

The temporal association between frequency of methamphetamine use, depression, and anxiety in a community-recruited cohort of methamphetamine smokers

Zoe Duncan, Keith Sutton, Bernadette Ward, Rebecca Kippen, Kasun Rathnayake, Matthew Hickman, Brendan Quinn, Rebecca Jenkinson, Paul Dietze



Burnet Institute
Medical Research. Practical Action.

Acknowledgements

- Wurundjeri lands of the Kulin Nation (Melbourne)
- Lands of the Gunai Kurnai people (Gippsland)
- Lands of the Dja Dja Wurrung and the Taungurung Peoples of the Kulin Nation (Bendigo)
- Lands of the Yorta Yorta people (Shepparton)
- Co-investigators, co-authors and PhD supervisors
- Fieldworkers based at Monash University and Burnet Institute
- Participants of the VMAX study

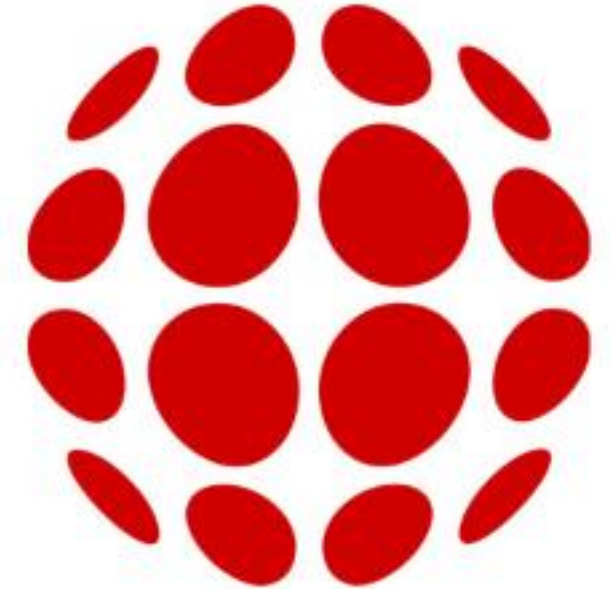
Disclosure of interests

The VMAX study was established with a grant from the Colonial Foundation and is now funded by the National Health and Medical Research Council (NHMRC, 1148170). PD is supported by an NHMRC Senior Research Fellowship. BQ was supported by a Postdoctoral Fulbright Scholarship during the 2016/17 financial year. PD has received investigator-driven funding from Gilead Sciences and Indivior for work unrelated to this study.

VMAX study: a community-recruited cohort of people who regularly use methamphetamine

VMAX involves more than 800 community-based individuals who use methamphetamine across metropolitan and rural Victoria.

The VMAX study monitors the nature and course of methamphetamine use in those who primarily used non-injecting methods of administration on entry to the study.



Burnet Institute
Medical Research. Practical Action.

Methamphetamine and mental health

Globally, methamphetamine use has been found to be associated with several adverse mental health outcomes including:

- Psychosis
- Violent behaviour
- Suicide
- Depression

Research Paper

Mental health outcomes associated with the use of amphetamines: A systematic review and meta-analysis

Rebecca McKetin^{a,*}, Janni Leung^{a,b}, Emily Stockings^a, Yan Huo^b, James Foulds^c,
Julia M. Lappin^{a,d}, Craig Cumming^e, Shalini Arunogiri^{f,g}, Jesse T. Young^{e,h,i,j}, Grant Sara^{k,l},
Michael Farrell^a, Louisa Degenhardt^a

^a National Drug and Alcohol Research Centre, University of New South Wales, Sydney, Australia

^b Faculty of Health and Behavioural Sciences, The University of Queensland, Australia

^c Department of Psychological Medicine, University of Otago, Christchurch, New Zealand

^d School of Psychiatry, University of NSW, Sydney, Australia

^e School of Population and Global Health, The University of Western Australia, Perth, Western Australia, Australia

^f Turning Point, Eastern Health, Richmond, VIC, Australia

^g Eastern Health Clinical School, Monash University, Box Hill, VIC, Australia

^h National Drug Research Institute, Curtin University, Perth, Australia

ⁱ Justice Health Unit, Centre for Health Equity, Melbourne School of Population and Global Health, The University of Melbourne, Parkville, VIC, Australia

^j Centre for Adolescent Health, Murdoch Children's Research Institute, Parkville, VIC, Australia

^k Northern Clinical School, Sydney Medical School, University of Sydney, Australia

^l InforMH, System Information and Analytics Branch, NSW Ministry of Health, Australia

ARTICLE INFO

Article history:

Received 13 August 2019

Revised 20 September 2019

Accepted 20 September 2019

Available online 17 October 2019

Keywords:

Amphetamines

Anxiety

Depression

Mental health

Methamphetamine

Psychosis

Substance use

Suicidality

Violence

ABSTRACT

Background: The use of amphetamines is a global public health concern. We summarise global data on use of amphetamines and mental health outcomes.

Methods: A systematic review and meta-analysis (CRD 42017081893). We searched Medline, EMBASE, PsycInfo for methamphetamine or amphetamine combined with psychosis, violence, suicidality, depression or anxiety. Included studies were human empirical cross-sectional surveys, case-control studies, cohort studies and randomised controlled trials that assessed the association between methamphetamine and one of the mental health outcomes. Random effects meta-analysis was used to pool results for any use of amphetamines and amphetamine use disorders.

Findings: 149 studies were eligible and 59 were included in meta-analyses. There was significant heterogeneity in effects. Evidence came mostly from cross-sectional studies. Any use of amphetamines was associated with higher odds of psychosis (odds ratio [OR] = 2.0, 95%CI 1.3–3.3), violence (OR = 2.2, 95%CI 1.2–4.1; adjusted OR [AOR] = 1.4, 95%CI 0.8–2.4), suicidality (OR = 4.4, 95%CI 2.4–8.2; AOR = 1.7, 95%CI 1.0–2.9) and depression (OR = 1.6, 95%CI 1.1–2.2; AOR = 1.3, 95%CI 1.2–1.4). Having an amphetamine use disorder was associated with higher odds of psychosis (OR = 3.0, 95%CI 1.9–4.8; AOR = 2.4, 95%CI 1.6–3.5), violence (OR = 6.2, 95%CI 3.1–12.3), and suicidality (OR = 2.3, 95%CI 1.8–2.9; AOR = 1.5, 95%CI 1.3–1.8).

Interpretation: Methamphetamine use is an important risk factor for poor mental health. High quality population-level studies are needed to more accurately quantify this risk. Clinical responses to methamphetamine use need to address mental health harms.

© 2019 Published by Elsevier Ltd.

This is an open access article under the CC BY-NC-ND license.
(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Previous Sub-study results

Percentage distribution of PHQ-9 (depression) and GAD-7 (anxiety) scores (n=725)

		GAD-7		
		None to mild anxiety (score 0–9) %	Moderate to severe anxiety (score 10–21) %	Total %
PHQ-9	None to mild depression (score 0–9) %	40.8	8.3	49.1
	Moderate to severe depression (score 10–27) %	13.2	37.7	50.9
	Total %	54.0	46.0	100.0

$r = .70, n = 725, p < .001 (R^2 = .49)$

Common mental health disorders in Australia

- 13% of the population have an anxiety disorder.
- 10% have symptoms of depression.
 - These two disorders commonly overlap.
- Substance use disorders are the third most common mental health disorder.
 - commonly co-occur with anxiety and depression.

Methamphetamine research gaps

More research is needed on:

- Australian cohorts
- People recruited in community settings
- People from both metropolitan and rural settings
- People whose primary method of administration is smoking



<https://www.businessinsider.com/mental-physical-effects-of-cocaine-2016-5?r=AU&IR=T>

Longitudinal Sub-study aim

To examine the longitudinal effect of methamphetamine use frequency in the outcomes of anxiety and depression within the VMAX cohort, and the impact of other factors on this trajectory.

Methods

- Logistic mixed effects models
- 3 outcomes: moderate to severe anxiety and/or depression, moderate to severe depression, moderate to severe anxiety.
- Stata SE Version 15.0
- Patient Health Questionnaire (PHQ-9)
- Generalised Anxiety Disorder (GAD-7)
- Study time period: 17 June 2016 to 13 March 2020
- Number of interview records: 2491 from 853 unique participants

Covariates

Demographic characteristics	Socio-economic characteristics	Patterns of Substance Use	Physical health
Gender (Male/Female)	Employment (yes/no)	Frequency of methamphetamine use (# of days in past month)	Self-reported Health status (Excellent-Good/Fair-Very Poor)
Age (<30, 30-39, 40+)	Homelessness (yes or no)	Route of administration (Injecting/non-injecting)	
Aboriginal or Torres Strait Islander (yes/no)	Level of social support (medium to high, or low)	Drug treatment in the past month (yes/no)	
Residential location (Metropolitan or regional/rural)		Severity of Dependence (dependent/non-dependent)	

Results

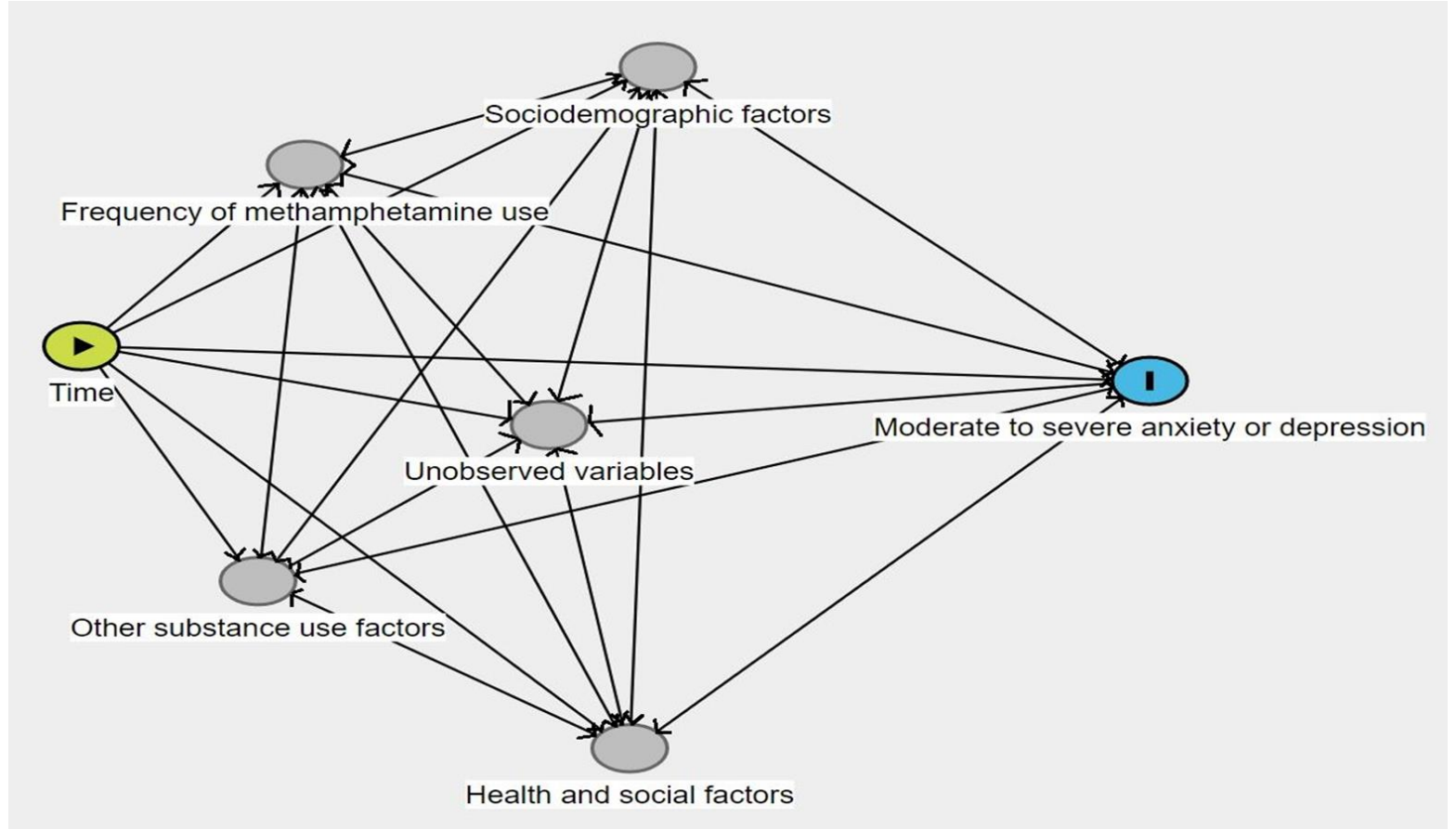
	Combined Anxiety and Depression	Anxiety Only	Depression only
Positively associated	<p>Past year homelessness (OR = 1.41)</p> <p>Methamphetamine dependence (OR = 3.47)</p>	<p>Past year homelessness (OR = 1.49)</p> <p>Methamphetamine dependence (OR = 3.58)</p>	<p>Past year homelessness (OR = 1.34)</p> <p>Living Metropolitan (OR = 1.41)</p> <p>Methamphetamine dependence (OR = 2.91)</p>
Negatively associated	<p>Age 40+ (OR = 0.65)</p> <p>Male gender (OR = 0.47)</p> <p>Current employment (OR = 0.48)</p> <p>High social support (OR = 0.79)</p> <p>Good physical health (OR = 0.33)</p>	<p>Age 30-39 (OR 0.65)</p> <p>Age 40+ (OR = 0.63)</p> <p>Male gender (OR = 0.48)</p> <p>Current employment (OR = 0.50)</p> <p>High social support (OR = 0.70)</p> <p>Good physical health (OR = 0.38)</p>	<p>Male gender (OR = 0.54)</p> <p>Current employment (OR = 0.48)</p> <p>High social support (OR = 0.60)</p> <p>Good physical health (OR = 0.23)</p> <p>Smoking methamphetamine or other non-injecting (OR = 0.68)</p>

Discussion

- Protective factors: Age, gender, employment, social support, good physical health
- Risk factors: homelessness, dependence
- Frequency of methamphetamine use vs. dependence?

Limitations and opportunities

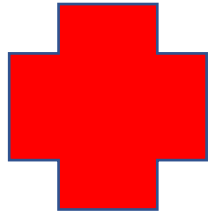
- Alternative longitudinal data analysis methods?
- Variables not considered e.g. adverse childhood events, trauma-based questions, personality, cannabis use, alcohol use, opioid use etc.
- Self-report data – potential for data linkage to verify health-based outcomes?



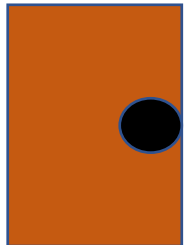
Conclusion



Levels of depression and anxiety in people that use methamphetamine



Primary Health services like to encounter comorbid depression or anxiety in people that use methamphetamine



Integrated Models



“No wrong door” approach

References

- Australian Bureau of Statistics. (2015). National Health Survey: First Results, 2014-15. [https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by Subject/4364.0.55.001~2014-15~Main Features~Mental and behavioural conditions~32](https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2014-15~Main%20Features~Mental%20and%20behavioural%20conditions~32)
- Australian Institute of Health & Welfare. (2020). National Drug Strategy Household Survey 2019. <https://www.aihw.gov.au/reports/illicit-use-of-drugs/national-drug-strategy-household-survey-2019/contents/table-of-contents>
- Chang, X., Sun, Y., Zhang, Y., Muhai, J., Lu, L., & Shi, J. (2018). A Review of Risk Factors for Psychiatric Symptoms. 9(November), 1–8. <https://doi.org/10.3389/fpsy.2018.00603>
- Darke, S., Kaye, S., McKetin, R., & Dufrou, J. (2008). Major physical and psychological harms of methamphetamine use. *Drug and Alcohol Review*, 27(3), 253–262. <https://doi.org/10.1080/09595230801923702>
- Deady, M., Barrett, E. L., Mills, K. L., Kay-lambkin, F., Haber, P., Shand, F., Baker, A., Baillie, A., Christensen, H., Manns, L., & Teesson, M. (2014). Comorbid mental illness and illicit substance use. *Evidence Check*.
- Duncan, Z., Kippen, R., Sutton, K., Ward, B., Agius, P. A., Quinn, B., & Dietze, P. (2021). Correlates of anxiety and depression in a community cohort of people who smoke methamphetamine. *Australian & New Zealand Journal of Psychiatry*, 00(0), 000486742110481. <https://doi.org/10.1177/00048674211048152>
- Levesque, F.-J., Harris, M., & Russell, G. (2013). Patient-centred access to health care. *International Journal for Equity in Health*, 12(18). <https://doi.org/10.1002/cber.189502803178>
- McKetin, R., Degenhardt, L., Shanahan, M., Baker, A. L., Lee, N. K., & Lubman, D. I. (2018). Health service utilisation attributable to methamphetamine use in Australia: Patterns, predictors and national impact. *Drug and Alcohol Review*, 37(2), 196–204. <https://doi.org/10.1111/dar.12518>
- McKetin, R., Leung, J., Stockings, E., Huo, Y., Foulds, J., Lappin, J. M., Cumming, C., Arunogiri, S., Young, J. T., Sara, G., Farrell, M., & Degenhardt, L. (2019). Mental health outcomes associated with the use of amphetamines: A systematic review and meta-analysis. *EClinicalMedicine*, 16, 81–97. <https://doi.org/10.1016/j.eclinm.2019.09.014>
- Quinn, B., Ward, B., Agius, P. A., Jenkinson, R., Hickman, M., Sutton, K., Hall, C., McKetin, R. M. C., Farrell, M., Cossar, R., & Dietze, P. M. (2020). A prospective cohort of people who use methamphetamine in Melbourne and non-metropolitan Victoria, Australia: Baseline characteristics and correlates of methamphetamine dependence. *Drug and Alcohol Review*, 40(7), 1239–1248. <https://doi.org/10.1111/dar.13194>
- Stuart, A. M., Baker, A. L., Denham, A. M. J., Lee, N. K., Hall, A., Oldmeadow, C., Dunlop, A., Bowman, J., & McCarter, K. (2020). Psychological treatment for methamphetamine use and associated psychiatric symptom outcomes: A systematic review. *Journal of Substance Abuse Treatment*, 109(September 2019), 61–79. <https://doi.org/10.1016/j.jsat.2019.09.005>
- Ward, B., Lane, R., Quinn, B., & Russell, G. (2021). Qualitative understandings of access to primary care services for consumers who use methamphetamine. *Australian Journal of General Practice*, 50(7), 505–510. <https://doi.org/10.31128/AJGP-07-20-5550>