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TITLE: *A prospective cohort of people who use methamphetamine in Melbourne and non-metropolitan Victoria, Australia: Baseline characteristics and correlates of methamphetamine dependence*

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ABSTRACT

Introduction and Aims: Limited research has investigated methamphetamine use and related harms in rural and regional Australia. We investigated whether people who used methamphetamine in non-metropolitan Victoria differed in their sociodemographics and were more likely to be methamphetamine-dependent than those recruited in Melbourne.

Design and Methods: We used baseline data from an ongoing prospective cohort study, 'VMAX'. Participants were recruited from Melbourne and three non-metropolitan Victorian regions. Sequential multivariable logistic regression of nested models assessed unadjusted and adjusted associations between residential locations and methamphetamine dependence.

Results: The sample mostly (77%) comprised people who used methamphetamine via non-injecting means (N=744). Thirty-nine percent were female. Melbourne-based participants were less likely than non-metropolitan participants to identify as Aboriginal and Torres Strait Islander, be heterosexual, have children, and be unemployed. More frequent methamphetamine use (aOR=1.22, 95%CI: 1.12-1.34) and using crystal methamphetamine vs. 'speed' powder (aOR=2.38, 95%CI: 1.26-3.64) were independently ($p<0.05$) associated with being classified as methamphetamine-dependent. A significantly higher percentage of participants in every non-metropolitan region were classified as methamphetamine-dependent vs. those in Melbourne, but this relationship was attenuated when adjusting for methamphetamine use frequency and primary form used. Despite 65% of participants being classified as methamphetamine-dependent, less than half had recently (past year) accessed any professional support for methamphetamine, with minimal variation by recruitment location.

Discussions and Conclusions: VMAX participants in non-metropolitan Victoria were more likely to be methamphetamine-dependent than those living in Melbourne. Unmet need for professional support appears to exist among people using methamphetamine across the state, regardless of geographical location.

Key words: *substance use disorder, methamphetamine smoking, rural-urban, prospective cohort study*

INTRODUCTION

Household survey estimates suggest the prevalence of past-year amphetamine or methamphetamine (hereafter: 'methamphetamine') use in Australia has remained stable at around two percent of the population from the late 1990s through to 2016 [1]. These estimates are among the highest in the world [2]. Despite the apparent stability of methamphetamine use prevalence, the incidence of methamphetamine-related harms (e.g., mortality rates, criminal activity) has increased in recent years [3-6], a change likely resulting from factors including greater drug purity [7] and more frequent consumption [1]. The ongoing occurrence of such harms has generated considerable media interest and influenced perceptions of methamphetamine use and associated outcomes in Australia's wider community [8].

Recent increases in high purity crystalline methamphetamine consumption in Australia have disproportionately affected rural areas of the country, where use has increased among particular sub-groups such as young men and employed people [9]. This has created a need to tailor interventions to address methamphetamine use in non-metropolitan contexts; however, most data used to guide service implementation (e.g., self-reported patterns of use, service utilisation trends, barriers professional support) come from urban areas of Australia [e.g., 10, 11-14], with scarce data outside of this context [15, 16]. Despite smoking being the most common route of methamphetamine administration in Australia [1], such research has typically over-sampled people who inject drugs, meaning our understanding of methamphetamine use in Australia is largely driven by study findings predominantly involving those who inject the drug versus those consuming it via other means. Moreover, most research pre-dates fundamental market changes witnessed from 2009, in which the purity-adjusted price of methamphetamine fell dramatically and the primary form used shifted from methamphetamine powder to crystal methamphetamine, which is typically of greater purity [7]. Its use is associated with an increased likelihood of experiencing methamphetamine - related harms [17]. From prevention, education and harm reduction perspectives, it is crucial to know and understand the characteristics, common methamphetamine use patterns (e.g., frequency of use and primary form/s used), service utilisation trends, and barriers and enablers to professional support of Australians outside of major cities who use methamphetamine. This gap is evident despite frequent reports of regional crises in use [8, 18, 19], and the aforementioned changes to the methamphetamine market and incidence of related harms.

One exception is the work of Roche and McEntee [20], which compared rates of lifetime and past-year methamphetamine use among metropolitan vs. regional and rural Australians via secondary analyses of National Drug Strategy Household Survey and drug treatment data during 2006/07-2012/13. Findings indicated that levels of both lifetime and past-year methamphetamine use were significantly higher among Australians in rural areas compared to those residing in regional and metropolitan locations. Rates of methamphetamine-related treatment utilisation increased significantly across rural, regional and metropolitan areas during this period. Although such work affords valuable indications of overall methamphetamine use trends throughout Australia, secondary data analyses of household survey findings offer little beyond rudimentary statistics (e.g., basic characteristics of people who use methamphetamine, main form/s used, broad frequency of past-year use). This makes it difficult to examine differences in the characteristics of people who

use methamphetamine in major cities compared to those in regional and rural locations, and factors associated with more harmful use patterns among non-metropolitan methamphetamine consumers.

'VMAX' is an ongoing prospective cohort study involving over 700 people who use methamphetamine – mostly via non-injecting means – in metropolitan, regional, and rural areas of Victoria that addresses some of these gaps. In this paper we outline the overall methodology of VMAX and examine differences in the sociodemographic and drug use characteristics of the sample at baseline between participants from Melbourne compared to those recruited in non-metropolitan locations. We specifically investigated whether there were significant differences in the percentages of participants classified as methamphetamine-dependent in non-metropolitan areas compared to those from Melbourne, and whether sociodemographic and methamphetamine use patterns were related to these differences. Given widespread media reporting and anecdotal information in Victoria over time [8, 18, 19], we hypothesised that a greater percentage of participants in rural and regional areas would be methamphetamine-dependent.

METHODS

Design

Face-to-face interviews are conducted at ascertainment. Face-to-face or telephone interviews are subsequently conducted at six-month intervals. Recruitment of the baseline sample commenced in June 2016 and ended in June 2018. Rolling recruitment is occurring to account for sample attrition during follow-up.

Sample

Participants were recruited from Melbourne and three non-metropolitan Victorian locations. The non-metropolitan areas were selected as recruitment sites due to high rates of methamphetamine-related harms (specifically: methamphetamine-related ambulance attendances). Participants were recruited via multiple methods, namely convenience and targeted approaches (e.g., advertising online), in addition to respondent-driven sampling (RDS; i.e., reimbursement of participants for successful recruitment of other members of methamphetamine-using networks); see Box 1 for a breakdown of percentage of participants recruited by each source. The eligibility criteria comprised: 1) Being aged ≥18 years; 2) At least monthly use of methamphetamine (any form) in the previous six months; 3) Residing in one of the four recruitment locations; and, 4) Primarily using methamphetamine via non-injecting routes of administration (e.g., smoking, snorting). Following a period of slow recruitment, the latter criterion was relaxed in an attempt to reach our target sample size.

Participants were reimbursed AUD40 for their time and out-of-pocket expenses in accordance with accepted practice [13, 14]. Those who referred peers into the study via respondent-driven means were reimbursed a further AUD20 for each recruited peer.

[Box 1 about here]

Questionnaire design & administration

Baseline interviews were conducted at mutually-convenient times and locations. The structured questionnaire comprised tailored questions and validated measures and was designed to elicit information across multiple domains: participant sociodemographics, drug use history and patterns of use, methamphetamine market characteristics, mental and general health, utilisation of health and support services for methamphetamine and other drug use, involvement in criminal behaviours, and contact with the criminal justice system. Interviews were recorded using Android tablet devices programmed with REDCap [21]. Informed consent was obtained from every participant prior to data collection.

Measures

Modified Monash Model (MMM) geographical classifications: Participants' residential locations (postcodes) were categorised according to MMM classifications of metropolitan, regional, rural and remote areas in Australia with regard to both geographical remoteness and town size [22]. Briefly, the MMM uses the Australian Statistical Geography Standard–Remoteness Areas (ASGS-RA; the Australian Bureau of Statistics' classification system comprising five remoteness categories) [23] as a base, and further differentiates areas in Inner and Outer Regional Australia based on local town size. It includes seven categories (MMM 1–MMM 7); following recruitment, it was observed that VMAX participants resided in five (MMM 1–MMM 5). The classifications of residential location, and the terms we have applied to describe them, are:

- MMM 1: '*Metropolitan areas*' or '*major cities*' accounting for 70% of Australia's population (in this sample it comprises metropolitan Melbourne and greater suburbs).
- MMM 2: '*Regional centres*'; i.e., Inner and Outer Regional areas in, or within 20 kilometres (km) road distance of, a town with a population of >50,000 residents.
- MMM 3: '*Large rural towns*'; i.e., Inner and Outer Regional areas in, or within 15km road distance of, a town with population between 15,000–50,000 residents.
- MMM 4: '*Medium rural towns*'; i.e., Inner and Outer Regional areas in, or within 10km road distance, of a town with population between 5,000–15,000 residents.
- MMM 5: '*Small rural towns*'; i.e., All remaining Inner and Outer Regional areas.

Methamphetamine dependence: The Severity of Dependence Scale (SDS) was used to classify dependence on methamphetamine. Participants who recorded a SDS score of $\geq$4 were classified as methamphetamine-dependent [24].

Methamphetamine use frequency: Participants were asked to report the average number of days per week they used methamphetamine (any type) in the month preceding interview; possible responses ranged from 0-7 days. If participants used methamphetamine less frequently than once/week during the last month, responses ranged from 0-0.75 days/week; e.g., if methamphetamine had only been used one day in the past month, this equated to an average of 0.25 days/week during that time. For two days in the past month: 0.5 days/week; for three days: 0.75 days/week.

Utilisation of *professional support* was defined as accessing any of the following services in relation to methamphetamine use: individual/one-on-one or group counselling, residential or outpatient detoxification/withdrawal, residential rehabilitation, general practitioner, psychiatrist or psychologists, and pharmacotherapy. To focus on more chronic or long-term methamphetamine use and related concerns (as opposed to acute associated harms; e.g., injuries incurred while intoxicated), we excluded utilisation of ambulance and hospital services for methamphetamine use from 'professional support'.

Participants who were not currently working at baseline were classified as *unemployed*. *Recent criminal behaviours* comprised self-reported involvement in dealing, violence, property crime and/or fraud in the past month.

Design & statistical analysis

To investigate differences between participants according to residential location, descriptive statistics were produced to describe the VMAX sample as a whole, and according to MMM geographical categories. Participants residing in locations classified as small or medium rural towns were consolidated into one group ('small and medium towns') due to low numbers in each of those categories (n=35 in each). Statistical inference for estimates of difference across residential locations at the bivariate level were provided by Pearson's Chi-square test for categorical variables, and the Kruskal-Wallis test for investigating associations between continuous/non-parametric variables and independent variables with more than two categories.

To test our hypothesis that participants from non-metropolitan areas would be more likely to be methamphetamine-dependent than those based in Melbourne, the second stage of the analysis involved sequential multivariable logistic regression of nested models, where the association between methamphetamine dependence and residential location was estimated, adjusting for sociodemographic and substance use factors. Specifically, the Models estimated: A) unadjusted associations between residential location and methamphetamine dependence; B) associations between residential location and methamphetamine dependence, adjusted for sociodemographic factors; and, C) associations between residential location and methamphetamine dependence adjusted for sociodemographic and methamphetamine use factors (in consideration of pertinent literature and theoretical interest). Post-estimation Wald tests were used to provide joint inference and inference across categories for polytomous factors. A complete case approach was used in multivariable logistic regression analyses with respect to observations with missing data on methamphetamine dependence and/or exposures.

Quantitative analyses were conducted using Stata Version 15.0 (Statacorp LP, TX, USA), with a significance level of $p<0.05$.

The study protocol was approved by the Alfred Hospital Ethics Committee (project number: 171/16) and Monash University Ethics Committee in 2016 (project number: 2938).

RESULTS

Sample characteristics

The sociodemographic characteristics of the VMAX sample at baseline (n=744), stratified by residential location classification, are shown in Table 1. Overall, 39% of participants identified as female, 13% as Aboriginal and Torres Strait Islander Peoples, and 14% as non-heterosexual. Most (78%) were unemployed at baseline. Eleven percent reported that they were currently studying. Around five percent of participants reported currently being employed and currently studying at baseline.

While there was no evidence of differences across recruitment locations regarding participant gender, those residing in Melbourne were less likely than their non-metropolitan counterparts to identify as Aboriginal and Torres Strait Islander, be heterosexual, and have children. Non-metropolitan VMAX participants were also more likely to be unemployed and to report having ever been incarcerated as an adult. Despite the latter, there were no significant differences across locations regarding self-reported involvement in criminal behaviours in the past month.

[Table 1 about here]

Methamphetamine use characteristics

Table 2 lists the patterns of methamphetamine use among the cohort at baseline, stratified by residential location. The vast majority of the sample (96%) reported consuming methamphetamine in crystal form at least once in the last year; less than half (41%) reported using methamphetamine powder ('speed') during that time. Accordingly, 92% of the sample reported that crystal methamphetamine was the main form of the drug they currently used. Although only seven per cent of participants were mainly using speed powder at baseline, a higher percentage of those residing in Melbourne reported primarily using this methamphetamine form (15%) compared to participants residing in each of the non-metropolitan areas of Victoria (1-3%).

Aligning with the study's original eligibility criteria, smoking was the main route of methamphetamine administration for 77% of participants. There were differences in primary route of methamphetamine administration among participants across recruitment locations: a higher percentage of those residing in Melbourne (15%) reported typically snorting or swallowing the drug (which accords with a higher percentage of people using speed powder in metropolitan areas), whereas, more participants in non-metropolitan locations reported mainly injecting methamphetamine at baseline (11-19%, across residential locations, vs. 5% of Melbourne-based participants).

Close to two-thirds (65%) of the sample were classified as methamphetamine-dependent according to the SDS. The amount of methamphetamine-dependent participants differed significantly across residential locations, with the lowest percentage (59%) of dependent participants residing in Melbourne locations, and the highest (77%) residing in regional centres.

In general, participants (84%) spent the majority of their time at a private residence during their last period of methamphetamine use; 56% spent most of this time in their own home, whereas 28%

reported spending most of this period at a friend's residence. Other locations included outdoors (e.g., beach, park; 5%) and at pub, bar or nightclub (4%).

[Table 2 about here]

Multivariable analyses: Independent predictors of methamphetamine dependence

Data from eight percent (n=60) of the sample were excluded from analyses due to missing data across various exposures. Table 3 lists the unadjusted and adjusted associations between select exposures and methamphetamine dependence across Models A, B and C. More specifically, the independent effects were such that a higher frequency of methamphetamine use [adjusted odds ratio (aOR)=1.22, 95% Confidence Interval (CI)=1.12, 1.34] and using crystal methamphetamine vs. speed powder (aOR=2.38, 95% CI=1.26, 3.64) were significantly associated with being classified as methamphetamine-dependent when controlling for other socio-demographic and methamphetamine use factors. Older age (aOR=0.95, 95% CI=0.93, 0.97) and current enrolment in some form of education (aOR=0.48, 95% CI=0.26, 0.85) were protective of methamphetamine dependence.

There was an association between methamphetamine dependence and residential location among the cohort after controlling for sociodemographic and methamphetamine use factors [Model C, Wald $\chi^2(3)=15.34$, $p=0.002$]. Contrary to our hypothesis, however, and despite the bivariate association between residing in regional centres and methamphetamine dependence, residing in non-metropolitan recruitment locations was not independently associated with methamphetamine dependence compared to living in Melbourne (Table 3). Regardless, post-estimation Wald tests showed those residing in regional centre locations were at significantly higher odds of methamphetamine dependence compared to those in large rural towns [Wald $\chi^2(1)=13.32$, $p<0.001$], but not significantly different compared to those in small-medium rural towns [Wald $\chi^2(1)=0.21$, $p=0.645$]. Additionally, participants residing in large rural towns exhibited significantly lower odds of methamphetamine dependence compared to those in small-medium rural towns [Wald $\chi^2(1)=5.36$, $p<0.05$].

Smoking methamphetamine exhibited odds of methamphetamine dependence that were not significantly different versus injecting the drug [Wald $\chi^2(1)=1.32$, $p=0.250$].

[Table 3 about here]

DISCUSSION

VMAX is the only active prospective cohort study of people who regularly use methamphetamine in Australia, and the first involving people who use methamphetamine to use the MMM classification system. The study is also unique in enabling comparisons between participants based in Melbourne and those in non-metropolitan areas of Victoria, thereby enabling us to address

research gaps on methamphetamine use outside of major Australian cities. Here we sought to describe the sociodemographic and drug use characteristics of the cohort at baseline according to participants' residential locations, as categorised by the MMM, and to examine whether those residing in non-metropolitan areas of the state were more likely to be classified as methamphetamine-dependent, compared to participants recruited in Melbourne.

Our findings indicate clear differences in the characteristics of participants by geographical area. For example, Melbourne-based participants were more likely to be employed, educated, and/or self-identify as non-heterosexual compared to the regional samples. Use of methamphetamine powder was significantly less common among non-metropolitan participants, and fewer people were present when these participants last used methamphetamine. Consistent with our hypothesis, there was an association between geographical area and dependence in descriptive and bivariate analyses; specifically, a higher percentage of participants in every non-metropolitan region were classified as methamphetamine-dependent, compared to those in Melbourne. Contrary to our hypothesis, however, this association was attenuated when controlling for other factors in our final multivariable model; specifically, residing in non-metropolitan locations was not independently associated with methamphetamine dependence compared to living in Melbourne; however, the odds of being methamphetamine-dependent were significantly higher for those residing in regional centre locations compared to those in large rural towns. Methamphetamine dependence was associated with a higher frequency of methamphetamine consumption and use of crystal methamphetamine (vs. speed powder). This is perhaps unsurprising in the context of the high purity of crystalline methamphetamine available in Victoria [7]. Additionally, previous research has indicated that both factors are associated with an increased likelihood of being methamphetamine-dependent [25]. Regardless, our findings highlight the importance of considering geographic variation in dependence when planning and designing treatment and associated services for methamphetamine use in Victoria.

Despite reports of poor availability of alcohol and other drug services outside major cities [26], over half (54-56%) our sample had ever received professional support for their methamphetamine use, and just less than half (44-47%) reported having done so in the previous year, with almost no variation across residential location. Although this finding is encouraging, it is still possible non-metropolitan people who use methamphetamine experience different impediments to service utilisation than those in Melbourne (e.g., travelling greater distances to receive support, anonymity concerns), and that a need for increased investment in services and resources for managing methamphetamine dependence may exist in non-metropolitan areas of Victoria. This is being explored in other work with the cohort. Further, around two-thirds of the sample were classified as methamphetamine-dependent at baseline, yet less than half reported contact with any form of professional support regarding their methamphetamine use in the past year. This finding is consistent with previous research in Australia [27], including a past study involving a cohort of people who used methamphetamine based in Melbourne [10, 28], and suggests that, despite close attention to the issue and new investment in treatment services, personal (e.g., lack of self-perceived need), social (e.g., stigma) and structural (e.g., limited opening hours) barriers to professional support continue to exist for people who use methamphetamine generally, perhaps regardless of

residential location. Addressing such barriers is crucial to preventing and reducing methamphetamine-related harms across Australia. Appropriate education of relevant service providers in regional and rural parts of the state, including how to adequately meet the needs of people who use methamphetamine, barriers to service utilisation and appropriate referral pathways, and the impact of psychosocial and structural determinants of disadvantage, may be one effective step towards addressing this issue.

Overall, many characteristics of participants in the VMAX sample were similar to previous Australian studies investigating methamphetamine use and associated issues [e.g., 10, 29-31], with most participants identifying as male, heterosexual, unemployed and Australian-born, and few identifying as Aboriginal and Torres Strait Islander. Despite these similarities, VMAX participants in non-metropolitan areas were – overall – more socioeconomically disadvantaged compared to those recruited in Melbourne; for example, compared to those in Melbourne, descriptive bivariate analyses indicated that a greater percentage of participants residing in non-metropolitan locations were unemployed, reported experiencing homelessness during the previous year, and had ever been incarcerated as an adult. Smaller percentages of participants in non-metropolitan locations reported having health insurance at the time of their baseline interview. These factors may be important to consider when planning and implementing service responses.

Further research with the cohort

Regular follow-up with the cohort over five years will provide valuable data to improve understanding of little-researched areas of methamphetamine use and related harms, especially the natural history of methamphetamine use, including factors associated with remission from dependence and harmful use, progression to – and maintenance of – abstinence, and relapse. A more detailed examination of the relationship between contact with health and criminal justice systems and methamphetamine use trajectories will be aided by data linkage with state and federal datasets. More research with the cohort will determine where non-metropolitan participants seek and obtain professional support; e.g., are they accessing services in local rural and regional communities, or travelling to other towns, including urban centres, to avoid specific service barriers such as confidentiality concerns?

Limitations

The targeted and convenience sampling methods used for recruitment, and the recruitment of people who use methamphetamine from rural and regional Victorian locations with high rates of methamphetamine-related harms, mean that the sample is likely not representative of people who use methamphetamine in Melbourne, non-metropolitan Victoria, or Australia more generally. The interviewer-administered self-report process for the behavioural survey means that the data were subject to recall and social desirability biases. Future work involving data linkage will address some of these potential biases, especially in relation to contact with health and social support and drug treatment services.

CONCLUSION

In our sample of people who regularly used methamphetamine in Victoria, we observed significant differences is sociodemographic and methamphetamine use characteristics and behaviours among those residing in non-metropolitan areas compared to those in Melbourne. Significantly higher rates of methamphetamine dependence were observed among non-metropolitan participants; however, after adjustment, methamphetamine dependence appeared to be more strongly influenced by factors including use of crystal methamphetamine and greater methamphetamine use frequency. Nevertheless, these variations are important considerations for service planners. Our findings suggest that a degree of unmet need exists among people using methamphetamine across the state: despite two-thirds of participants being classified as methamphetamine-dependent, less than half had accessed any form of professional support in the past year. Further research with this prospective cohort will provide more in-depth findings regarding trajectories of methamphetamine use and related harms among Victorians who use the drug.

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Box 1: Participant recruitment source

	n (%)
Respondent-driven sampling (RDS)	398 (53)
Social media advertisement	105 (14)
Hardcopy flyers/ brochures (e.g., displayed at services)	89 (12)
Non-RDS referral/ snowball sampling	74 (10)
Other (e.g., service provider referral)	78 (10)
TOTAL	744 (100)

Table 1: Key characteristics of VMAX Study participants at baseline (N=744), according to residential MMM classification: Counts, percent (%) and probability values (p-value)[γ] (unless otherwise stated)

Variable	TOTAL n=744 n (%)	Residential location as per MMM category				*p-value*
		Major city n=266 n (%)	Regional centre n=146 n (%)	Large rural town n=262 n (%)	Small-medium rural towns n=70 n (%)	
Gender: Female[a]	288 (39)	101 (38)	62 (42)	106 (40)	19 (27)	0.137
Age in years, mean (SD)[b]	34 (10)	32 (10)	35 (9)	35 (9)	37 (10)	**<0.001**
Aboriginal and Torres Strait Islander[b]	98 (13)	8 (3)	25 (17)	61 (23)	4 (6)	**<0.001**
Country of birth: Australia	687 (92)	234 (88)	136 (93)	251 (96)	66 (94)	**0.007**
Homeless last 12 months*	274 (37)	64 (24)	68 (47)	117 (45)	25 (36)	**<0.001**
Heterosexual	637 (86)	199 (75)	135 (92)	237 (90)	66 (94)	**<0.001**
Has children	394 (53)	63 (24)	98 (67)	188 (72)	45 (64)	**<0.001**
Secondary education ≥Year 11 **	345 (46)	178 (67)	47 (32)	86 (33)	34 (49)	**<0.001**
Currently studying	83 (11)	51 (19)	7 (5)	15 (6)	10 (14)	**<0.001**
Unemployed	578 (78)	163 (61)	130 (89)	232 (89)	53 (76)	**<0.001**
Weekly income ≤$399[c]	380 (51)	120 (45)	76 (52)	148 (56)	36 (51)	0.072
Has health insurance	82 (11)	59 (22)	7 (5)	11 (4)	5 (7)	**<0.001**
Recent criminal behaviours	429 (58)	159 (60)	91 (62)	140 (54)	39 (56)	0.292

Notes: MMM = Modified Monash Model; SD = Standard Deviation

[γ]Chi-square tests were used for identifying associations between categorical variables; the Kruskal-Wallis test was used for investigating associations between continuous/non-parametric variables and those with >2 levels with means and standard deviations (SD) reported

**At least one period of experiencing homelessness during the last year*

***Median = Year 10*

[a]Missing data for three participants (two identified as non-binary, one refused)

[b]Missing data for one participant

[c]*Missing data for six participants (two 'don't know', four 'not applicable')*

Table 2: Methamphetamine use characteristics (N=744), according to residential MMM classification (%, unless otherwise stated)

Variable	TOTAL n=744 n (%)	Residential location as per MMM category: Major city n=266 n (%)	Regional centre n=146 n (%)	Large rural town n=262 n (%)	Small-medium rural town n=70 n (%)	*p-value*
Form/s used in the last year						
Speed powder	308 (41)	125 (47)	44 (30)	103 (39)	36 (51)	**0.002**
Crystal methamphetamine	714 (96)	244 (92)	145 (99)	255 (97)	70 (100)	**<0.001**
Main form (current)[a]						
Speed powder	50 (7)	39 (15)	3 (2)	7 (3)	1 (1)	
Crystal methamphetamine	688 (92)	226 (85)	143 (98)	251 (96)	68 (97)	**<0.001**
Years of methamphetamine use, mean (standard deviation)[b]	14.7 (9.2)	12.7 (8.5)	16.2 (8.9)	15.4 (9.6)	16.2 (9.3)	**<0.001**
Main route of administration[c]						
Smoke	576 (77)	211 (79)	125 (86)	187 (71)	53 (76)	
Inject	90 (12)	12 (5)	16 (11)	49 (19)	13 (18)	
Snort, swallow or shelve/shaft	60 (8)	41 (15)	5 (3)	12 (5)	2 (3)	**<0.001**
Use frequency last month (days/week), mean (standard deviation)	3.4 (2.3)	3.2 (2.4)	3.3 (2.2)	3.6 (2.2)	3.1 (2.0)	0.101
Number people present when last used methamphetamine, mean (standard deviation)[d]	2.3 (3.1)	2.5 (4.4)	1.8 (1.6)	2.3 (1.9)	2.1 (2.1)	**0.004**
Methamphetamine dependence (SDS)						
Total SDS score (possible range: 0-15), mean (standard deviation)	5.7 (3.9)	5.5 (4.1)	6.9 (3.8)	5.1 (3.5)	5.9 (3.8)	**<0.001**
Methamphetamine-dependent (SDS≥4)	486 (65)	156 (59)	113 (77)	166 (63)	51 (73)	**0.001**

Ever utilised professional support for methamphetamine use (y)[e]	415 (56)	150 (56)	79 (54)	147 (56)	39 (56)	0.975
Utilised prof. support in last 12 months	337 (45)	116 (44)	66 (45)	122 (47)	33 (47)	0.903

Notes: SDS = Severity of Dependence Scale; MMM = Modified Monash Model

[γ]Chi-square tests were used for identifying associations between categorical variables; the Kruskal-Wallis test was used for investigating associations between continuous/non-parametric variables and those with >2 levels with means and standard deviations (SD) reported

[a]Some percentages do not sum to 100 because one participant reported their main methamphetamine form to be 'base', and five participants did not list a main methamphetamine form

[b]Missing data for four participants

[c]Missing data for 18 participants

[d]Missing data for 62 participants ('don't know')

Table 3: Sequential multivariable logistic regression of nested models showing associations with methamphetamine dependence (SDS≥4): Odds ratios (ORs), adjusted odds ratios (aORs), 95% confidence intervals (95% CIs), and probability values (p-values)

		Model A n=744			**Model B n=737**			**Model C n=684[a]**	
	OR	**95% CI**	***p-value***	**aOR**	**95% CI**	***p-value***	**aOR**	**95% CI**	***p-value***
Residential location									
Major city (MMM 1)	1	-	-	1	-	-	1	-	-
Regional centre (MMM 2)	2.41	1.53, 3.82	**<0.001**	1.50	0.89, 2.53	0.124	1.72	0.98, 3.04	0.059
Large rural town (MMM 3)	1.11	0.86, 1.73	0.267	0.77	0.50, 1.19	0.232	0.66	0.40, 1.07	0.093
Small-medium rural town (MMM 4/5)	2.15	1.06, 3.38	0.031	1.65	0.88, 3.09	0.120	1.46	0.74, 2.91	0.276
Age (years)				0.96	0.94, 0.98	**<0.001**	0.96	0.93, 0.99	**0.019**
Gender (male)				1.05	0.75, 1.48	0.774	1.05	0.72, 1.52	0.801
Aboriginal and Torres Strait Islander				1.16	0.69, 1.97	0.576	1.22	0.69, 2.16	0.502
Homeless past year				1.18	0.83, 1.68	0.355	1.06	0.72, 1.55	0.773
Has children				1.51	1.01, 2.25	**0.042**	1.35	0.87, 2.09	0.178
Highest school year completed				0.87	0.61, 1.23	0.424	1.03	0.70, 1.52	0.879
Currently studying				0.38	0.23, 0.64	**<0.001**	0.45	0.25, 0.81	**0.008**
Currently employed				0.70	0.46, 1.05	0.085	0.77	0.49, 1.22	0.261
Has health insurance				0.72	0.42, 1.22	0.216	0.76	0.42, 1.35	0.345
Engaged in criminal behaviour/s last month				1.49	1.07, 2.07	**0.017**	1.40	0.97, 2.03	0.074
Meth. use frequency (days/week past month)							1.23	1.12, 1.35	**<0.001**
Main form methamphetamine: crystal (ref: speed powder)							2.36	1.55, 3.61	**<0.001**
Primary route of administration: non-IDU							0.73	0.43, 1.26	0.264
Years of methamphetamine use							0.99	0.96, 1.02	0.474

Notes: IDU = Injecting drug use; SDS = Severity of Dependence Scale; MMM = Modified Monash Model
[a]Missing data for 60 participants (including n=46 for meth. use frequency, n=18 for main route of administration, n=6 for main form of meth. used, n=2 for criminal behaviours, and n=1 for Indigenous status and age)