex work ☐  
 Other, e.g. begging, busking (*specify*) \_\_\_\_\_ ☐  
 No income ☐

a. (If income reported) During the past month, what was your MAIN source of income? (mark only one response)

Full-time employment ☐  
 Part-time or casual employment ☐  
 Temporary benefit (*e.g. unemployment, sickness benefits*) ☐  
 Pension (*e.g. aged, disability*) ☐  
 Student allowances ☐  
 Dependent on others ☐  
 Child support ☐

30. Which of the following would represent your average weekly income (before tax) in the past 4 weeks from all sources?

≥ \$2,000 ☐  
 \$1,600 - \$1,999 ☐  
 \$1,300 - \$1,599 ☐  
 \$1,000 - \$1,299 ☐  
 \$800 - \$999 ☐  
 \$600 - \$799 ☐  
 \$400 - \$599 ☐  
 \$250 - \$399 ☐  
 \$150 - \$249 ☐  
 \$1 - \$149 ☐  
 Nil income ☐  
 Negative ☐  
 Other (*specify*) \_\_\_\_\_ ☐

31. Thinking about the last 4 weeks, on average how much would you have spent each week on? (range acceptable)

	\$/week
Accommodation and bills	_____
Food	_____
Child care/support	_____
Transport (including fuel costs)	_____
Paying off debts	_____
Alcohol	_____
Tobacco	_____
Other drugs	_____

Health care (excl. pharmacotherapy) \_\_\_\_\_  
 Education/training \_\_\_\_\_  
 Gambling \_\_\_\_\_  
 Licit pharmacotherapy treatment \_\_\_\_\_

No ☐

32. During the last 4 weeks how have you mostly got around? (mark only one response)

Your own vehicle ☐  
 Driving a vehicle borrowed from family/friends ☐  
 On foot ☐  
 Pushbike ☐  
 Public Transport ☐  
 Lift from family/friends ☐  
 Transport provided by community worker/organisation ☐  
 Other (*specify*) \_\_\_\_\_ ☐

33. Do you have private health cover?

Yes ☐  
 No ☐

a. (If yes), Who is this provided by?

Self ☐  
 Employer ☐  
 Partner ☐  
 Parents ☐  
 Other relative(s) (*specify*) \_\_\_\_\_ ☐  
 Other (*specify*) \_\_\_\_\_ ☐

34. Do you have a healthcare card?

Yes ☐

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**Section B: Drug use history and recent drug use**

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No

☐

12. What is your main drug of choice? (i.e. favourite or preferred drug, one response only)

- |  |                          |
|--|--------------------------|
| Ecstasy                                  | <input type="checkbox"/> |
| Methamphetamine powder (speed)           | <input type="checkbox"/> |
| Methamphetamine base                     | <input type="checkbox"/> |
| Crystal methamphetamine (ice)            | <input type="checkbox"/> |
| Cocaine                                  | <input type="checkbox"/> |
| LSD                                      | <input type="checkbox"/> |
| MDA                                      | <input type="checkbox"/> |
| Ketamine                                 | <input type="checkbox"/> |
| GHB/GBL/1,4B                             | <input type="checkbox"/> |
| Amyl nitrate                             | <input type="checkbox"/> |
| Nitrous oxide                            | <input type="checkbox"/> |
| Cannabis                                 | <input type="checkbox"/> |
| Alcohol                                  | <input type="checkbox"/> |
| Heroin                                   | <input type="checkbox"/> |
| Other opiates (e.g. morphine, oxycodone) | <input type="checkbox"/> |
| Benzodiazepines                          | <input type="checkbox"/> |
| Pharmaceutical stimulants                | <input type="checkbox"/> |
| Steroids                                 | <input type="checkbox"/> |
| Methadone                                | <input type="checkbox"/> |
| Buprenorphine                            | <input type="checkbox"/> |
| Suboxone                                 | <input type="checkbox"/> |
| Mushrooms                                | <input type="checkbox"/> |
| Tobacco                                  | <input type="checkbox"/> |
| Other ( <i>specify</i> ) _____           | <input type="checkbox"/> |

13. Have you injected any drug during the last 12 months/since baseline?

Yes

☐

14. The following questions are about your recent drug use:

Drug(s)	Ever used?	Used last 12 months?	Injected last 12 months?	Smoked last 12 months?	Snorted last 12 months?	Swallowed last 12 months?	Av. no. days per week used in last month? (incl. days injected)	Av. no. days per week injected in last month?
Speed powder								
Crystal meth/ice								
Methamphetamine base								
Amphetamine liquid								
Pharmaceutical stimulants								
Ecstasy								
Cocaine								
BZDs (e.g. Valium, Xanax, Serepax)								
Heroin								
Methadone								
Buprenorphine								
Suboxone								
Other opiates (e.g. morphine, oxycodone)								
Inhalants								
Hallucinogens (e.g. LSD, magic mushrooms)								
Alcohol								
Tobacco								
Cannabis								
GHB								
Mephedrone								
Illicit antipsychotics (e.g. Seroquel)								
Other illicit drug (specify _____)								

15. Average number of days used any methamphetamine (i.e. speed, ice, base, liquid) last month? \_\_\_\_\_ days per week

16. On a typical day of methamphetamine use, how much would you use? \_\_\_\_\_ points, grams, lines, etc. (ask for speed powder, crystal meth/ice and methamphetamine base)
17. On the last day you used any methamphetamine, how much did you use? \_\_\_\_\_ points, grams, lines, etc. (ask for speed powder, crystal meth/ice and methamphetamine base)

**18. Methamphetamine use**

19. What is the main type of methamphetamine you currently use? (i.e. form most used over last 4 weeks; if haven't used in the last 4 weeks, generalise for the last 12 months)

- Methamphetamine powder (speed) ☐  
Methamphetamine base ☐  
Crystal methamphetamine (ice) ☐  
Amphetamine liquid ☐

20. Why is this your main type of methamphetamine?

- Drug effects ☐  
Availability ☐  
Price ☐  
Purity ☐  
Other (*specify*) \_\_\_\_\_ ☐

21. How did you use your main type of methamphetamine the first time you used it?

- Injected ☐  
Swallowed ☐  
Snorted ☐  
Smoked ☐  
Shelved/shafted ☐

22. How have you mainly used your main type of methamphetamine over the last 12 months?

- Injected ☐  
Swallowed ☐  
Snorted ☐

- Smoked ☐  
Shelved/shafted ☐

23. During the last 12 months, have you usually used other drugs at the same time as methamphetamines? (i.e. while intoxicated, not while coming down)

- Yes ☐  
No ☐

a. (If yes), What other drugs did you usually use with methamphetamines?

- Ecstasy/MDMA (pill or powder form) ☐  
Mephedrone ☐  
Cocaine ☐  
LSD ☐  
MDA ☐  
Ketamine ☐  
GHB/GBL/1,4B ☐  
Amyl nitrate ☐  
Nitrous oxide ☐  
Cannabis ☐  
Alcohol ☐  
Heroin ☐  
Other opiates (e.g. morphine, oxycodone) ☐  
Benzodiazepines (e.g. Xanax, Valium) ☐  
Pharmaceutical stimulants ☐  
Steroids ☐  
Methadone ☐  
Buprenorphine ☐  
Suboxone ☐  
Mushrooms ☐  
Tobacco ☐

Other (*specify*) \_\_\_\_\_ ☐

24. During the last 12 months, have you usually used other drugs while coming down from methamphetamines?

Yes ☐

No ☐

a. (If yes), What other drugs did you usually use when coming down from methamphetamines?

Ecstasy ☐

Mephedrone ☐

Cocaine ☐

LSD ☐

MDA ☐

Ketamine ☐

GHB/GBL/1,4B ☐

Amyl nitrate ☐

Nitrous oxide ☐

Cannabis ☐

Alcohol ☐

Heroin ☐

Other opiates ☐

Benzodiazepines ☐

Pharmaceutical stimulants ☐

Steroids ☐

Methadone ☐

Buprenorphine ☐

Suboxone ☐

Mushrooms ☐

Tobacco ☐

Other (*specify*) \_\_\_\_\_ ☐



25. In the last 12 months, why did you use your MAIN TYPE of methamphetamine? Did you usually... *(read list and ask participant to choose only the 3 most significant responses, then ask them to choose which is the most important)*

	Yes	Most important
Use methamphetamines to party (incl. to stay awake to party)	<input type="checkbox"/>	<input type="checkbox"/>
Use to bond with your partner or friends (use to socialise)	<input type="checkbox"/>	<input type="checkbox"/>
Use for sex/as an aphrodisiac	<input type="checkbox"/>	<input type="checkbox"/>
Use when you were unhappy or depressed, to lift your mood	<input type="checkbox"/>	<input type="checkbox"/>
Use because the drug was there/avail. at the time	<input type="checkbox"/>	<input type="checkbox"/>
Use because of peer pressure	<input type="checkbox"/>	<input type="checkbox"/>
Use out of habit	<input type="checkbox"/>	<input type="checkbox"/>
Use because you like it/for fun	<input type="checkbox"/>	<input type="checkbox"/>
Use for pain relief	<input type="checkbox"/>	<input type="checkbox"/>
Use to stay awake for work	<input type="checkbox"/>	<input type="checkbox"/>
Use to stay awake for study	<input type="checkbox"/>	<input type="checkbox"/>
Use to stay awake generally	<input type="checkbox"/>	<input type="checkbox"/>
Use to be productive (e.g. to clean house)	<input type="checkbox"/>	<input type="checkbox"/>
Use for escapism	<input type="checkbox"/>	<input type="checkbox"/>
Use to maintain/lose weight	<input type="checkbox"/>	<input type="checkbox"/>
Use out of boredom	<input type="checkbox"/>	<input type="checkbox"/>
Use for motivation	<input type="checkbox"/>	<input type="checkbox"/>
Use to drink alcohol for a longer period of time	<input type="checkbox"/>	<input type="checkbox"/>
Use to minimise/reduce the effects of alcohol	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

26. Where did you spend most of your time while last under the influence of methamphetamines? (one response only)

Private house (own, friend's, etc.)	<input type="checkbox"/>
Pubs/bars	<input type="checkbox"/>
Nightclubs	<input type="checkbox"/>
Day clubs	<input type="checkbox"/>
Raves/dance parties	<input type="checkbox"/>
Music festivals	<input type="checkbox"/>
Outdoors (e.g. camping, beach)	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

27. Who did you last use methamphetamines with?

No one (alone)	<input type="checkbox"/>
Regular sex partner	<input type="checkbox"/>
Friend(s)	<input type="checkbox"/>
Housemate(s)	<input type="checkbox"/>
Acquaintance(s)	<input type="checkbox"/>
Sibling(s)	<input type="checkbox"/>
Work colleague(s)	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

28. How did you last use methamphetamines?

Injected	<input type="checkbox"/>
Smoked	<input type="checkbox"/>
Snorted/inhaled	<input type="checkbox"/>
Swallowed	<input type="checkbox"/>
Shelved/shafted	<input type="checkbox"/>

29. During the past 12 months, did you get into any arguments or fights while using methamphetamines?

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>

a. (If yes), How often did you attribute these arguments or fights to your use of methamphetamines?

30. During the past 12 months, have you injured yourself or anyone else while using methamphetamines?

- Yes, myself ☐  
Yes, someone else ☐  
Yes, both ☐  
No ☐

a. (If yes), How often did you attribute these injuries directly to your use of methamphetamines?

31. How often during the past 12 months have you made decisions when using methamphetamines that you later regretted?

- Never ☐  
Sometimes ☐  
About half the time ☐  
Most times ☐  
Always ☐

a. (If yes), what types of decisions did you make while using methamphetamine that you later regretted?

- Spending too much money ☐  
Staying out too late ☐  
Engaging in sexual activities with people I normally wouldn't ☐  
Saying things I wouldn't otherwise say ☐  
Driving while intoxicated ☐  
Engaging in unprotected sex ☐  
Consuming too many/much drugs ☐

- Consuming too much alcohol ☐  
Engaging in verbal disagreements/arguments ☐  
Engaging in physical fights/becoming too violent or aggressive ☐  
Other (*specify*) \_\_\_\_\_ ☐

32. Has your methamphetamine use caused any relationship/social problems during the past 12 months? (i.e. with a partner, friends, family)

- Yes ☐  
No ☐

a. (If yes), What types of relationship/social problems have resulted from your methamphetamine use?

- Engaging in verbal arguments/disagreements ☐  
Mistrust ☐  
Ending a relationship ☐  
Violence ☐  
Kicked out of home ☐  
Other (*specify*) \_\_\_\_\_ ☐

b. (If yes), With whom did you usually experience these relationship/social problems?

- Partner ☐  
Parent(s) ☐  
Sibling(s) ☐  
Friend(s) ☐  
Colleague(s) ☐  
Other (*specify*) \_\_\_\_\_ ☐

33. Has your methamphetamine use caused any work/study

problems during the past 12 months?

Yes ☐  
No ☐

a. (If yes), What types of work/study problems have resulted from your methamphetamine use during the past 12 months?

Trouble concentrating ☐  
Reduced work performance ☐  
Lack of motivation at work/study ☐  
Lack of motivation to seek employment/education ☐  
Non attendance/sick leave ☐  
Sacked/quit job ☐  
Deferred/withdrew from education ☐  
Conflict with colleagues ☐  
Other (*specify*) \_\_\_\_\_ ☐

34. Has your methamphetamine use caused any financial problems during the past 12 months?

Yes ☐  
No ☐

a. (If yes), What types of financial problems have resulted from your methamphetamine use?

No money for recreation/luxuries ☐  
No money for essentials (e.g. food, rent) ☐  
Accrued debt/owe money ☐  
Other (*specify*) \_\_\_\_\_ ☐

35. Has your methamphetamine use caused any legal/police

problems during the past 12 months?

Yes ☐  
No ☐

a. (If yes), What types of legal/police problems have resulted from your methamphetamine use?

Cautioned by police ☐  
Arrested ☐  
Convicted of crime(s) ☐  
Imprisoned ☐  
Other (*specify*) \_\_\_\_\_ ☐

36. During the past 12 months has your methamphetamine use had any other negative impact on your health and wellbeing in the days following use?

Yes ☐  
No ☐

a. (If yes), please specify: (mark all that apply)

Reduced/lack of motivation ☐  
Felt depressed ☐  
Felt anxious ☐  
Paranoia ☐  
Hallucinations ☐  
Tired/exhausted ☐  
Experienced mood swings ☐  
Experienced sleeping problems ☐  
Disrupted/altered my eating patterns ☐  
Fluctuating weight ☐

Felt run down/reduced immunity ☐

Other (*specify*) \_\_\_\_\_ ☐

37. For you, what is the worst thing about your methamphetamine use?

Comedown/hangover ☐

(If yes), specify comedown symptoms \_\_\_\_\_

Work problems ☐

Study problems ☐

Mental harms (*specify*) \_\_\_\_\_ ☐

Social harms (*specify*) \_\_\_\_\_ ☐

Financial harms (*specify*) \_\_\_\_\_ ☐

Physical harms (*specify*) \_\_\_\_\_ ☐

Legal/police consequences (*specify*) \_\_\_\_\_ ☐

Other (*specify*) \_\_\_\_\_ ☐

### Severity of Dependence Scale

38. Please answer the following four questions about how often you have felt certain ways about your methamphetamine use during the past 12 months, using the following scale:

**Never/almost  
never**

☐

**Sometimes**

☐

**Often**

☐

**Always/nearly  
always**

☐

During the LAST 12 MONTHS ...

	Never/almost never	Sometimes	Often	Always/nearly always
f. Did you ever think your use of methamphetamine was out of control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Did the prospect of missing a hit/dose/fix make you anxious or worried?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Did you worry about your use of methamphetamine?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Did you wish you could stop using?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

j. How difficult would you find it to stop using or go without methamphetamine?

Not difficult ☐

Quite difficult ☐

Very difficult ☐

Impossible ☐

### Harmful Alcohol Use

The following 3 questions ask about your use of alcohol over the last 12 months (*skip if participant has not consumed alcohol in the last year*).

39. How often of you have a drink containing alcohol?

- Never ☐
- Monthly or less ☐
- 2 to 4 times per month ☐
- 2 to 3 times per week ☐
- 4 or more times per week ☐

40. How many drinks containing alcohol do you have on a typical day when you are drinking?

- 1 or 2 ☐
- 3 or 4 ☐
- 5 or 6 ☐
- 7 to 9 ☐
- 10 or more ☐

41. How often do you have six or more drinks on one occasion?

- Never ☐
- Less than monthly ☐
- Monthly ☐
- Weekly ☐
- Daily or almost daily ☐

42. How often do you have a drink containing alcohol while also using methamphetamine?

- Never ☐
- Monthly or less ☐

- 2 to 4 times per month ☐
- 2 to 3 times per week ☐
- 4 or more times per week ☐

a. (If more than never), How many drinks containing alcohol do you have on a typical day when you are drinking and using methamphetamine at the same time?

- 1 or 2 ☐
- 3 or 4 ☐
- 5 or 6 ☐
- 7 to 9 ☐
- 10 or more ☐

b. How often do you have 6 or more drinks on one occasion while also using methamphetamine?

- Never ☐
- Less than monthly ☐
- Monthly ☐
- Weekly ☐
- Daily or almost daily ☐

c. Do you usually drink more, less or about the same amount of alcohol when consuming it with methamphetamine (in comparison to when drinking without methamphetamine)?

- Consume more alcohol ☐
- Consume about the same amount ☐
- Consume less alcohol ☐

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**Section C: Methamphetamine Market Characteristics**

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6. The last time you purchased any methamphetamines, what type(s) did you buy?

Methamphetamine powder (speed) ☐

Methamphetamine base ☐

Crystal methamphetamine (ice) ☐

7. What quantity did you purchase and how much did it cost?

Quantity	Measure	Cost (\$)
_____	Lines	_____
_____	Grams	_____
_____	Points	_____
_____	Caps	_____
_____	Ounces	_____
_____	Tabs/pills	_____
_____	Bags	_____
_____	Bumps	_____
_____	Kilos	_____
_____	Dollars	_____
_____	Drops	_____
_____	Quarters	_____
_____	Rocks	_____

8. What proportion (%) did you use yourself? \_\_\_\_\_ %

9. What proportion (%) did you share with others? \_\_\_\_\_ %

10. What proportion (%) did you sell? \_\_\_\_\_ %

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**Section D: Social Support**

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10. What is your current relationship status?

- Married/de facto ☐  
In a stable relationship but not living together ☐  
No current relationship/single ☐  
Widowed ☐  
Separated/divorced ☐  
Other (*specify*) \_\_\_\_\_ ☐

11. Do you have any children?

- Yes ☐  
No ☐

a. (If yes), How many? \_\_\_\_\_ children

b. Do you currently have access to your children?

- Yes ☐  
No ☐  
Some but not others ☐

12. How many close friends do you currently have contact with?

- None ☐  
1-5 ☐  
6-10 ☐  
More than 10 ☐

a. (If  $\geq 1$  friend) How many of these close friends use drugs?

- None ☐  
A few ☐  
Some ☐  
Most ☐  
All ☐

b. (If  $\geq 1$  friend) How many of these close friends use methamphetamine?

- None ☐  
A few ☐  
Some ☐  
Most ☐  
All ☐

c. How many of these close friends inject drugs?

- None ☐  
A few ☐  
Some ☐  
Most ☐  
All ☐

13. Does your partner use drugs? (if applicable)

- Yes ☐  
No ☐

a. Does your partner use methamphetamine?

- Yes ☐  
No ☐

b. Does your partner inject drugs?



Yes ☐  
No ☐

14. Overall, about how many people do you know who inject drugs?

\_\_\_\_\_

15. About how many of these people would you say you know well?  
(number not proportion)

\_\_\_\_\_

16. About how many of these people would you regularly inject with?  
(number not proportion)

\_\_\_\_\_

## 17. Enriched Social Support Inventory

I would like to ask you some questions to understand how you are currently placed with loved ones and mates. These questions are about the support you get from people around you.

During the last month, how often...	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Is there someone available whom you can count on to listen to you when you need to talk?	1	2	3	4	5
Is there someone available to give you good advice about a problem?	1	2	3	4	5
Is there someone available to you who shows you love and affection?	1	2	3	4	5
Is there someone available to help you with daily chores?	1	2	3	4	5
Can you count on anyone to provide you with emotional support? (e.g. talking over problems or helping you make a difficult decision)	1	2	3	4	5
Do you have as much contact as you would like with someone that you feel close to, someone in whom you can trust and confide?	1	2	3	4	5

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**Section E: Mental Health**

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**5. Kessler Psychological Distress Scale (K10)**

Please answer the following questions about how often you have felt certain ways in the PAST 4 WEEKS, using the following scale:

<b>All of the time</b>	<b>Most of the time</b>	<b>Some of the time</b>	<b>A little of the time</b>	<b>None of the time</b>
5	4	3	2	1

In the LAST 4 WEEKS, about how often did you feel...

	<b>None</b>	<b>A little</b>	<b>Some</b>	<b>Most</b>	<b>All</b>
Tired out for no good reason?	1	2	3	4	5
Nervous?	1	2	3	4	5
So nervous that nothing could calm you down?	1	2	3	4	5
Hopeless?	1	2	3	4	5
Restless or fidgety?	1	2	3	4	5
So restless that you could not sit still?	1	2	3	4	5
Depressed?	1	2	3	4	5
That everything was an effort?	1	2	3	4	5
So sad that nothing could cheer you up?	1	2	3	4	5
Worthless?	1	2	3	4	5

6. Have you attended a health professional for any mental health problem(s) in the last 12 months?

Yes ☐

No ☐

a. (If yes), Are you currently attending a health professional for mental health problems? (i.e. appointments on a regular basis, not just attending a GP for mental health medication prescriptions)

Yes ☐

No ☐

b. (If yes), Have you been diagnosed with any mental illnesses in the last 12 months/since baseline? (mark all that apply)

Depression ☐

Anxiety ☐

Schizophrenia ☐

Bipolar disorder ☐

Borderline personality disorder ☐

Personality disorder ☐

Post-traumatic stress disorder ☐

Schizophrenia ☐

Psychosis ☐

Drug-induced psychosis ☐

Other (*specify*) \_\_\_\_\_ ☐

7. Are you currently taking any sort of prescribed medication (e.g. benzodiazepines, antidepressants, antipsychotics) for mental health issues?

Yes ☐

No ☐

a. (If yes), what medications are you currently taking for your mental health issues, and how often do you take them? If you know the dosage, what is it?

	<b>Name</b>	<b>How often (number)?</b>	<b>How often (measure, e.g. day, week, etc.)?</b>	<b>Dosage (mg)?</b>
3.1.11	Medication 1			
3.1.12	Medication 2			
3.1.13	Medication 3			
3.1.14	Medication 4			
3.1.15	Medication 5			

8. Have you been prescribed any pharmaceutical stimulants (e.g. Ritalin, dexamphetamine, Duramine) in the past 12 months/since baseline?

	<b>Name</b>	<b>How long prescribed?</b>	<b>How often took (number then measure)?</b>	<b>Reason prescribed?</b>	<b>Dosage (mg)?</b>	<b>Still prescribed? (Y/N)</b>
3.1.16	Pharmaceutical stimulant #1					
3.1.17	Pharmaceutical stimulant #2					
3.1.18	Pharmaceutical stimulant #3					
3.1.19	Pharmaceutical stimulant #4					
3.1.20	Pharmaceutical stimulant #5					

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## Section F: General Health

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### 4. BBVI vaccination and testing

- e. Have you been vaccinated against Hepatitis B in the last 12 months/since baseline?

No ☐  
 Yes, completed schedule ☐  
 Yes, did not complete schedule ☐  
 Don't know ☐

- f. Have you been tested for Hepatitis C in the last 12 months/since baseline?

Yes ☐  
     - Last month  
     - Last 6 months  
     - Last 12 months  
 No ☐  
 Don't know ☐

- i. (If yes), What was the result of your most recent Hepatitis C test?

Negative (don't have HCV) ☐  
 Positive (have HCV) ☐  
 Had virus but cleared it ☐  
 Don't know ☐

- g. Have you been tested for HIV in the last 12 months/since baseline?

Yes ☐  
     - Last month  
     - Last 6 months

- Last 12 months

No ☐  
 Don't know ☐

- i. (If yes), What was the result of your most recent HIV test?

Negative (don't have HIV) ☐  
 Positive (have HIV) ☐  
 Don't know ☐

- h. Have you been screened for sexually transmitted infections (STIs) in the last 12 months/since baseline? (e.g. swab, urine or other blood test)

Yes ☐  
     - Last month  
     - Last 6 months  
     - Last 12 months  
 No ☐  
 Don't know ☐

- i. (If yes), Were you diagnosed with any STIs? (e.g. Chlamydia, gonorrhoea)

Yes (*specify*) \_\_\_\_\_ ☐  
 No ☐  
 Don't know ☐

5. Have you experienced any of the following because of your methamphetamine (MA) use in the last 12 months/since baseline? If yes, how often did you experience them during the last year?

Positive effects	Yes	How often?
Euphoria or well-being		Potential responses (if yes): <ul style="list-style-type: none"> <li>- Every time used MA;</li> <li>- Most times used MA;</li> <li>- Some/about half the time used MA;</li> <li>- A little of the time used MA.</li> </ul>
Increased confidence/self-esteem		
Increased libido		
Increased concentration/focus		
Increased motivation		
Increased sociability		
<b>General health/physical problems</b>		
Overdose/dropped		How often last year? (number)
Severe headaches		Potential responses (if yes): <ul style="list-style-type: none"> <li>- Every time used MA (ongoing);</li> <li>- Most times used MA;</li> <li>- Some/about half the time used MA;</li> <li>- A little of the time used MA.</li> </ul>
Diarrhoea		
Constipation		
Fluctuations in weight		
Dental problems (If yes, specify problem types)		
Chest problems (If yes, specify problem types)		
Cracked/chapped lips		
Mouth ulcers		
Nausea		



Nasal problems <i>(If yes, specify type of problems)</i>		
Sleep deprivation		
Violence/aggression		
<b>IV-related harms</b>		
Track marks/scarring		N/A
Collapsed veins		
Abscesses/infections		Potential responses (if yes): <ul style="list-style-type: none"> <li>- Every time used MA;</li> <li>- Most times used MA;</li> <li>- Some/about half the time used MA;</li> <li>- A little of the time used MA.</li> </ul>
Bruising		
Dirty hit		
<b>Mental health problems</b>		
Paranoia		Potential responses (if yes): <ul style="list-style-type: none"> <li>- Every time used MA;</li> <li>- Most times used MA;</li> <li>- Some/about half the time used MA;</li> <li>- A little of the time used MA.</li> </ul>
Hallucinations		
Depression		
Anxiety		
Other ( <i>specify</i> ) _____		

### Sexual risk behaviours

6. What best describes your sexual orientation?

- Heterosexual ☐  
Homosexual ☐  
Bisexual ☐  
Other (*specify*) \_\_\_\_\_ ☐

7. During the last 12 months, have you had penetrative sex with anyone?

- Yes ☐  
No ☐

a. (If yes), how many casual partners have you had penetrative sex with? ('Casual partner' refers to anyone you have had penetrative sex with who is not a regular partner)

- One partner ☐  
Two partners ☐  
3-5 partners ☐  
6-10 partners ☐  
More than 10 partners ☐

b. How often did you use condoms/gloves/other protection when you had sex with casual partners during the last 12 months?

- Always ☐  
Mostly ☐  
Sometimes ☐  
Rarely ☐  
Never ☐

### Weight loss

8. Have you used methamphetamine to help lose or maintain weight in

the last 12 months?

- Yes ☐  
No ☐

9. Are you concerned about gaining weight if you stop using methamphetamine?

- Yes ☐  
No ☐

10. Are you concerned that you have lost an excessive amount of weight because of your methamphetamine use?

- Yes ☐  
No ☐

a. (If yes), Would weight gain be a desirable outcome should you cease or stop your methamphetamine use?

- Yes ☐  
No ☐

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**Section G: Reducing methamphetamine use/treatment utilisation/barriers to treatment**

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1. Have you tried any of the following methods of reducing/stopping methamphetamine use WITHOUT ANYONE ELSE'S HELP (incl. professional services, friends, family, etc.) during the last 12 months? (If none, go to question ?). How many times did you try each method?

	No. times
Cutting down/cold turkey	<input type="checkbox"/>
Self-medication/substitution	<input type="checkbox"/>
Geographical/health trip	<input type="checkbox"/>
Isolation	<input type="checkbox"/>
Moving	<input type="checkbox"/>
Cutting off friends/reducing contact with specific friends/acquaintances	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>
None	<input type="checkbox"/>

- a. (If other than none), What was the last method you tried to reduce your methamphetamine use WITHOUT ANYONE ELSE'S HELP?

Cutting down/cold turkey	<input type="checkbox"/>
Self-medicating/substitution	<input type="checkbox"/>
Geographical health trip	<input type="checkbox"/>
Isolation	<input type="checkbox"/>
Moving	<input type="checkbox"/>
Cutting off friends/reducing contact with specific friends/acquaintances	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

- b. Why did you attempt to reduce your methamphetamine use without anyone else's help during the last 12 months? (Check all that apply)

Embarrassed to ask for help	<input type="checkbox"/>
Thought I could reduce use on my own	<input type="checkbox"/>
Couldn't be bothered asking for help	<input type="checkbox"/>
Didn't have anyone to ask for help	<input type="checkbox"/>
Didn't know of any relevant services to ask for help	<input type="checkbox"/>
Relevant services weren't in my area	<input type="checkbox"/>
Couldn't afford help from service	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>

- c. What did you want to get out of reducing your use when you attempted to do so without anyone else's help? (tick all that apply)

A smaller habit/reduced use	<input type="checkbox"/>
A substitute drug (like methadone)	<input type="checkbox"/>
Time out/a break from using	<input type="checkbox"/>
Improved/change of lifestyle	<input type="checkbox"/>
Control over drug use	<input type="checkbox"/>
Parents/family off my back	<input type="checkbox"/>
To get out of illicit drug scene	<input type="checkbox"/>
Less hassle from the law	<input type="checkbox"/>
Abstinence	<input type="checkbox"/>
Stability	<input type="checkbox"/>
Improved/better mental health	<input type="checkbox"/>
Improved/better physical health	<input type="checkbox"/>
Control over finances	<input type="checkbox"/>
Friends off my back	<input type="checkbox"/>
To reduce criminal activity	<input type="checkbox"/>
Find a job/increase chances of employment	<input type="checkbox"/>
Commence/continue education	<input type="checkbox"/>

Other (*specify*) \_\_\_\_\_ ☐

- d. What drugs did you use to self-medicate/substitute the last time you did so when attempting to reduce your methamphetamine use? (Tick all that apply)

Benzodiazepines (*specify*) \_\_\_\_\_ ☐

Heroin \_\_\_\_\_ ☐

Pharmacotherapies (*specify*) \_\_\_\_\_ ☐

Pharmaceutical opiates (e.g. morphine, oxycodone) (*specify*) \_\_\_\_\_ ☐

Alcohol \_\_\_\_\_ ☐

Cannabis \_\_\_\_\_ ☐

Over-the-counter stimulant (e.g. Sudafed) \_\_\_\_\_ ☐

Prescription stimulant \_\_\_\_\_ ☐

Over-the-counter painkillers \_\_\_\_\_ ☐

Other (*specify*) \_\_\_\_\_ ☐

- e. Where did you go the last time you went on a geographical/health trip to reduce your methamphetamine use?

Elsewhere in suburb \_\_\_\_\_ ☐

Elsewhere in city \_\_\_\_\_ ☐

Country Victoria \_\_\_\_\_ ☐

Interstate \_\_\_\_\_ ☐

Overseas \_\_\_\_\_ ☐

Other (*specify*) \_\_\_\_\_ ☐

- f. What drugs (if any) did you use to self-medicate the last time you went on a geographical/health trip when attempting to reduce your methamphetamine use? (Mark all that apply)

None \_\_\_\_\_ ☐

Benzodiazepines (*specify*) \_\_\_\_\_ ☐

Heroin \_\_\_\_\_ ☐

Pharmacotherapies (*specify*) \_\_\_\_\_ ☐

Pharmaceutical opiates (e.g. morphine, oxycodone) (*specify*) \_\_\_\_\_ ☐

Alcohol \_\_\_\_\_ ☐

Cannabis \_\_\_\_\_ ☐

Over-the-counter stimulant (e.g. Sudafed) \_\_\_\_\_ ☐

Prescription stimulant \_\_\_\_\_ ☐

Over-the-counter painkillers \_\_\_\_\_ ☐

Other (*specify*) \_\_\_\_\_ ☐

- g. What drugs (if any) did you use to self-medicate the last time you isolated yourself when attempting to reduce your methamphetamine use? (Check all that apply)

None \_\_\_\_\_ ☐

Benzodiazepines (*specify*) \_\_\_\_\_ ☐

Heroin \_\_\_\_\_ ☐

Pharmacotherapies (*specify*) \_\_\_\_\_ ☐

Pharmaceutical opiates (e.g. morphine, oxycodone) (*specify*) \_\_\_\_\_ ☐

Alcohol \_\_\_\_\_ ☐

Cannabis \_\_\_\_\_ ☐

Over-the-counter stimulant (e.g. Sudafed) \_\_\_\_\_ ☐

Prescription stimulant \_\_\_\_\_ ☐

Over-the-counter painkillers \_\_\_\_\_ ☐

Other (*specify*) \_\_\_\_\_ ☐

- h. Where did you spend your time when you last isolated yourself to reduce your methamphetamine use? (Tick all that apply)

Home \_\_\_\_\_ ☐

Parents' home \_\_\_\_\_ ☐

Friend's home \_\_\_\_\_ ☐

Hotel/motel ☐  
 Other (*specify*) \_\_\_\_\_ ☐

2. Have you gone to one or more friends for help in reducing your methamphetamine use during the LAST 12 MONTHS? (If no, skip to question 10)

Yes ☐  
 No ☐

- a. (If yes), How many times have you done this in the LAST 12 MONTHS? \_\_\_\_\_

- b. When you did this, what sort of help were you seeking?

Support ☐  
 Advice ☐  
 Money ☐  
 Other (*specify*) \_\_\_\_\_ ☐

- c. Have you gone to one or more friends for help with the following methods to reduce your methamphetamine use during the LAST 12 MONTHS?

	How often?
Cutting down/cold turkey	<input type="checkbox"/>
Self-medicating/substitution	<input type="checkbox"/>
Geographical health trip	<input type="checkbox"/>
Isolation	<input type="checkbox"/>
Moving	<input type="checkbox"/>
Cutting off friends/reducing contact with specific friends/acquaintances	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>
None	<input type="checkbox"/>

3. Have you gone to one or more family members for help in reducing your methamphetamine use during the LAST 12 MONTHS? (If no skip to question 11)

Yes ☐  
 No ☐

- a. (If yes), How many times have you done this in the LAST 12 MONTHS? \_\_\_\_\_

- b. When you did this, what sort of help were you seeking?

Support ☐  
 Advice ☐  
 Money ☐  
 Other (*specify*) \_\_\_\_\_ ☐

- c. Have you gone to one or more family members for help with the following methods to reduce your methamphetamine use during the LAST 12 MONTHS?

	How often?
Cutting down/cold turkey	<input type="checkbox"/>
Self-medicating/substitution	<input type="checkbox"/>
Geographical health trip	<input type="checkbox"/>
Isolation	<input type="checkbox"/>
Moving	<input type="checkbox"/>
Cutting off friends/reducing contact with specific friends/acquaintances	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>
None	<input type="checkbox"/>

- d. Which family members have you gone to for help during the LAST 12 MONTHS?

- Parent(s) ☐  
 Sibling(s) ☐  
 Grandparents(s) ☐  
 Other relative(s) ☐

4. Have you had any contact with/undertaken any of the following professional treatment(s) for methamphetamine use in the last 12 months? Are you currently involved in any of these treatment(s)? If you're not currently in any treatment, specify which type of treatment you were most recently involved in (if any).

**\*For each service/treatment type, record (with use of hardcopy calendar) approximately when participants first accessed the service and how long they were engaged (not applicable for one-off contacts, they had to have some sort of regular engagement). With QDS will need to be able to include multiple time periods for each treatment type, e.g., in case participants accessed one-on-one counselling multiple times since baseline.**

	12 mths	Currently
Individual drug counselling	<input type="checkbox"/>	<input type="checkbox"/>
Group counselling	<input type="checkbox"/>	<input type="checkbox"/>
GP	<input type="checkbox"/>	<input type="checkbox"/>
Psychiatrist/psychologist	<input type="checkbox"/>	<input type="checkbox"/>
Residential detox	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient detox	<input type="checkbox"/>	<input type="checkbox"/>
Community based treatment/home detox	<input type="checkbox"/>	<input type="checkbox"/>
Residential rehab	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacotherapy treatment	<input type="checkbox"/>	<input type="checkbox"/>
Ambulance service	<input type="checkbox"/>	<input type="checkbox"/>
Hospital	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

a. (If haven't contacted/accessed any of these services in the last 12 months), Why not? (question asked for each treatment type)

- Do not know of any relevant services to contact ☐  
 Service(s) too expensive ☐  
 Service(s) not in my area/too far away ☐  
 Haven't had time, but would like to access in future ☐  
 Couldn't be bothered ☐  
 Service closed when I tried to access it (e.g. night/weekend) ☐  
 It's difficult getting appointments at times convenient to me ☐  
 Embarrassed or uncomfortable about accessing service(s) ☐  
 I know or have heard that waiting lists are extensive ☐  
 My use hasn't been problematic enough to warrant accessing a professional service ☐  
 (If yes), What types of problems or drug use patterns and related outcomes would prompt you to seek treatment?  
 Enjoy using MA and don't want to stop just now ☐  
 My use of other drugs (e.g. heroin) is more problematic – I need to address these problems first ☐  
 I'm in denial about the true extent or problematic nature of my use ☐  
 Other (*specify*) \_\_\_\_\_ ☐

b. (If have contacted any of these services during the last 12 months), Why did you contact/access those particular ones? (question asked for each type of treatment)

- Referred by friend ☐  
 Referred by parent(s) ☐  
 Referred by sibling(s) ☐  
 Referred by other relative(s) ☐  
 Referred by other user ☐  
 Referred by partner ☐  
 Referred by own worker (*specify type of service*) ☐

- Referred by service worker (*specify type of service*) ☐
- Referred self ☐
- Other (*specify*) \_\_\_\_\_ ☐

c. (After participant has specified who referred them into each treatment type), What prompted you to seek out this type of treatment?

- Mental health problems/related harms (*specify*) ☐
- Physical health problems/related harms (*specify*) ☐
- Court referred/legally required (e.g. parole conditions) ☐
- Job loss ☐
- Relationship breakdown ☐
- Increased use ☐
- Hospitalisation ☐
- Ambulance attendance ☐
- Arrested/detained ☐
- Violent episode ☐
- Other (*specify*) \_\_\_\_\_ ☐

d. (After reported accessing each treatment type), The last time you accessed this type of treatment (e.g. one-on-one counselling), what attracted you to this specific service?

- Free ☐
- No waiting list ☐
- Close to my accommodation ☐
- Recommended (e.g. by friends, family, other users) ☐
- Positive experience(s) with this service in the past ☐
- It's the only service of this type that I'm aware of ☐
- Other (*specify*) \_\_\_\_\_ ☐

5. What is your current or most recent treatment? (If none, skip to question 13)

- Individual drug counselling ☐
- Group counselling ☐
- GP ☐
- Psychiatrist/psychologist ☐
- Residential detox ☐
- Outpatient detox ☐
- Community based treatment/home detox ☐
- Residential rehab ☐
- Pharmacotherapy treatment ☐
- Ambulance service ☐
- Hospital ☐
- None ☐
- Other (*specify*) \_\_\_\_\_ ☐

a. (If other than none), During your current or most recent treatment do/did you have support from any of the following?

- Partner ☐
- Parent ☐
- Other family members ☐
- Friends ☐
- Workmates ☐
- Boss ☐
- Counsellor ☐
- Doctor/nurse/health care worker ☐
- Drug user organisation ☐
- Current users ☐
- Telephone help lines ☐
- Internet help ☐
- Other (*specify*) \_\_\_\_\_ ☐

b. Including your current/most recent treatment, approximately how

many times have you been in treatment for your methamphetamine use during the last 12 months?

\_\_\_\_\_ times

c. Did you complete your last treatment?

Yes ☐

No ☐

N/A Still completing last treatment ☐

d. (If no) What was your major reason for leaving the program early?

\_\_\_\_\_

\_\_\_\_\_

e. Have you been banned from a treatment program in the last 12 months?

Yes ☐

No ☐

f. (If yes), How many times have you been banned?

\_\_\_\_\_ times

g. (If yes), What drugs were you in treatment for at the time?

Ecstasy ☐

Methamphetamine powder (speed) ☐

Methamphetamine base ☐

Crystal methamphetamine (ice) ☐

Cocaine ☐

LSD ☐

MDA ☐

Ketamine ☐

GHB/GBL/1,4B ☐

Amyl nitrate ☐

Nitrous oxide ☐

Cannabis ☐

Alcohol ☐

Heroin ☐

Other opiates (e.g. morphine, oxycodone) ☐

Benzodiazepines ☐

Pharmaceutical stimulants ☐

Steroids ☐

Methadone ☐

Buprenorphine ☐

Suboxone ☐

Mushrooms ☐

Tobacco ☐

Other (*specify*) \_\_\_\_\_ ☐

h. (If yes), Why were you banned from treatment in the last 12 months?

For drug use ☐

Tobacco use ☐

Alcohol use ☐

Dirty urine test ☐

Verbal/physical abuse ☐

Violence ☐

Sex ☐

Stealing ☐

Gambling ☐

Other (*specify*) \_\_\_\_\_ ☐

i. Last time you were banned, what was the effect of being banned



on your drug use?

- Stopped using ☐  
 Decreased drug use ☐  
 Use remained the same ☐  
 Increased drug use ☐  
 Drug use became unmanageable ☐  
 Other (*specify*) \_\_\_\_\_ ☐

6. Have you accessed any of the following medical or other health services in relation to your use of drugs other than methamphetamine in the last 12 months? If so, which of the following services are you currently involved with? For which drug types did you access each treatment type?

	12 mths	Currently
Individual drug counselling	<input type="checkbox"/>	<input type="checkbox"/>
Group counselling	<input type="checkbox"/>	<input type="checkbox"/>
GP	<input type="checkbox"/>	<input type="checkbox"/>
Psychiatrist/psychologist	<input type="checkbox"/>	<input type="checkbox"/>
Residential detox	<input type="checkbox"/>	<input type="checkbox"/>
Outpatient detox	<input type="checkbox"/>	<input type="checkbox"/>
Community based treatment/home detox	<input type="checkbox"/>	<input type="checkbox"/>
Residential rehab	<input type="checkbox"/>	<input type="checkbox"/>
Pharmacotherapy treatment	<input type="checkbox"/>	<input type="checkbox"/>
Ambulance service	<input type="checkbox"/>	<input type="checkbox"/>
Hospital service	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>specify</i> ) _____	<input type="checkbox"/>	<input type="checkbox"/>

7. Have you tried to get treatment for your methamphetamine use and not been able to get it in the last 12 months?

Yes ☐  
 No ☐

- a. (If yes), On the last occasion that you were unable to get help, what sort of help were you trying to get?

- Individual drug counselling ☐  
 Group counselling ☐  
 GP ☐  
 Psychiatrist/psychologist ☐  
 Self-help group ☐  
 Residential detox ☐  
 Outpatient detox ☐  
 Community based treatment/home detox ☐  
 Residential rehab ☐  
 Pharmacotherapy treatment ☐  
 Treatment for dual diagnosis ☐  
 Ambulance service ☐  
 Hospital service ☐  
 Information ☐  
 Natural therapies ☐  
 Other (*specify*) \_\_\_\_\_ ☐

- b. On this occasion, what stopped you from getting help? (multiple responses allowed)

- Cost of the program/cost of drugs ☐  
 Waiting list too long ☐  
 No places available ☐  
 Travel problems/no service in the area ☐  
 Unable to meet entry criteria ☐

- You heard it was no good from other users ☐
- Lack of support from health professionals/doctor ☐
- Lack of support from family/friends ☐
- Treatment offered was not what you wanted ☐
- Unable to spare the time ☐
- Fear of job loss ☐
- Fear of children being taken away ☐
- Treatment unable to accommodate my children ☐
- Unable to accommodate my partner ☐
- Fear of disclosing drug use to others ☐
- Program did not suit my needs (e.g. daily dosing) ☐
- Banned from the program ☐
- Fear of being stigmatised ☐
- Other, e.g. lack of services for methamphetamine users (*specify*) \_\_\_\_\_ ☐

8. Have you ever wanted to get treatment or help for your methamphetamine use, or thought you should seek treatment or professional help, but not sought it out?

- Yes ☐
- No ☐

a. (If yes), why did you not seek any help/treatment? What stopped you?

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### Section I: Injecting risk behaviours

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11. Has participant injected in last month? *(If no and participant reported injecting in last 12 months, skip to question 9)*

Yes ☐  
No ☐

12. How many times in the last month have you used a needle after someone else had already used it?

No times ☐  
One time ☐  
☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

a. (If one or more times) How many people have used a needle before you in the last month?

One person ☐  
Two people ☐  
3-5 people ☐  
6-10 people ☐  
More than 10 people ☐

13. How many times in the last month has someone else used a needle after you had already used it?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐

6-10 times ☐  
More than 10 times ☐

14. How many times in the last month have you been injected by someone who had already injected or assisted in someone else's injections?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

15. How many times in the last month have you injected someone else after you had already injected?

No times ☐  
One time ☐  
Two times ☐  
3-5 times ☐  
6-10 times ☐  
More than 10 times ☐

16. Have you used any of the following injecting equipment after someone else had already used it during the last month?

Spoons/mixing containers ☐  
Filters ☐  
Tourniquets ☐  
Water ☐

17. How many times have you reused your own needles in the last month?

No times ☐

- One time ☐
- Two times ☐
- 3-5 times ☐
- 6-10 times ☐
- More than 10 times ☐

18. Last time you shared needles/syringes during the last month, what was the main reason?

- Outlet was too far away/unable to access due to distance ☐
- Outlet was closed (night/weekend) ☐
- Nearby outlet didn't have the equipment I needed ☐
- Couldn't be bothered going to get clean equipment ☐
- Embarrassed to access equipment at nearby outlet ☐
- Withdrawing so was rushed ☐
- Did not know where nearest outlet was ☐
- Other (*specify*) \_\_\_\_\_ ☐

19. In the last 12 months, have you experienced any difficulties when trying to access clean needles?

- Yes ☐
- No ☐

a. (If yes), What difficulties have you experienced when trying to access clean needles during the last 12 months/why did you find it hard to access clean needles?

- Outlet was too far away/unable to access due to distance ☐
- Outlet was closed (night/weekend) ☐
- Nearby outlet didn't have the equipment I needed ☐
- Couldn't be bothered going to get clean equipment ☐
- Embarrassed to access equipment at nearby outlet ☐
- Withdrawing so was rushed ☐

- Did not know where nearest outlet was ☐
- Worried I would be seen by family/friends ☐
- Worried about being seen as an IDU ☐
- No transport available ☐
- Didn't like service staff ☐
- Too many police around service ☐
- Other (*specify*) \_\_\_\_\_ ☐

20. From where did you usually source your clean needles/syringes during the last 12 months? (mark only one response)

- Fixed NSP ☐
- Chemist ☐
- Foot patrol ☐
- Friend, family member ☐
- Acquaintance ☐
- Other user ☐
- Dealer ☐
- Other (*specify*) \_\_\_\_\_ ☐

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**Section J: Criminal behaviours/contact with CJS**

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8. Have you been arrested in the last 12 months?

Yes ☐  
No ☐

a. (If yes), How many times? \_\_\_\_\_ times

b. (If yes), What were you arrested for? (multiple responses allowed)

Use/possession ☐  
Dealing/trafficking ☐  
Property crime ☐  
Fraud ☐  
Violent crime ☐  
Driving offence ☐  
Alcohol and driving ☐  
Drugs and driving ☐  
Prostitution ☐  
Parole violation ☐  
Don't know/can't remember ☐  
Other (*specify*) \_\_\_\_\_ ☐

9. Have you been put on an Involuntary Treatment Order for mental health issues in the last 12 months?

Yes ☐  
No ☐

a. (If yes), How many times?

\_\_\_\_\_ times

b. (If yes), Specify reason(s)

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10. During the last 12 months/since baseline, have you committed a property crime (e.g. shoplifting, break and enter, stealing a car, receiving stolen goods)?

Yes ☐  
No ☐

a. (If yes), On average, how often?

Less than once a week ☐  
Once a week ☐  
More than once a week ☐  
Daily ☐

11. During the last 12 months/since baseline, have you sold drugs to someone?

Yes ☐  
No ☐

a. (If yes), On average, how often?

Less than once a week ☐  
Once a week ☐  
More than once a week ☐  
Daily ☐

b. (If yes), Was this mostly for cash profit?

Yes ☐

No ☐

12. During the last 12 months/since baseline, have you committed fraud?

Yes ☐

No ☐

a. (If yes), On average, how often?

Less than once a week ☐

Once a week ☐

More than once a week ☐

Daily ☐

13. During the last 12 months/since baseline, have you committed a violent crime?

Yes ☐

No ☐

a. (If yes), On average, how often?

Less than once a week ☐

Once a week ☐

More than once a week ☐

Daily ☐

14. Have you been in prison during the last 12 months/since baseline?

Yes ☐  
No ☐

a. (If yes), Can you tell me about the times you have been incarcerated in prison, on remand, or in a juvenile justice centre?

a. Where? [1] Prison [2] Remand	b. Year you entered	c. Period of time incarcerated	d. Did you inject drugs while incarcerated?	e. Did you share injecting equipment while incarcerated?	f. What drugs did you inject while incarcerated?
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		<b>Weeks</b> <input type="checkbox"/> <b>Months</b> <input type="checkbox"/> <b>Years</b> <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		<b>Weeks</b> <input type="checkbox"/> <b>Months</b> <input type="checkbox"/> <b>Years</b> <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		<b>Weeks</b> <input type="checkbox"/> <b>Months</b> <input type="checkbox"/> <b>Years</b> <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	
		<b>Weeks</b> <input type="checkbox"/> <b>Months</b> <input type="checkbox"/> <b>Years</b> <input type="checkbox"/>	<input type="checkbox"/> No	<input type="checkbox"/> No	