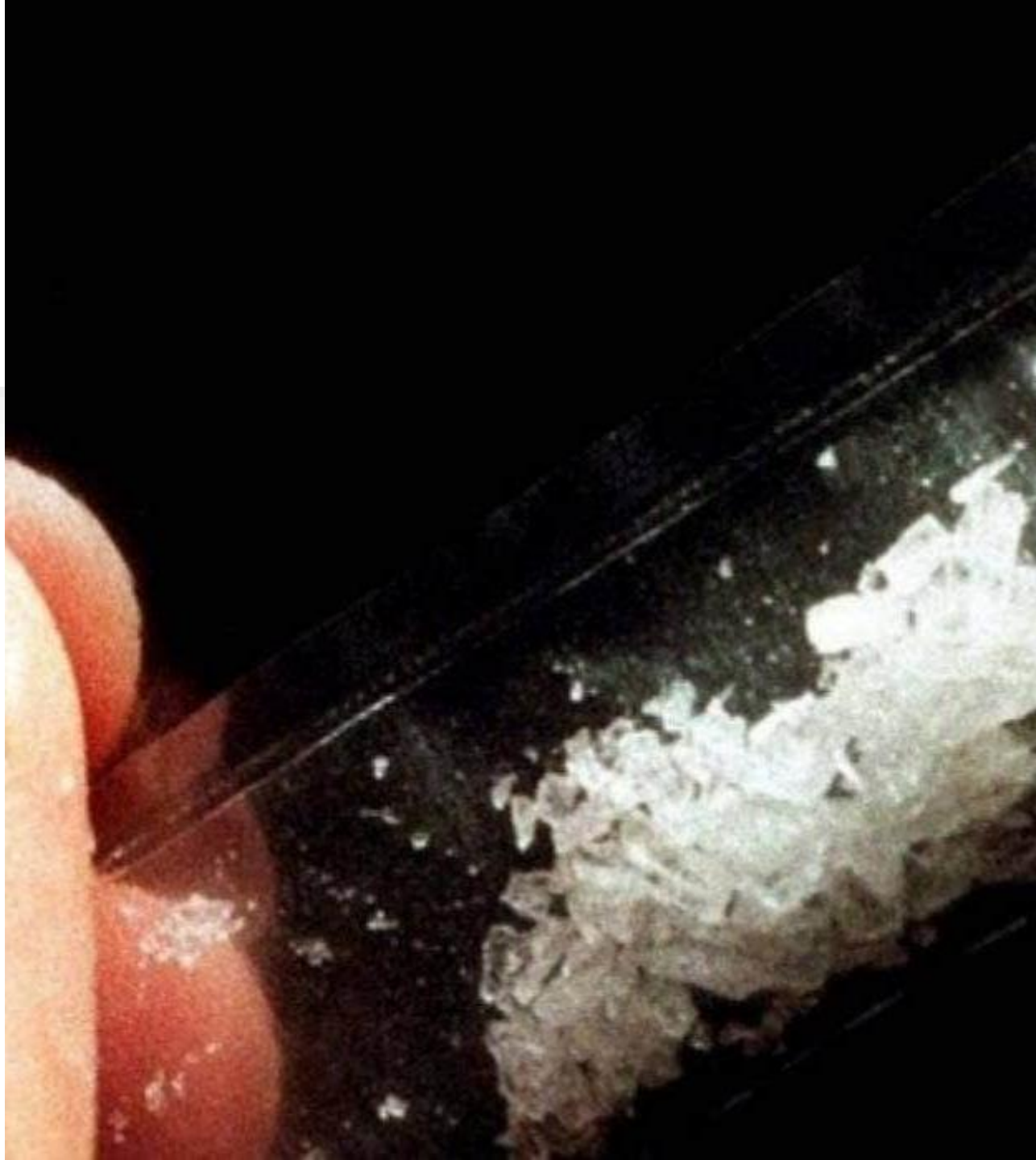
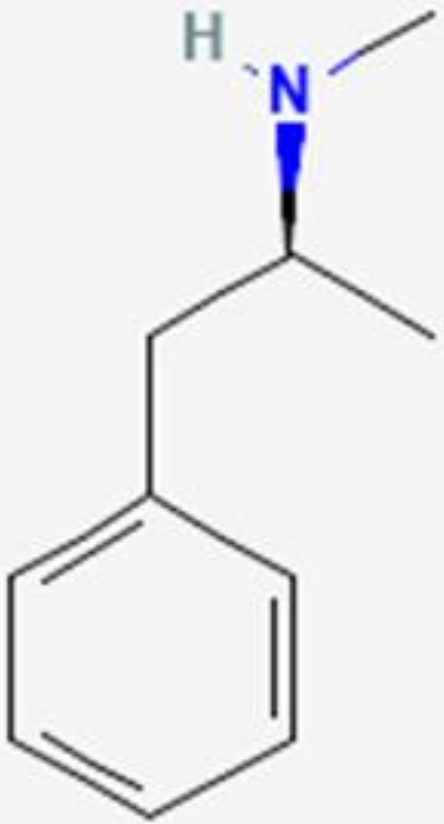
Methamphetamine

Dr Sam McBride

Methamphetamine

- Methamphetamines are sympathomimetic amines
- Comes in liquid, tablet or crystal form
- Ingested, smoked, inhaled , injected
- Immediate intense euphoria –longer lasting than cocaine
- Results in hours of stimulation, excitation and alertness
- Rush dissipates well before ½ life
- Highly physically addictive



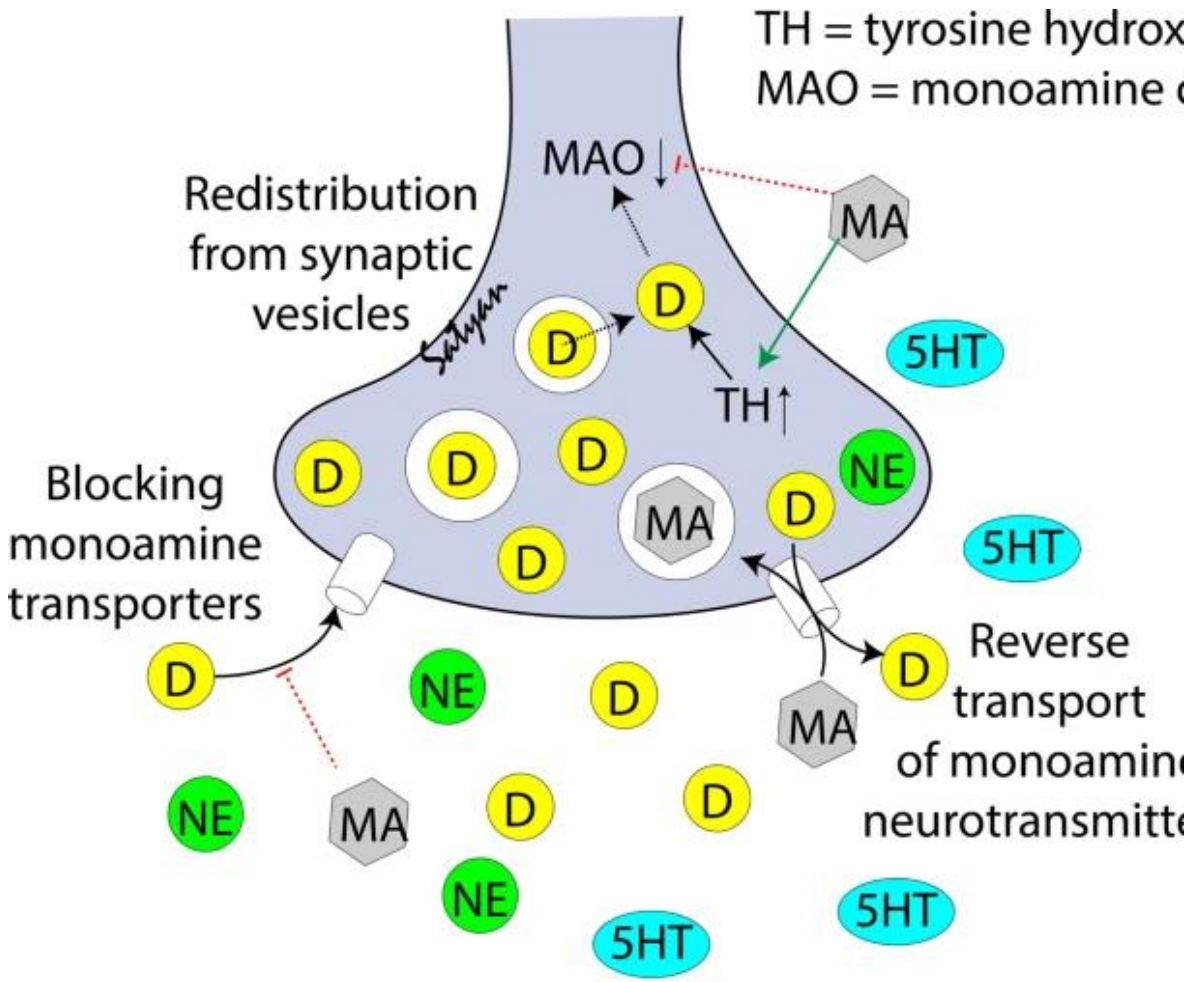


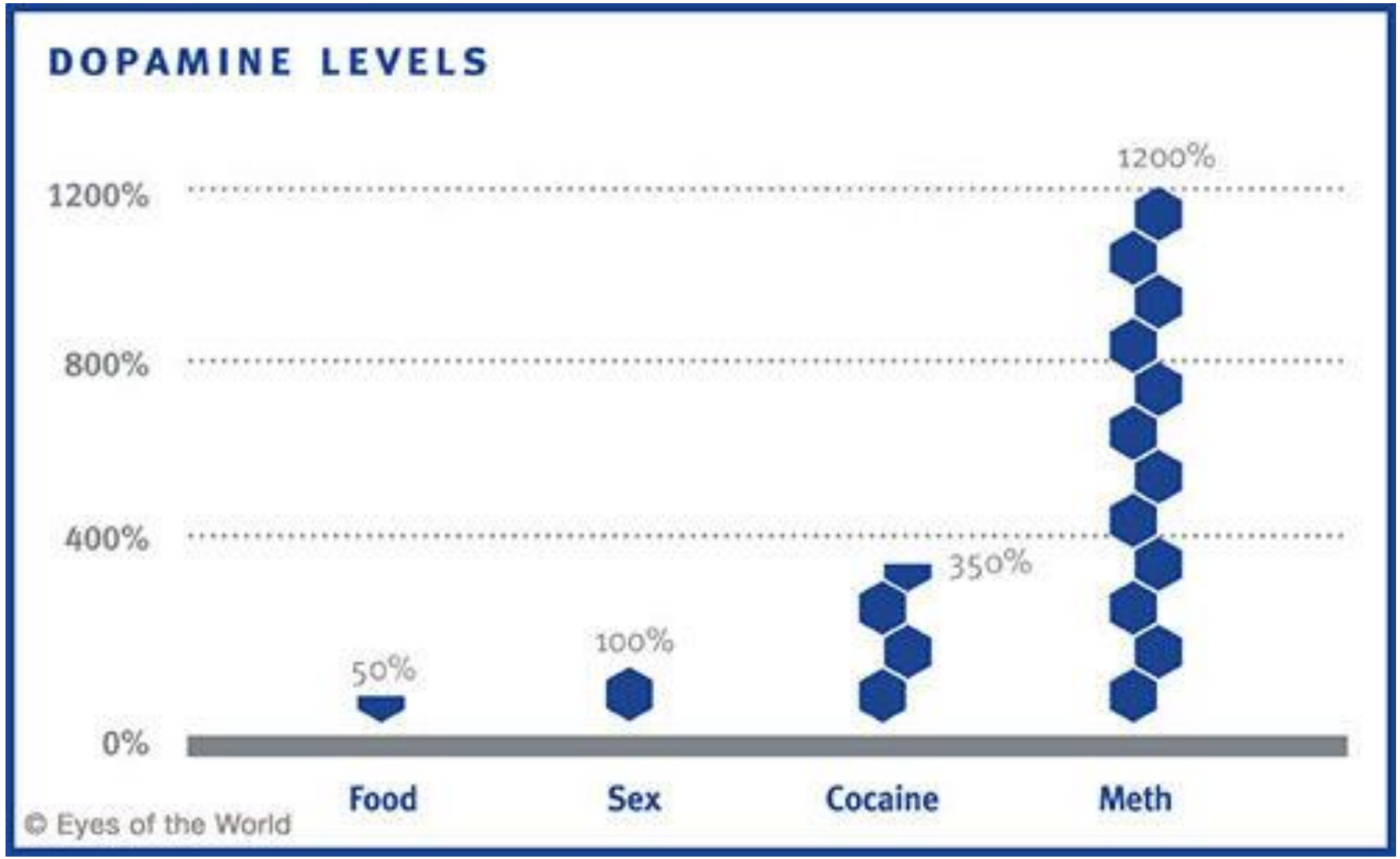
Pharmacokinetics of Methamphetamine

- Freely penetrate blood brain barrier and cardiovascular system due to the methyl group(lipophilic)
- ½ life -5-12 hours (eating bicarbonate can increase half life)
- Metabolised in liver by cytochrome p450 enzyme system. Specifically, CYP2D6 enzyme. (people with genetic variations in this enzyme can be more susceptible to psychosis and cardiomyopathy)
- Excreted primarily via the kidneys and detected up to 4 days in the urine after use

Methamphetamine at the synapse

Euphoria: increases release, blocks uptake and reduces degradation of dopamine, NA, serotonin both centrally and peripherally




DOPAMINE LEVELS
1200%
800%
400%
0%
50%
100%
350%
1200%
Food
Sex
Cocaine
Meth
© Eyes of the World

“A large proportion of people in society consume licit and/or illicit drugs. Only a minority of these use drugs in a problematic manner. Nevertheless, the effects of drugs are generally portrayed as negative in the media

(Global Commission on Drug Policy, 2017), leading to the stigmatisation of people who use drugs as media representations can have a strong influence on public perceptions (Global Commission on Drug Policy, 2017).”

Article

Committee on Drugs

Drug Science, Policy and Law
Volume 6: 1–9
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DOI: 10.1177/2050324520904540
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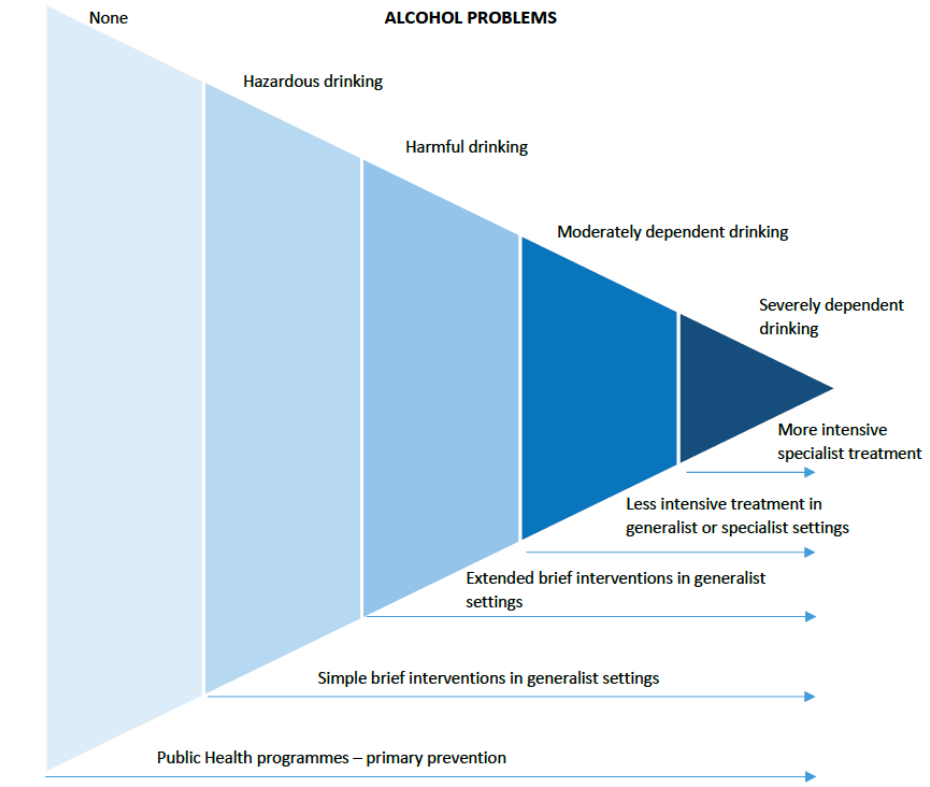
SAGE

Percentages of problem drug use and their implications for policy making: A review of the literature

Anne Katrin Schlag

Spectrum of use

Figure 1: A spectrum of responses to alcohol problems

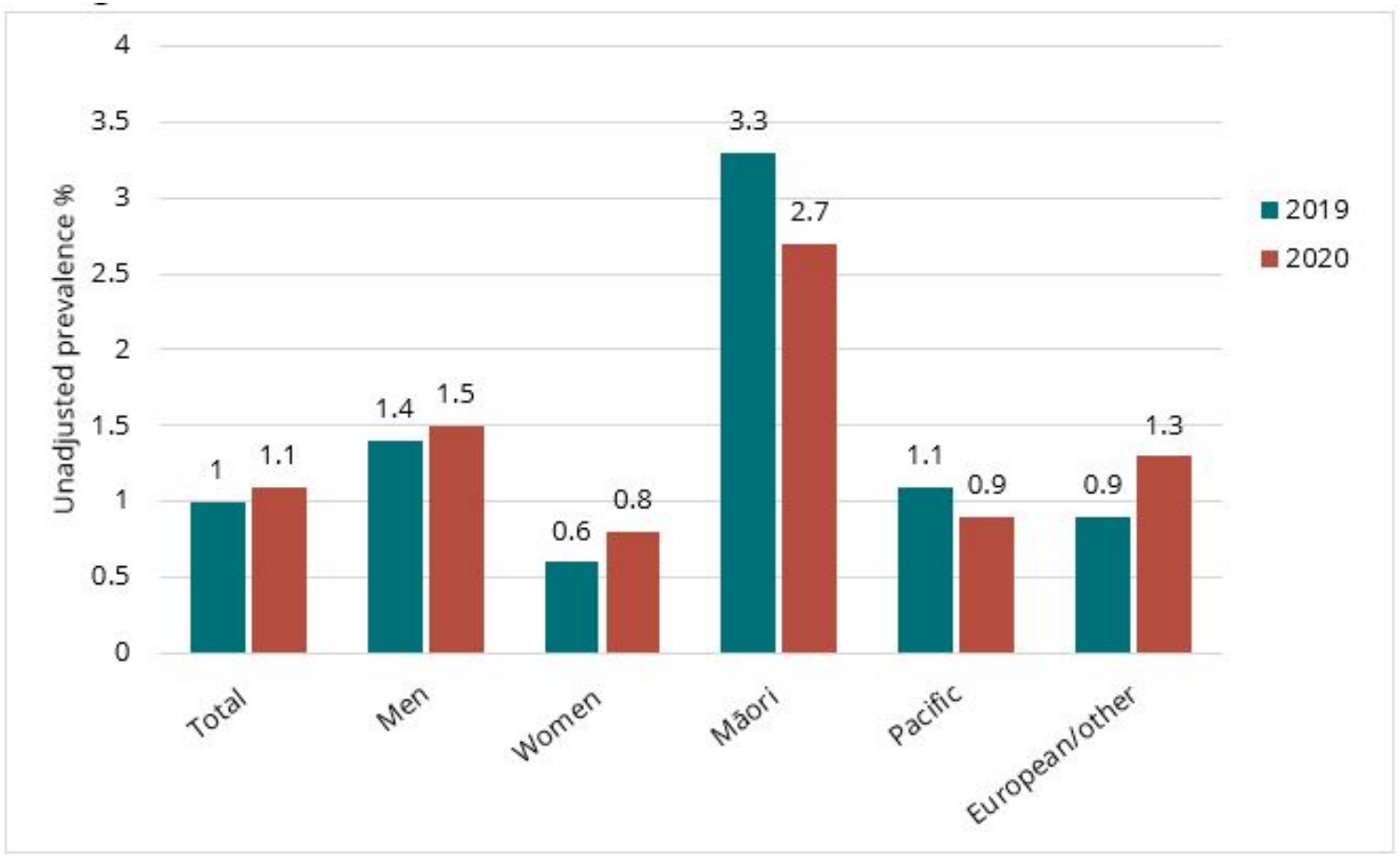


Source: Raistrick *et al.*, 2006. Review of the effectiveness of treatment for alcohol problems. *London: National Treatment Agency for Substance Misuse*.

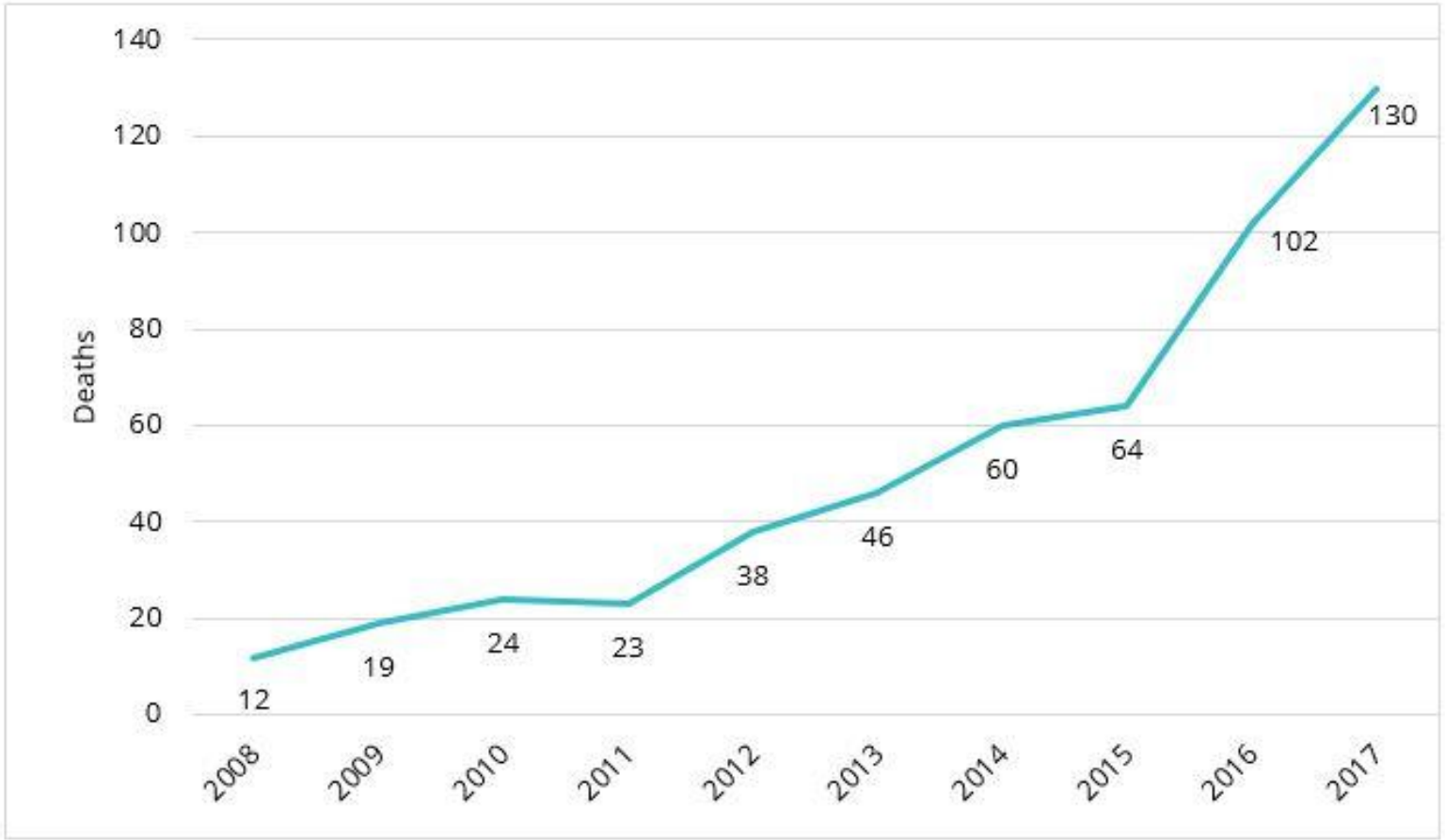
Methamphetamine a brief history Aotearoa

- 1960 amphetamines were 1st introduced in NZ as a weight loss drug and it was used to treat narcolepsy and ADHD
- 1970's amphetamine was starting to be manufactured in labs by Hells angels(uncovered 1980)
- 1990 due to crackdown and limits on precursor availability experimenting lead to methamphetamine "poor man's cocaine"
- A report in early 2000s said annual detection in labs by police increased by 200 from 1998 until 2003
- These labs were often using pseudoephedrine as the precursor and in 2003 the misuse of drugs amendment act was passed making it an offense. Restriction on pseudoephedrine sales in place

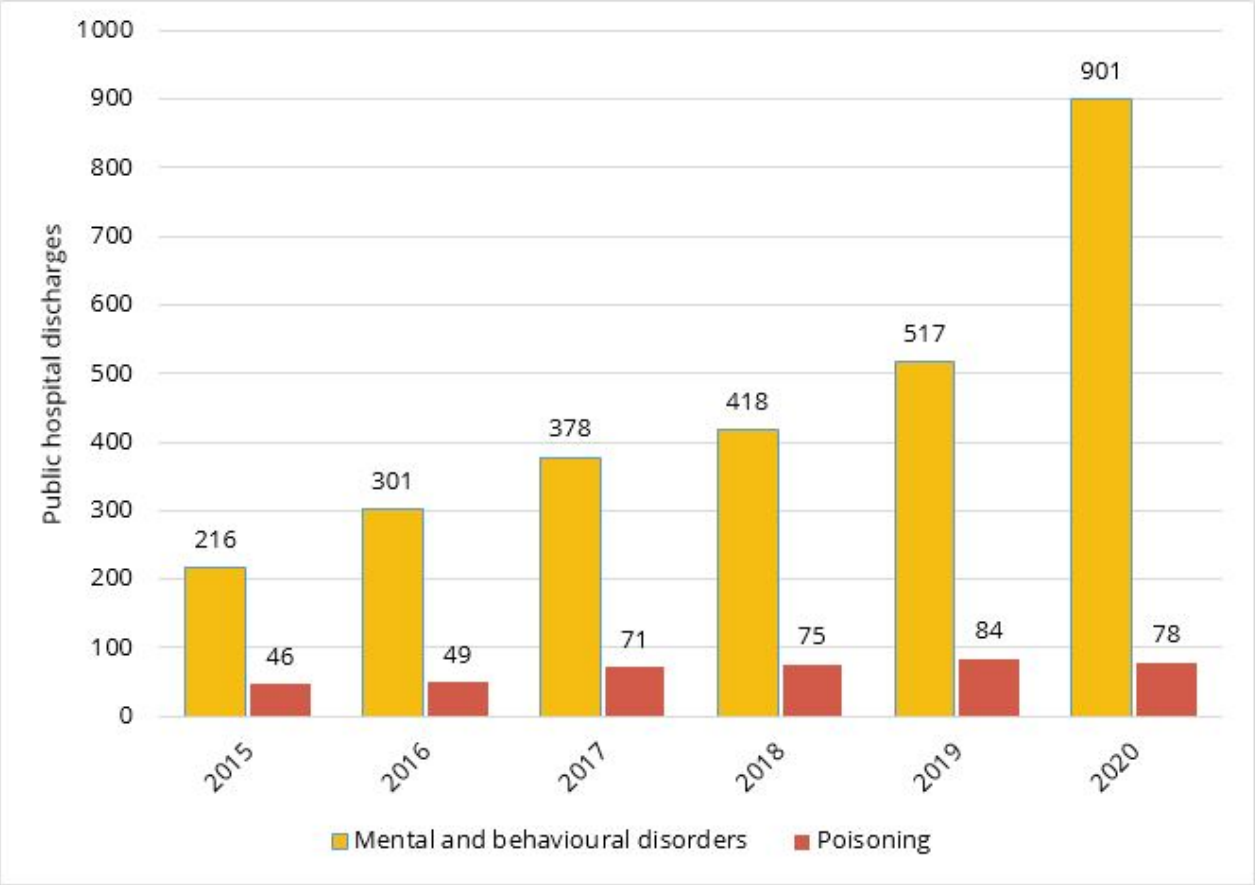
Amphetamine use by adults (15+) in selected populations 30 June 2019 and 2020



Deaths with an underlying or contributing cause of death, or nature of injury code indicating methamphetamine, years ending 30 June 2008 to 2017



Publicly funded hospital discharges with a primary diagnosis indicating methamphetamine, years ending 30 June 2015 to 2020



Conceptualising harm

Drugs ranked according to total harm UK experts MCDA approach

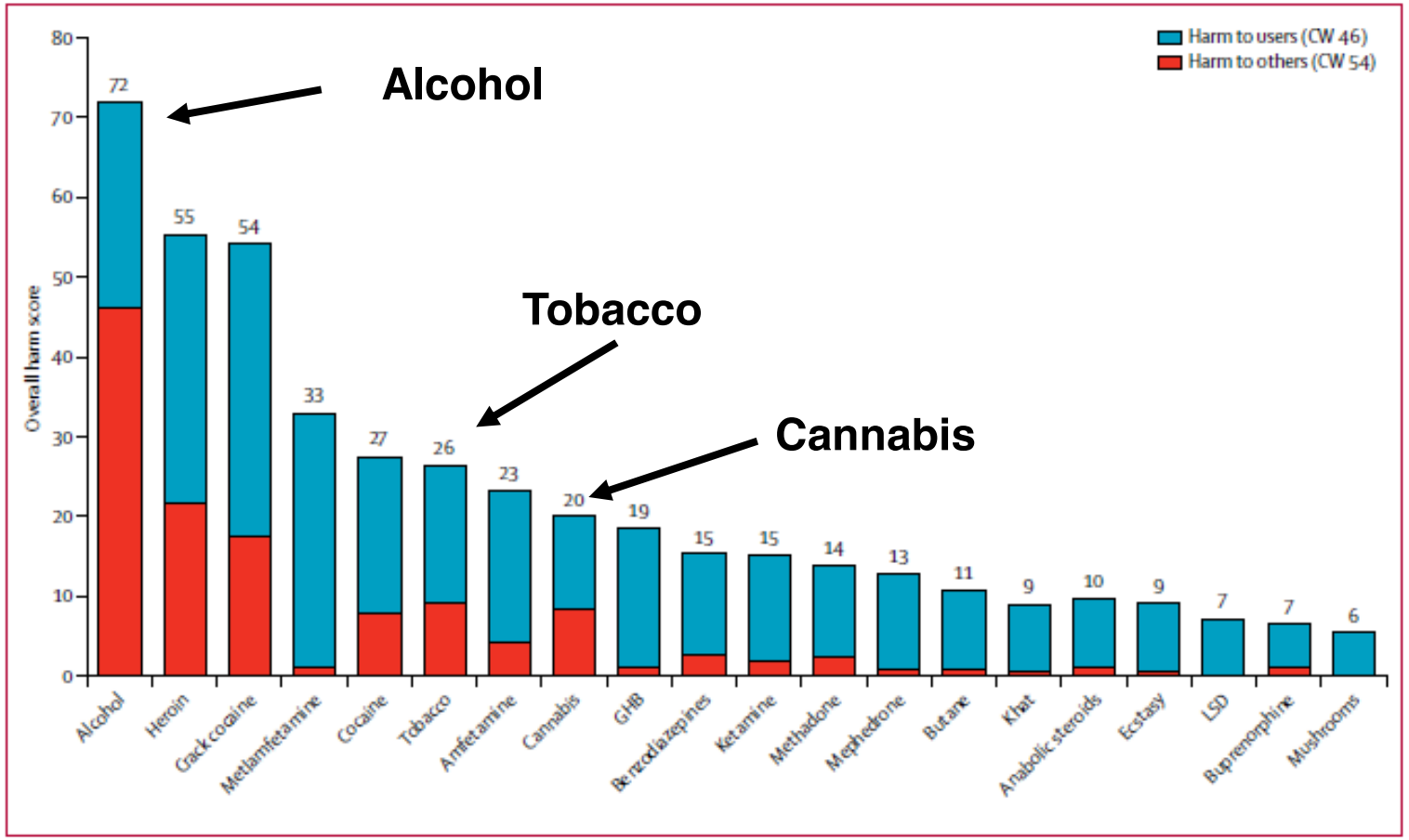


Figure 2: **Drugs ordered by their overall harm scores, showing the separate contributions to the overall scores of harms to users and harm to others**
The weights after normalisation (0–100) are shown in the key (cumulative in the sense of the sum of all the normalised weights for all the criteria to users, 46; and for all the criteria to others, 54). CW=cumulative weight. GHB=γ hydroxybutyric acid. LSD=lysergic acid diethylamide.

Nutt King & Phillips Lancet Nov 2010

Original Paper

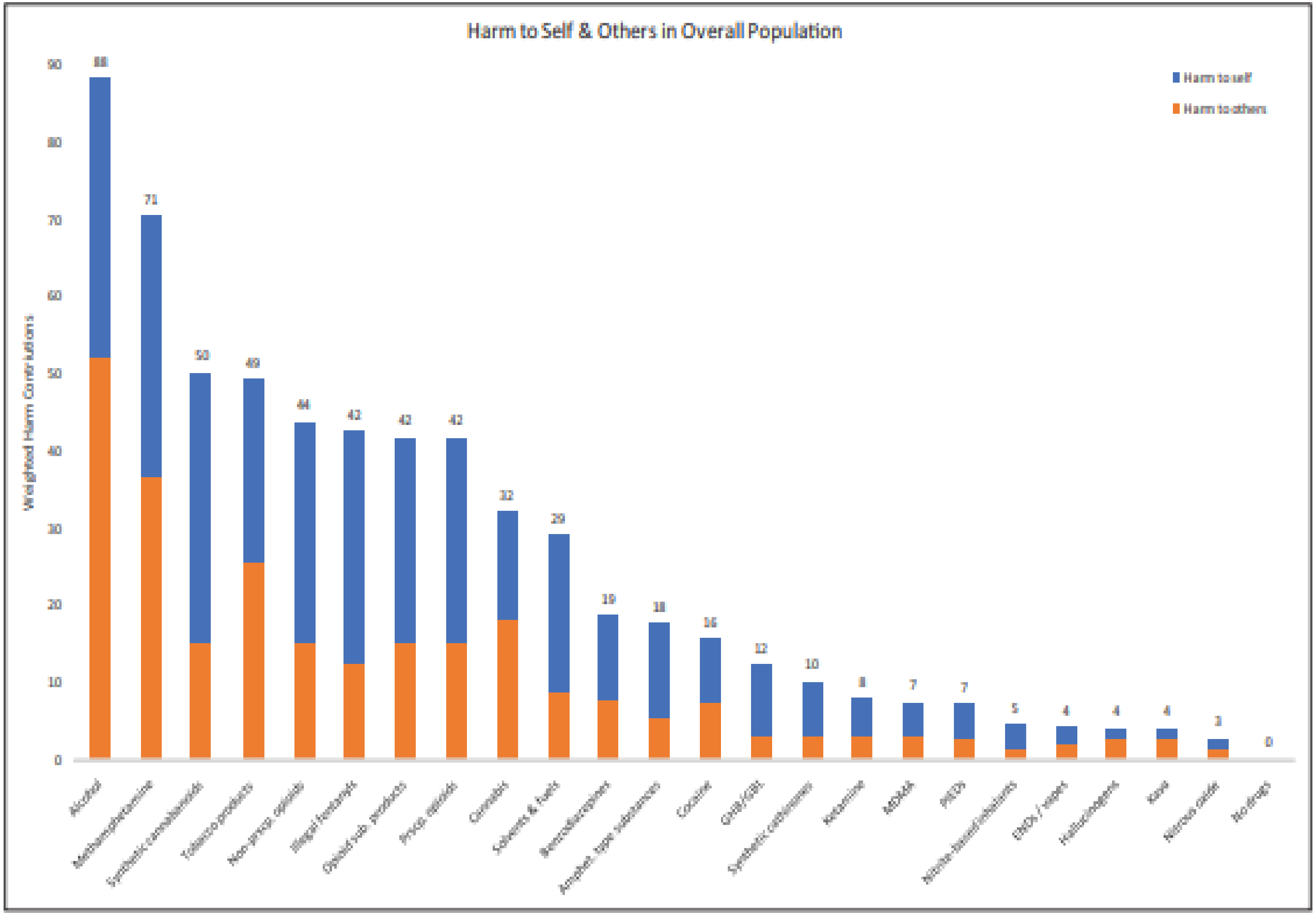
The New Zealand drug harms ranking study: A multi-criteria decision analysis

Rose Crossin[1], Lana Cleland[1,2], Chris Wilkins[3], Marta Rychert[3], Simon Adamson[2], Tuari Potiki[4], Adam C Pomerleau[5], Blair MacDonald[6], Dwaine Faletanoai[7], Fiona Hutton[8], Geoff Noller[9,10], Ian Lambie[11], Jane L Sheridan[12], Jason George[10], Kali Mercier[13], Kristen Maynard[14,15,16,17], Louise Leonard[18], Patricia Walsh[13], Rhys Ponton[19], Sue Bagshaw[20], Suresh Muthukumaraswamy[19], Tracey McIntosh[21,22], Edward Poot[23], Paul Gordon[24], Patrick Sharry[25,26], David Nutt[27] and Joseph Boden[2]

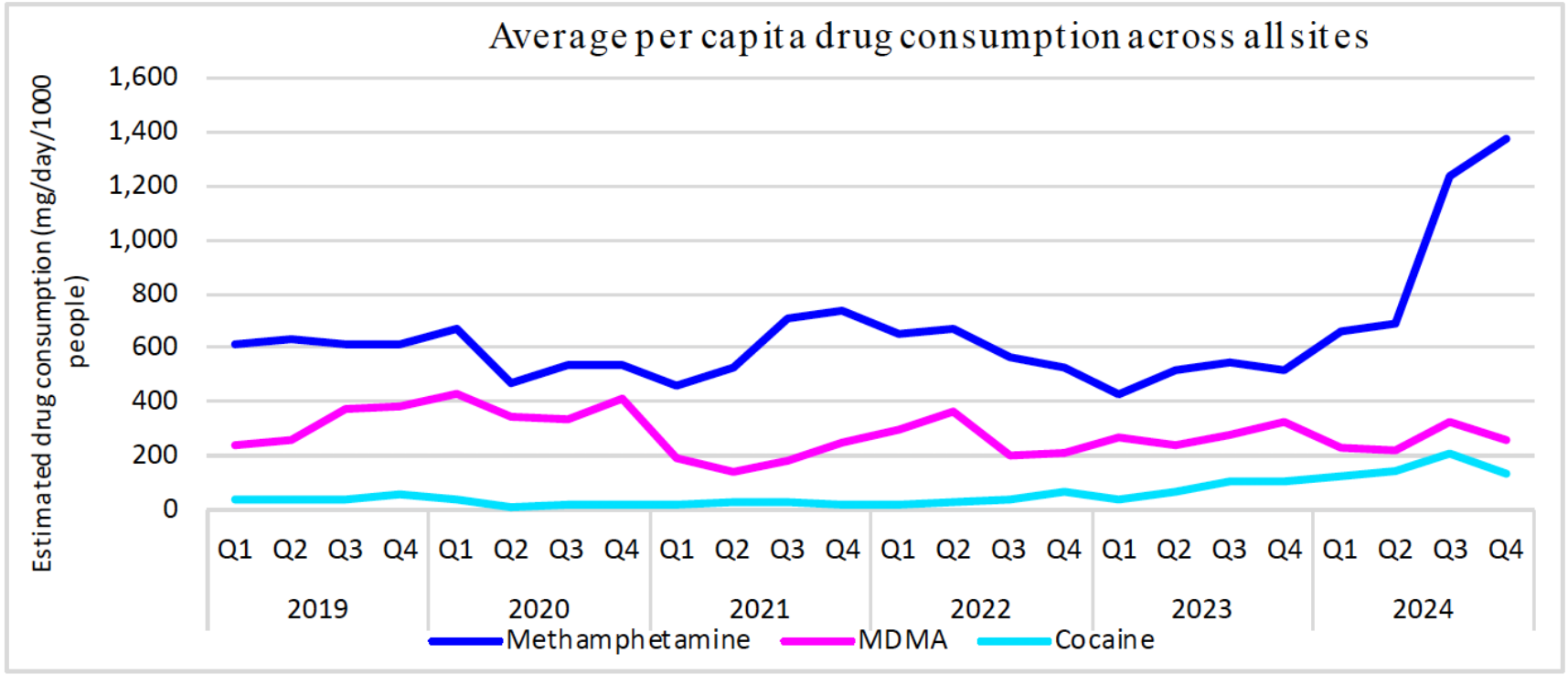
Psychopharm

Journal of Psychopharmacology
2023, Vol. 37(9) 891–903

DOI: 10.1177/02698811231182012
journals.sagepub.com/home/jop
Sage


Harm to Self & Others in Overall Population
Harm to self
Harm to others
Weighted Harm Contributions
0
10
20
30
40
50
60
70
80
90
88
71
50
49
44
43
42
42
32
29
19
18
16
12
10
8
7
7
5
4
4
4
3
0
Alcohol
Methamphetamine
Synthetic cannabinoids
Tobacco products
Non-presc. opioids
Illegal fentanyls
Opioid sub. products
Presc. opioids
Cannabis
Solvents & fuels
Benzodiazepines
Amphet. type substances
Cocaine
GHB/GBL
Synthetic cathinones
Ketamine
MDMA
PIEDs
Nitrite-based inhalants
ENDs / vapes
Hallucinogens
Kava
Nitrous oxide
No drugs

DRUGS IN WASTEWATER 2024 ANNUAL OVERVIEW



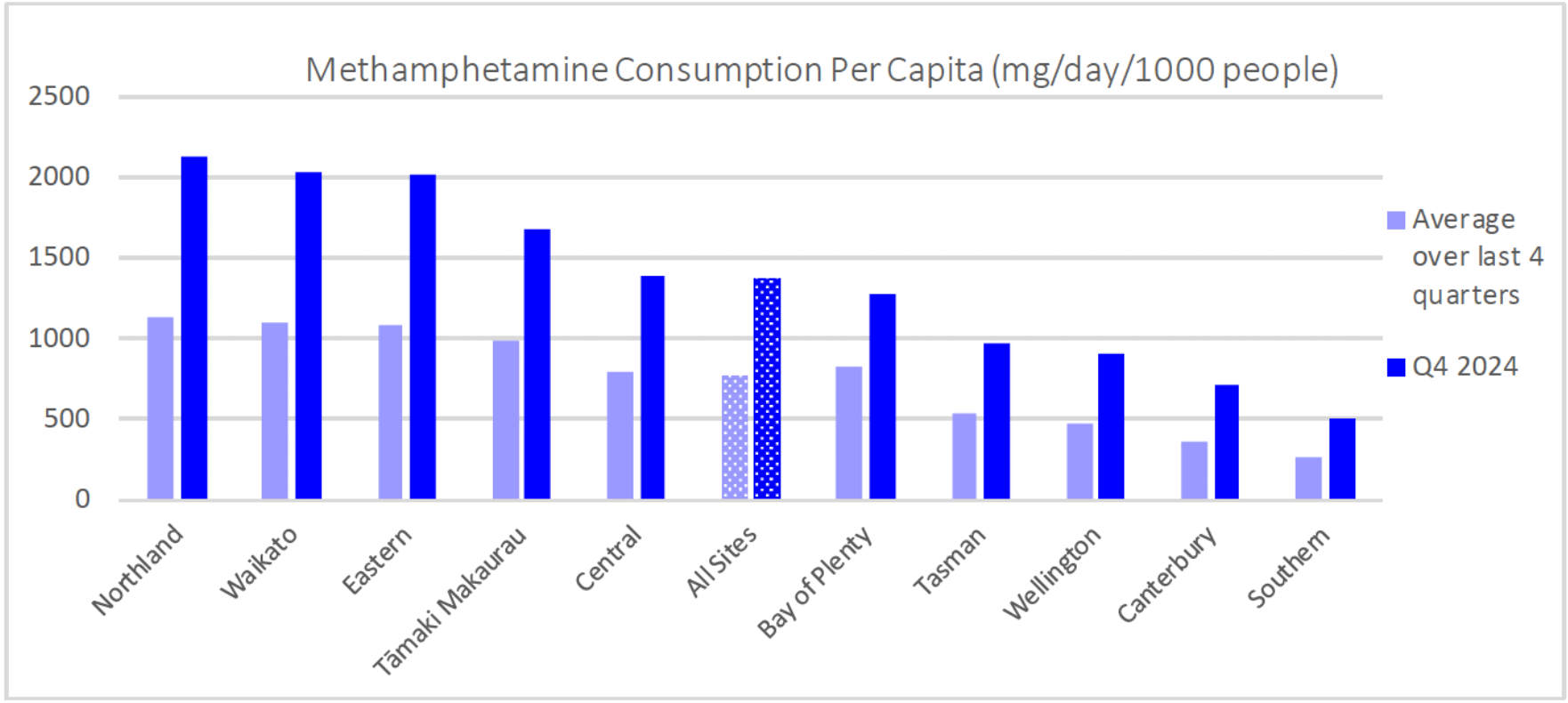
METHAMPHETAMINE

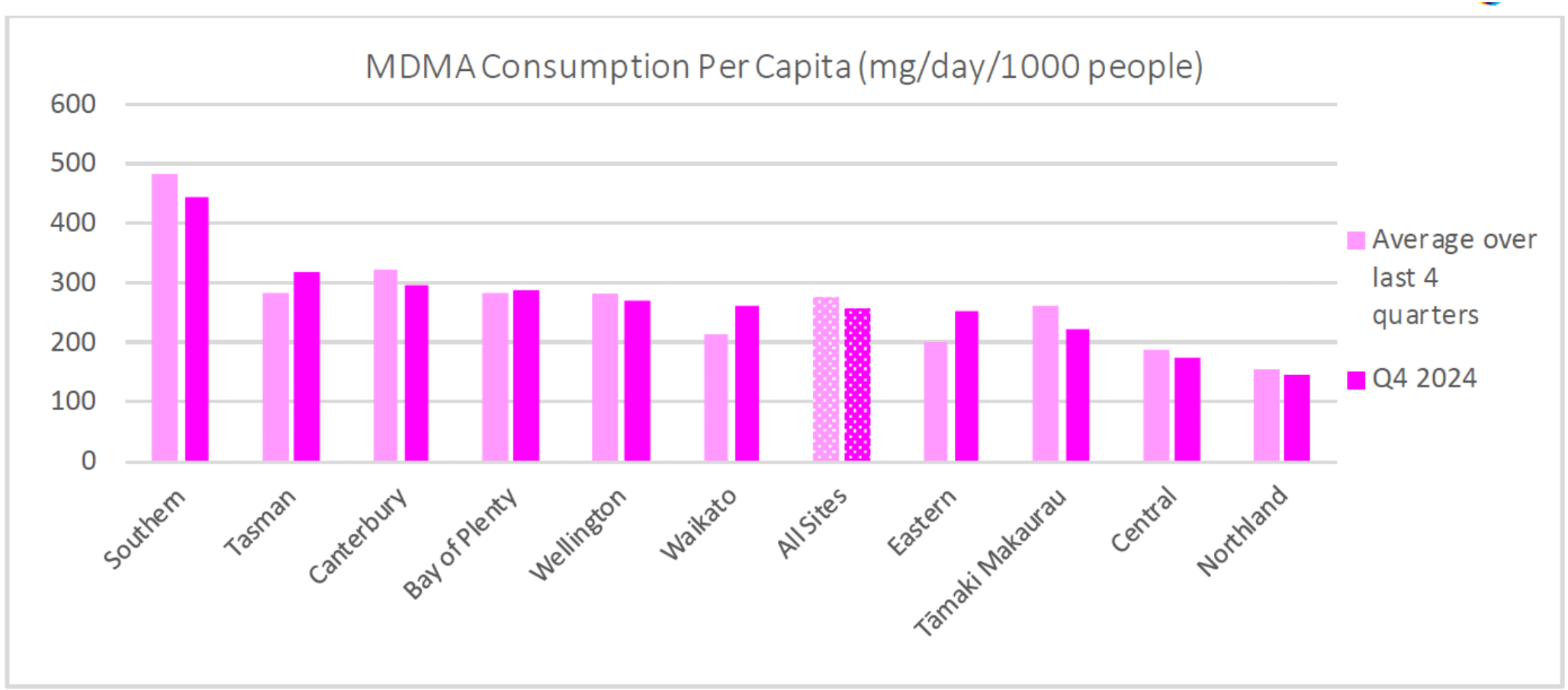
2024 saw an unprecedented 96% increase in methamphetamine consumption when compared with 2023, with consumption increasing across all sites. It is highly likely this resulted from an increase in both supply and demand, along with a decrease in street level pricing.

METHAMPHETAMINE

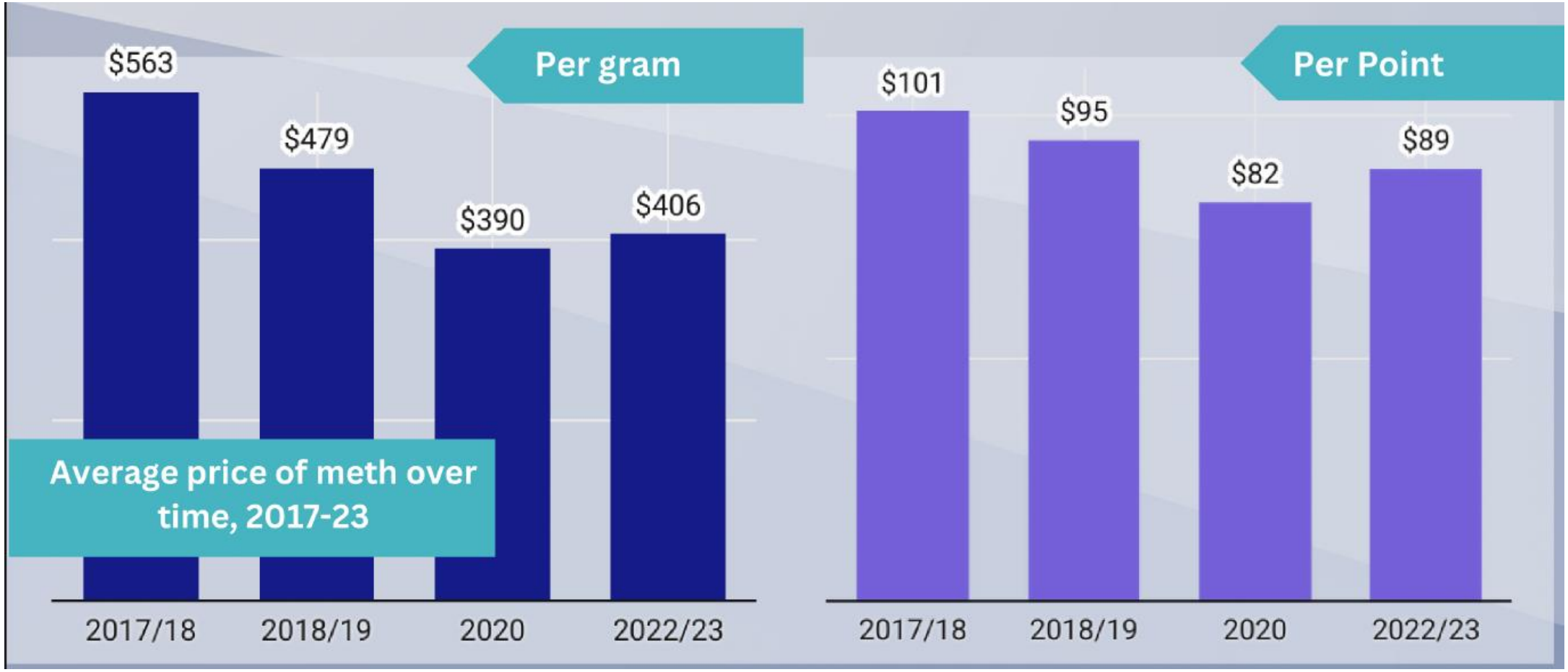
Methamphetamine use across sample sites remained elevated in Q4, averaging an estimated 36 kilograms per week. This was 78% (or 15.7 kilograms) above the average quantity consumed per week over the previous four quarters.

All districts recorded above average methamphetamine use when compared with their respective average consumption rates over the previous four quarters.




MDMA Consumption Per Capita (mg/day/1000 people)
600
500
400
300
200
100
0
Southern
Tasman
Canterbury
Bay of Plenty
Wellington
Waikato
All Sites
Eastern
Tāmaki Makaurau
Central
Northland
Average over last 4 quarters
Q4 2024

Price of meth in NZ



Why the increase?

ADDICTION

SSA SOCIETY FOR THE STUDY OF ADDICTION

ADDICTION OPINION AND DEBATE

doi:10.1111/add.15222

The dawn of a new synthetic opioid era: the need for innovative interventions

Bryce Pardo[1], Jirka Taylor[1], Jon Caulkins[2], Peter Reuter[3] & Beau Kilmer[1]

RAND Corporation, Santa Monica, CA, USA,[1] Stever University Professor of Operations Research and Public Policy, Pittsburgh, PA, USA[2] and School of Public Policy and Department of Criminology, University of Maryland, College Park, MD, USA[3]

Increasing presence of synthetic stimulants in Pacific region

- Pacific has become a significant trading highway for illicit drugs
- Limited capacity for law enforcement
- Deportee processes of US, Australia **AND** New Zealand exacerbating problem
- Growing domestic markets and associated harms emerging

ANALYSES

Drug trafficking in the Pacific Islands: The impact of transnational crime

The Pacific has become a lucrative drug corridor, driven by cartels, criminal organisations, and local gangs. Regional states and traditional partners must act rapidly and adaptively in response.

By Jose Sousa-Santos

16 February 2022

ADDICTION

SSA SOCIETY FOR THE STUDY OF ADDICTION

CLINICAL ISSUES: SUBSTANCE USE DISORDERS AND THE BODY

doi:10.1111/add.14713

Psychostimulant use disorder and the heart

Johan Duflou[1,2]

National Drug and Alcohol Research Centre, University of New South Wales, NSW, Australia[1] and Sydney Medical School, University of Sydney, NSW, Australia[2]

Cardiovascular System(CVS)Disorders and methamphetamine use

Acute

- Haemorrhagic stroke 5x increased risk, 15% of all strokes< 44yrs
- Aortic dissection (Second only to high blood pressure)
- Malignant hypertension
- IHD (vasospasm, plaque rupture, coronary artery dissection)
- Placental abruption and ischaemic bowel
- Sudden death

Chronic

- CAD
- Cardiomyopathy
- Pulmonary hypertension
- Endocarditis

Methamphetamine and cardiac arrhythmia’s

Methamphetamine has been shown to increase the risk of sudden cardiac death (27% increased risk) compared to controls

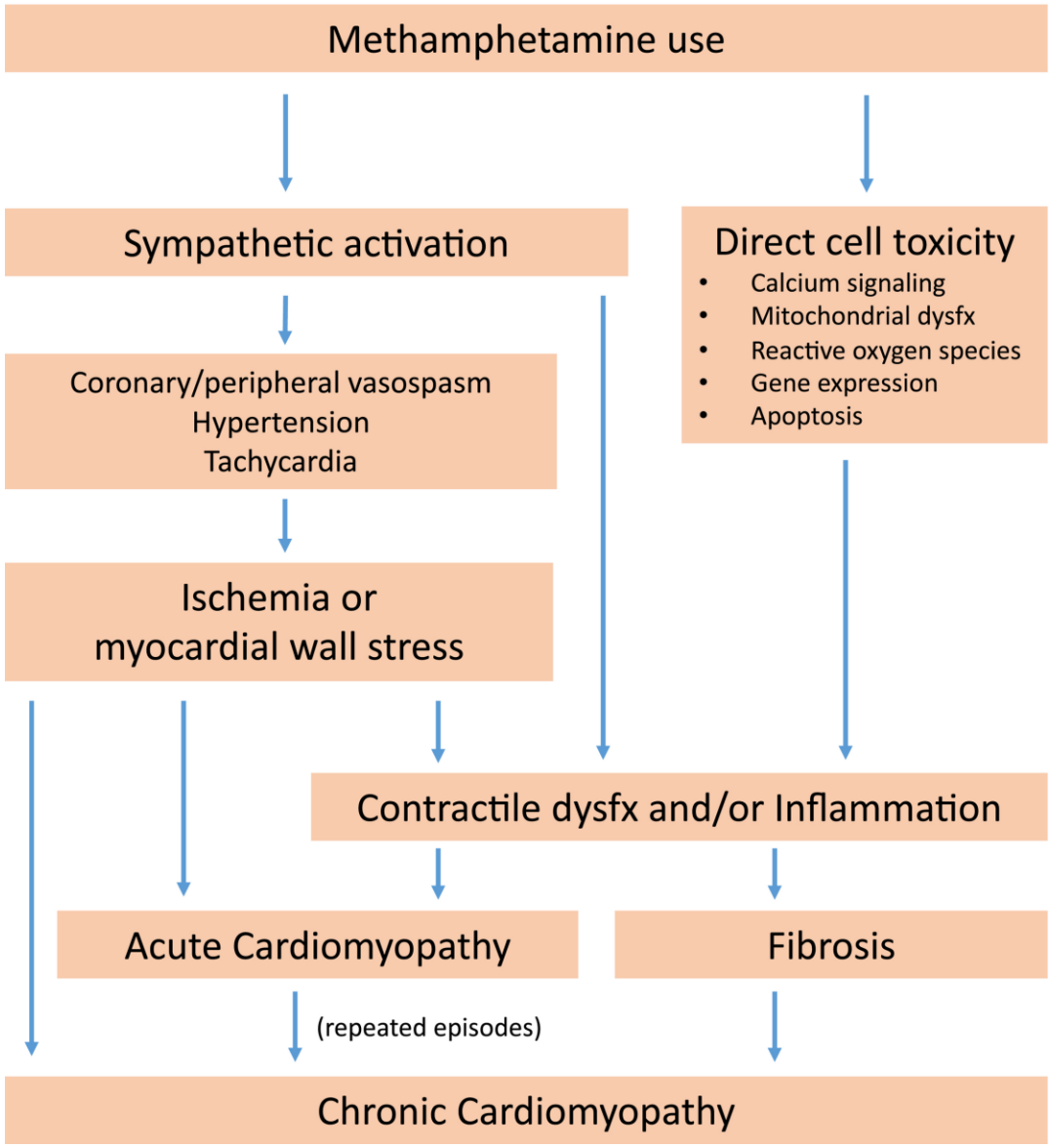
- There is growing evidence that methamphetamine induces prolonged QT acutely and chronically.

Chronic changes are due to inflammation and fibrosis of the heart with cardiac electrical remodelling, hypertrophy and impaired functioning

Methamphetamine induced cardiomyopathy

- MAC first reported in 1980's in America, increasing diagnosis globally with increase in methamphetamine use.
- Increased vulnerability in CYP2D6 extensive metabolisers
- Dilated cardiomyopathy is most commonly associated with methamphetamine use.
- Hypertrophic and stress cardiomyopathy (takotsubo) also seen with methamphetamine use.
- One study described 107 young patients with new diagnosis of idiopathic cardiomyopathy with subsequent interview and UDS 40% prevalence of methamphetamine use (Yeo et al)

Methamphetamine induced cardiomyopathy



ADDICTION

SSA SOCIETY FOR THE STUDY OF ADDICTION

CLINICAL ISSUES: SUBSTANCE USE DISORDERS AND THE BODY

doi:10.1111/add.14708

Psychostimulant use and the brain

Julia M. Lappin[1,2] & Grant E. Sara[3,4]

National Drug and Alcohol Research Centre (NDARC), University of New South Wales, Sydney, Australia,[1] School of Psychiatry, University of New South Wales, Sydney, Australia,[2] InforMH, NSW Ministry of Health, North Ryde, NSW, Australia[3] and Northern Clinical School, Sydney Medical School, The University of Sydney, Sydney, NSW, Australia[4]

- Identify main neurological effects of stimulants as stroke, neurocognitive impairment, seizures (cocaine), psychosis and Parkinson's disease
- Medicated through acute monoamine release, long term effects on neurotransmitter systems and indirect effects

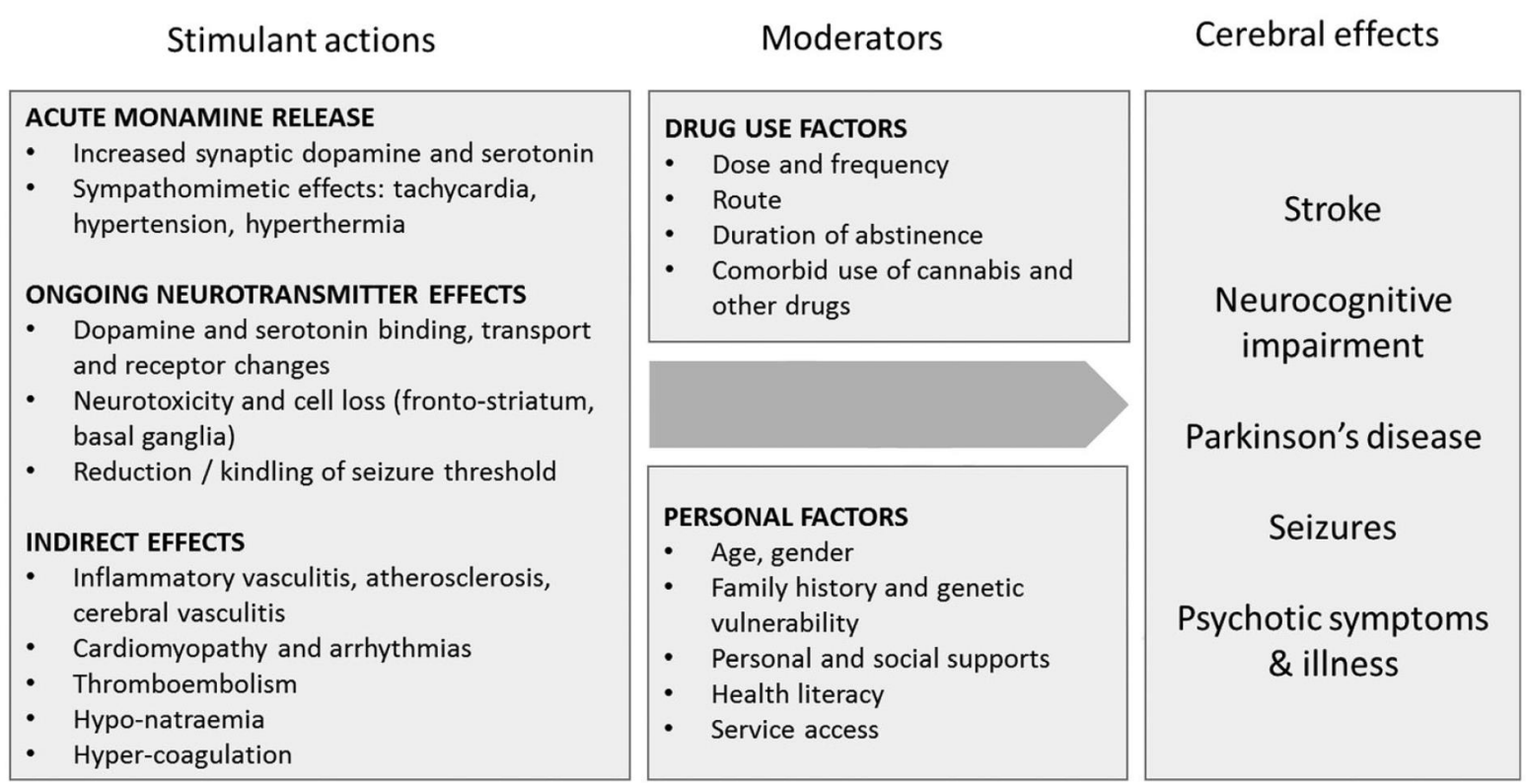


Figure 1 Overview of possible mechanisms and moderators of stimulant-related cerebral effects

Cognitive impairment

Cognitive impairment	
Epidemiology	Risks greater and deficits more widespread with amphetamines than with cocaine and MDMA Childhood deficits in cognitive function may predate amphetamine use Associations may be confounded by comorbidity with other substance use or mental disorders
Clinical presentation	Impairments in multiple domains, but greatest in learning, executive function, concentration, memory. Reduced cognitive flexibility, difficulty screening irrelevant information Impairments improve at least partially with abstinence
Causal mechanisms	Reduced dopamine receptor density and release. Specific reductions in caudate nucleus, striatum and mid-brain Structural damage and neurotoxicity in dopaminergic and serotoninergic neurons

Psychosis

Psychosis	
Epidemiology	Transient symptoms: 80% 12-month prevalence in recreational users. Increased with regular, high-dose or dependent use
Clinical presentation	Drug induced psychotic episodes: 13% in recreational users, 27% in dependent users High rate of stimulant use (15–30%) in early or prodromal psychotic illness More than 30% of amphetamine-induced psychosis may transition to schizophrenia Primarily positive symptoms (hallucinations, persecutory ideas). Dose-dependent, more likely at times of regular use. Absence of negative symptoms and broader deficits of schizophrenia High rate of comorbid cannabis use
Causal mechanisms	Increase synaptic DA by increased release, reduced uptake, suppression of monoamine oxidase Interaction with personal vulnerability, schizotypal traits and family history Frequent comorbidity with cannabis, possible additive effects

DA = dopamine; MDMA = 3,4-methylenedioxymethamphetamine; GABA = gamma-aminobutyric acid.

Psychosis

Methamphetamine-related psychosis is a growing public health concern. All individuals with transient amphetamine-related psychotic symptoms should be considered to be at risk for future development of an enduring psychotic illness, and prioritized for early intervention of integrated care across substance use and mental health services.

- Lappin et.al. Lancet 2016

Discussing the concept of substance-induced psychosis (SIP)

Jørgen G. Bramness[1,2,3,4], Carsten Hjorthøj[5,6], Solja Niemelä[7,8], Heidi Taipale[9,10,11] and Eline Borger Rognli[4]

Treatments

	Effect	Size of effect	Level of evidence
Screening and brief intervention	No effect	IRR 0·97 (0·77 to 1·22)	B[71]
Motivational enhancement therapy (also known as motivational interviewing)	No effect	RR 1·16 (0·95 to 1·42)	B[72]
Self-help interventions	No effect	Hedges' g 0·13 (–0·05 to 0·31)	A[73]
Self-help interventions involving peers	No effect	OR 0·75 (0·30 to 1·86)	A[74]
Peer-based support groups (12-step programmes, and NA)	Potential decrease	Insufficient evidence	B*[75]
Cognitive behaviour therapy	No effect	OR 1·17 (0·79 to 1·74)	A[74]
Family interventions, multisystemic therapy	Potential decrease	NE	B[76]
Contingency management	Decrease	OR 2·22 (1·59 to 3·10)	A[74]
Community reinforcement approach	No effect	OR 2·10 (0·67 to 6·59)	A[74]
Acceptance and commitment therapy	No effect	Compared with CBT RR 0·73 (0·26 to 2·07)	B[72]
Meditation-based therapies	No effect	OR 1·37 (0·48 to 3·93)	A[74]
Psychostimulant drugs	Decrease	RR 1·36 (1·05 to 1·77)	A[77]
Dopamine agonists	No effect	OR 1·12 (0·85 to 1·47)†	A[78]
Antidepressants	No effect	OR 1·22 (0·99 to 1·51)†	A[79]
Antipsychotics	No effect	OR 1·30 (0·72 to 2·33)†	A[80]
Therapeutic communities	No effect	RR 1·05 (0·87 to 1·27)†	C[81]
Compulsory drug treatment	No effect	Very low-quality evidence; likely to not be effective†	C[82]
Compulsory drug detention centres	No effect	Very low-quality evidence; likely to not be effective*	C[83]
Other law enforcement interventions (drug courts)	Unclear	OR 1·49 (0·88 to 2·53)‡	D[84]
Criminalisation of drug use	..	..	..

IRR=incidence rate ratio. RR=rate ratio. OR=odds ratio. NA=not applicable. CBT=cognitive behavioural therapy. NE=no pooled quantitative estimate reported. Level of evidence: A=consistent conclusions across meta-analyses, high-quality systematic reviews, or multiple randomised controlled trials. B=evidence from one or two randomised controlled trials only. C=high-quality systematic reviews with some inconsistent conclusions from authors; or multiple consistent ecological studies, or cohort studies. D=cross-sectional association, case series suggesting outcome, single cohort study. *Evidence from people with substance use problems not necessarily stimulants. †Evidence specifically for cocaine. ‡Evidence specifically for amphetamines.

Table 3: **Summary of the evidence of interventions to reduce stimulant use**

ORIGINAL ARTICLE

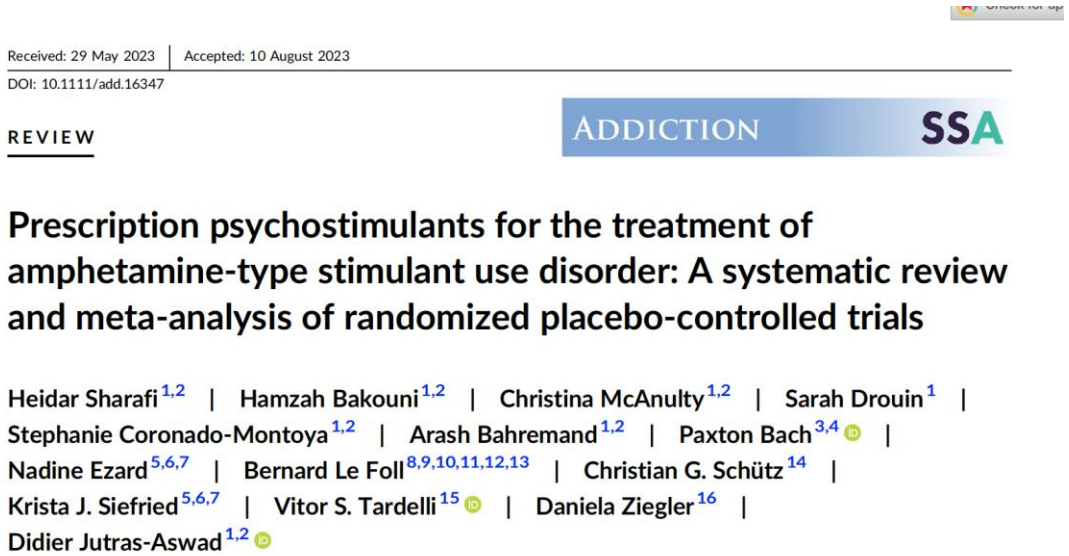
Bupropion and Naltrexone in Methamphetamine Use Disorder

Authors: Madhukar H. Trivedi, M.D., Robrina Walker, Ph.D., Walter Ling, M.D., Adriane dela Cruz, M.D., Ph.D., Gaurav Sharma, Ph.D., Thomas Carmody, Ph.D., Udi E. Ghitza, Ph.D., +12 , and Steven Shoptaw, Ph.D. Author Info & Affiliations

Published January 13, 2021 | N Engl J Med 2021;384:140-153 | DOI: 10.1056/NEJMoa2020214 | VOL. 384 NO. 2

Substitution treatment?

- Systematic review of 10 RTC (x=561)
- Trials included studies of methylphenidate (7) in doses of 54-180 mg and dexamphetamine (3) in doses of 60-110mg
- Some reduction in amp + urine associated with high dose long term treatments (> 162mg methylphenidate) on subgroup analysis and may reduce craving



Received: 29 May 2023 | Accepted: 10 August 2023
DOI: 10.1111/add.16347

REVIEW

ADDICTION SSA

Prescription psychostimulants for the treatment of amphetamine-type stimulant use disorder: A systematic review and meta-analysis of randomized placebo-controlled trials

Heidar Sharafi[1,2] | Hamzah Bakouni[1,2] | Christina McAnulty[1,2] | Sarah Drouin[1] | Stephanie Coronado-Montoya[1,2] | Arash Bahremand[1,2] | Paxton Bach[3,4] | Nadine Ezard[5,6,7] | Bernard Le Foll[8,9,10,11,12,13] | Christian G. Schütz[14] | Krista J. Siefried[5,6,7] | Vitor S. Tardelli[15] | Daniela Ziegler[16] | Didier Jutras-Aswad[1,2]

Worth it?

Received: 19 December 2023 | Accepted: 20 December 2023
DOI: 10.1111/add.16434

LETTER TO THE EDITOR

ADDICTION SSA

Response to Hall *et al.*: Prescription psychostimulants for amphetamine-type stimulant use disorder - acknowledging challenges but not giving up on its potential cost-effectiveness

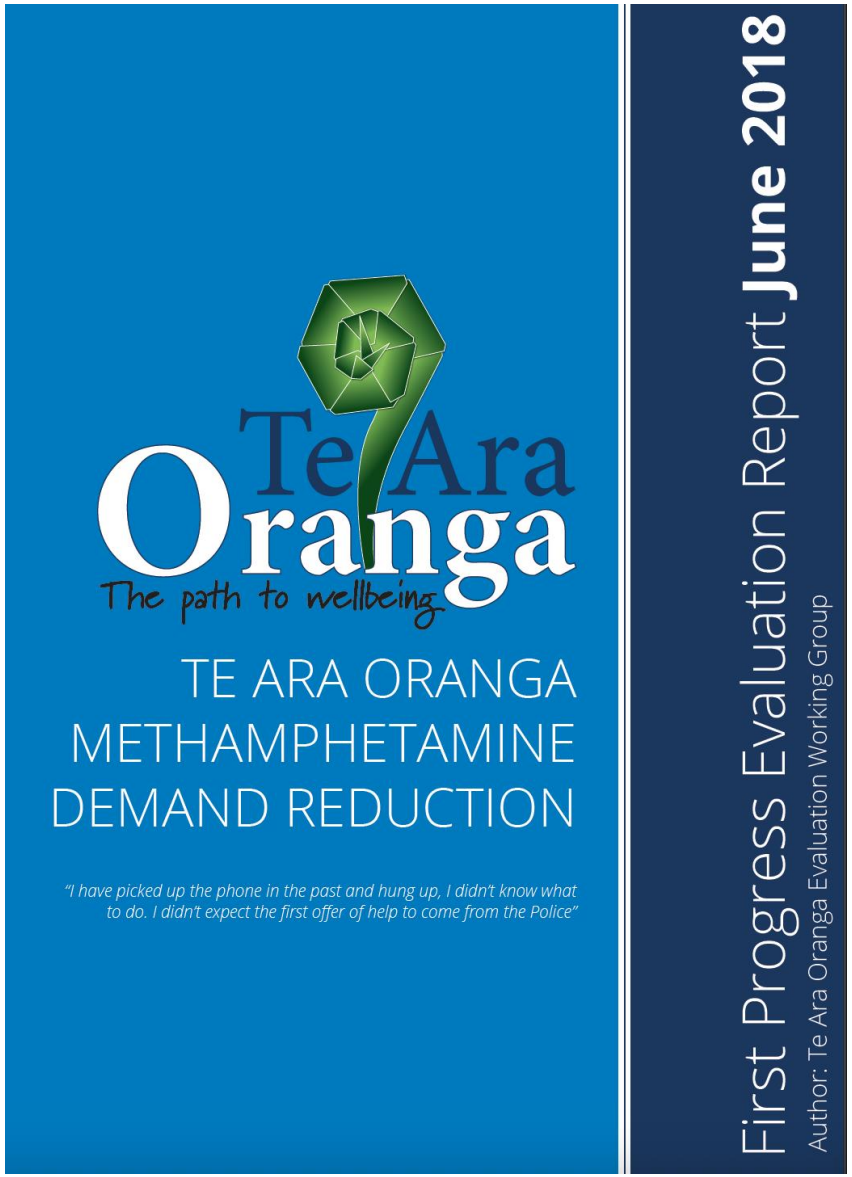
Received: 14 November 2023 | Accepted: 20 November 2023
DOI: 10.1111/add.16416

LETTER TO THE EDITOR

ADDICTION SSA

Do we need clinical trials of high dose stimulant agonist treatment for stimulant use disorders?

Community interventions



METHAMPHETAMINE

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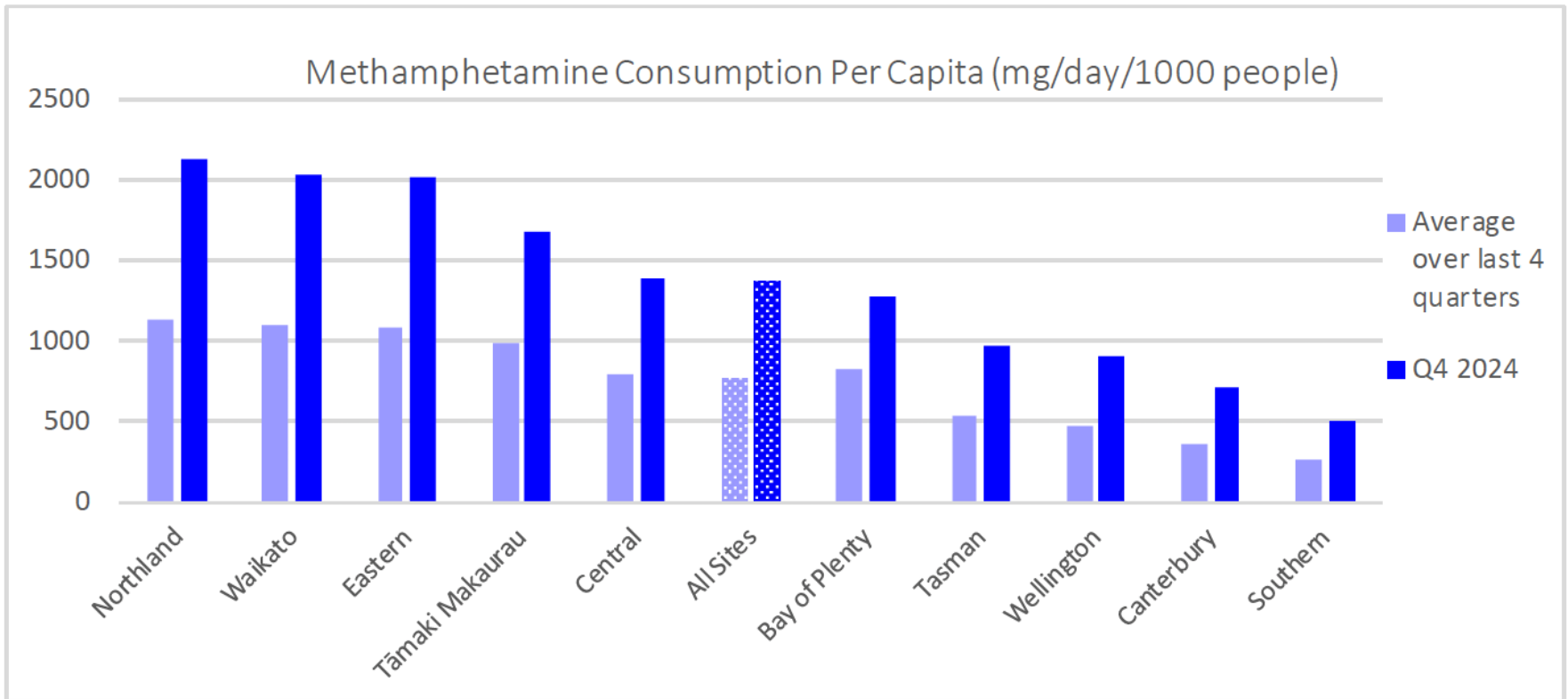

Deaths of despair

"But as the crisis has evolved to include heroin, fentanyl, and most recently stimulant drugs, it has become all too clear that the problem is far more complex. It is about pain, but that pain is as much social as it is physical. It is inflicted by increasingly difficult realities in which more and more people find themselves isolated, struggling, and despairing"

Drug and Alcohol Dependence 222 (2021) 108678

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Commentary

To end the opioid crisis, we must address painful social disparities

Nora D. Volkow

National Institute on Drug Abuse, United States

Prevention of mental disorders requires action on adverse childhood experiences

Anthony F Jorm[1] and Roger T Mulder[2]

Why has increased provision of psychiatric treatment not reduced the prevalence of mental disorder?

Roger Mulder[1], Julia Rucklidge[2] and Sam Wilkinson[1]

"It may be time for psychiatry to focus more on factors outside the delivery of good clinical practice to those with a mental illness……. We also need to consider whether there has been too little emphasis on reducing incidence through prevention?"

Mulder et.al 2017

Discussion