

Chemsex and the Brain

Dr. Stephen Naulls MBBS BSc MSc

NIHR Academic Clinical Fellow – Department of Clinical Neuroscience, Brighton & Sussex Medical School



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@ChemsexBrain
chemsexbrain.com

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Deaths related to drug poisoning in England and Wales: 2024 registrations

Deaths related to drug poisoning in England and Wales from 1997 to 2024, by year, sex, age and substances involved in the death.

This is the latest release. [View previous releases](#)



Contact:

[Population Health Monitoring group](#)

Release date:

17 October 2025

Next release:

To be announced

ADDICTION



SHORT REPORT | [Open Access](#) |

Characteristics of drug-related deaths among individuals identified as LGBTQ+ in the United Kingdom, 1997–2024

Emmert Roberts [✉](#) Miriam Hillyard, Caroline Copeland

First published: 20 September 2025 | <https://doi.org/10.1111/add.70198>

Funding information: This study was supported by the corresponding author's National Institute of Health and Care Research (NIHR) Advanced Fellowship (NIHR302215). The funders had no contribution to the study design; the collection, analysis and interpretation of data; the writing of the report; and the decision to submit the article for publication.

☰ SECTIONS



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TOOLS



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ADDICTION



SHORT REPORT | [Open Access](#) |

Characteristics of methamphetamine-related deaths in the United Kingdom, 1997–2024

Emmert Roberts [✉](#) Rebecca McKetin, Caroline Copeland

First published: 15 October 2025 | <https://doi.org/10.1111/add.70215>

Funding information: This study was supported by the corresponding author's National Institute of Health and Care Research (NIHR) Advanced Fellowship (NIHR302215). The funders had no contribution to the study design; the collection, analysis and interpretation of data; the writing of the report; and the decision to submit the article for publication.

All-cause and cause-specific mortality by sexual orientation, England and Wales: March 2021 to November 2024

Leading causes of death and all-cause and cause-specific mortality rates per 100,000 people by sexual orientation, broken down by Census 2021 characteristics.

This is the latest release. [View previous releases](#)

Contact:

National Statistician's Analysis Unit

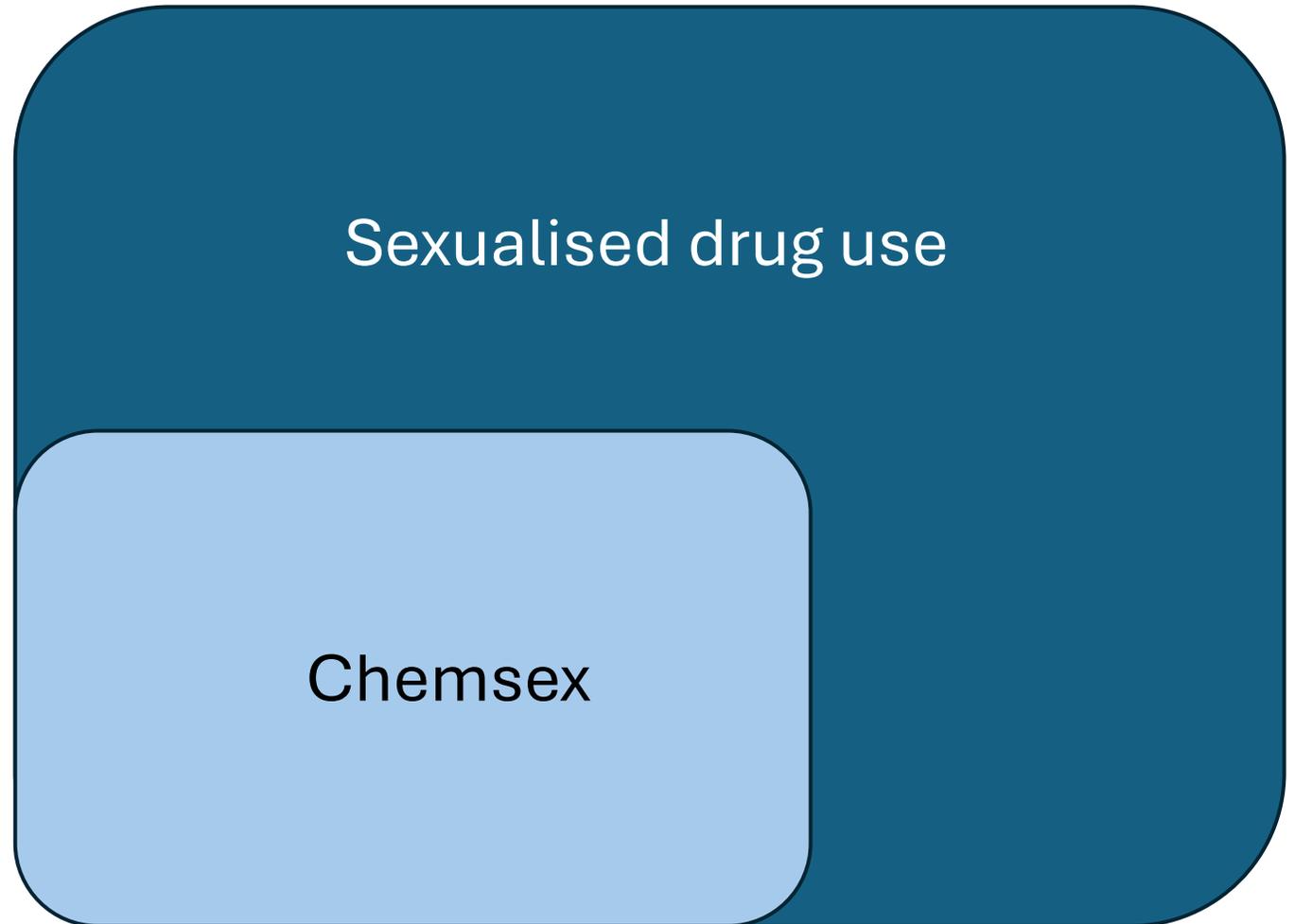
Release date:

13 January 2026

Next release:

To be announced

What is chemsex?



What is chemsex?

Chemsex: origins of the word, a history of the phenomenon and a respect to the culture

David Stuart, (2019) "Chemsex: origins of the word, a history of the phenomenon and a respect to the culture", Drugs and Alcohol Today, Vol. 19 Issue: 1, pp.3-10, <https://doi.org/10.1108/DAT-10-2018-0058>

The use of specific drugs, used specifically for sex, by gay and bisexual men who sleep with men (GBMSM).

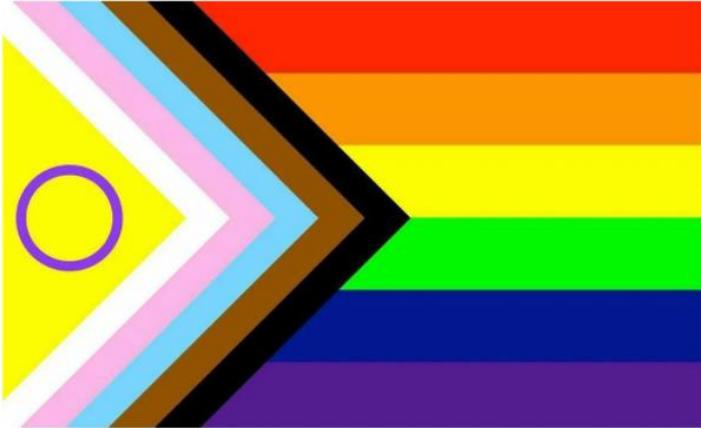
Crystal methamphetamine, GHB/GBL, synthetic cathinones (e.g. mephedrone) = 'chems'

Responsible for the specific 'chemsex' high people are chasing

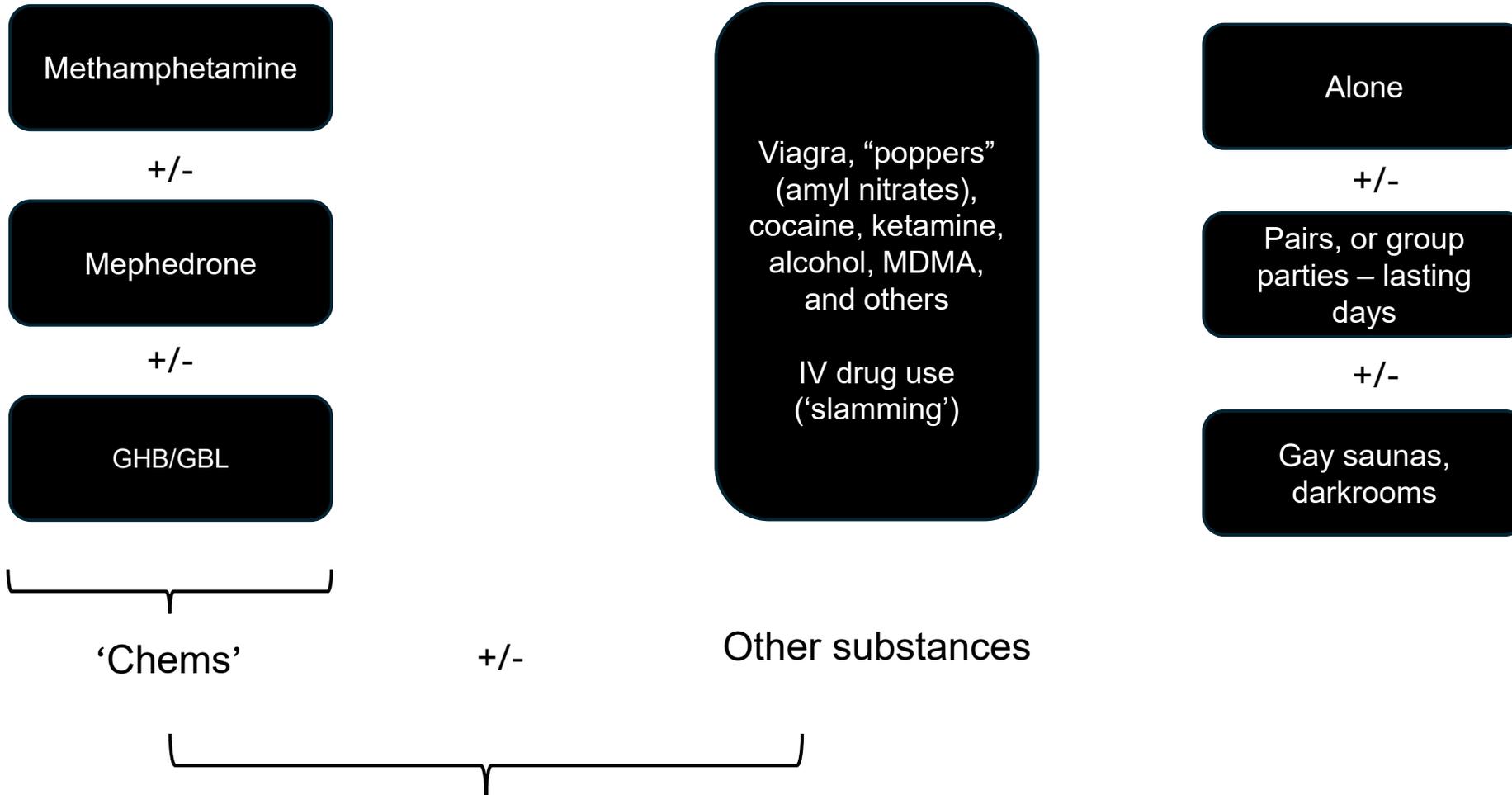
Use of other substances common (Viagra, amyl nitrate "poppers", cocaine, *ketamine*)

Often constitute the polysubstance use alongside chemsex drugs

The roots of chemsex & ongoing facilitators



Putting it together



Unique patterns of **polysubstance use** + Sexual activity = **'Chemsex'**

Putting it together

Methamphetamine

+/-

Mephedrone

+/-

GHB/GBL

Viagra, "poppers"
(amyl nitrates),
cocaine, ketamine,
alcohol, MDMA,
and others

IV drug use
(‘slamming’)

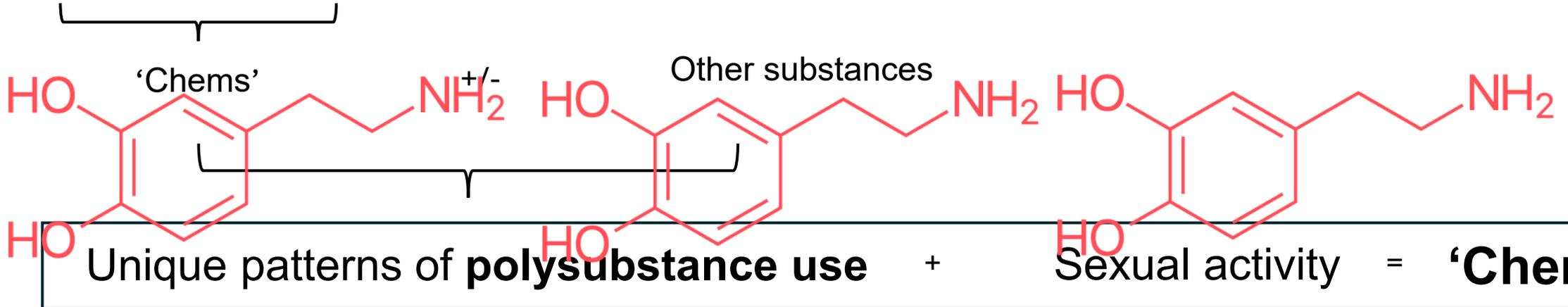
Alone

+/-

Pairs, or group
parties – lasting
days

+/-

Gay saunas,
darkrooms



Substance	Neurotransmitter effect	Main imaging findings	Key effects
METHAMPHETAMINE (T, Tina)	Increased dopamine, serotonin, and noradrenaline through release and reuptake inhibition	Reduces striatal DAT binding and cortical thinning (MRI, PET) Weaker front-striatal functional connectivity (rs-fMRI)	Euphoria Cognitive impairment Risk of psychosis
MEPHEDRONE (M-cat)	Increased dopamine and serotonin via release and reuptake inhibition	Limited human studies Increased striatal signal, then serotonergic damage	Short-lived euphoria Enhanced sociability, Paranoia
GHB/GBL (G, Gina)	GABA-B receptor agonist (inhibitory), biphasic dopamine effect (initial inhibition then increased release)	Repeated GHB comas show high activation of DLPFC Disrupted DMN-salience coupling (task & rs-fMRI)	Euphoria at low doses Sedation and blackouts High risk of overdose

Chemsex Drugs and the Brain: A Systematic Review of Neuroimaging Studies

Stephen Naulls, James Stone

Citation

Stephen Naulls, James Stone. Chemsex Drugs and the Brain: A Systematic Review of Neuroimaging Studies. PROSPERO 2025 CRD420251105737. Available from <https://www.crd.york.ac.uk/PROSPERO/view/CRD420251105737>.

REVIEW TITLE AND BASIC DETAILS

Review title

Chemsex Drugs and the Brain: A Systematic Review of Neuroimaging Studies

NEUROBIOLOGICAL MECHANISMS UNDERPINNING CHEMSEX: a scoping review of human neuroimaging and neurophysiological studies

Naulls S^{1,2,3}, Eccles J^{1,2,3}, Stone J^{1,2,3}

Study	Chemsex defined cohort	MSM or LGBT sample stated	Sexual cues or tasks	Drug exposure studied	Polysubstance use	Sexual decision making	Social / partner context	Repeated dosing / duration	Executive control
Bosch et al. 2017a (GHB erotic fMRI)	X	X	✓	✓ (GHB)	X	X	X	X	X
Bosch et al. 2017b (GHB ASL)	X	X	X	✓ (GHB)	X	X	X	X	X
Bosch et al. 2018 (GHB rsFC)	X	X	X	✓ (GHB)	X	X	X	X	X
Huang et al. 2018 (MA + sexual cues)	X	X	✓	✓ (MA history)	X	X	X	X	X
Chen et al. 2020 (MA abstinence)	X	X	✓	✓ (MA history)	X	X	X	X	△
Yan et al. 2024 (MA abstinence trajectory)	X	X	✓	✓ (MA history)	X	X	X	X	△
Droutman et al. 2019 (casual MA decision making)	X	X	X	✓ (MA history)	X	△ (non sexual risk)	X	X	✓
Xue et al. 2018a (erotic Go NoGo MSM)	X	✓	✓	X	X	✓	X	X	✓
Smith et al. 2018 (safe sex negotiation MSM)	X	✓	✓	X	X	✓	✓ (simulated)	X	△
Barkley Levenson et al. 2018 (Stroop MSM)	X	✓	X	X	X	△	X	X	✓
Liao et al. 2018 (ketamine cues)	X	X	✓	✓ (ketamine)	X	X	X	X	X
Klöbl et al. 2026	X	X	✓	✓ (ketamine)	X	△ (sexual arousal)	X	X	X
Schwarz et al. 2025 (chemsex EEG)	✓	✓	X	✓ (multiple)	△	△	X	△	✓

Naulls et al, 2026

PILOT STUDY

GBMSM engaged in
chemsex
(n=10)

Men who don't use drugs
(n=10)

- Basic demographics
- Validated psychiatric assessment scales (PHQ-9, GAD-7, BIS, CSBI)
- ASSIST
- Chemsex questionnaire

- Structural images, rs-fMRI, Stop Signal Task, 1H-MRS, NM-MRI

- Assess feasibility and establish basis for a power calculation

How does **CHEMSEX** impact the brain?



We are recruiting volunteers for a study assessing how chemsex affects brain function.

We are looking for:

- Gay and bisexual men who take part in chemsex (use of drugs during sex).
- Gay and bisexual men who don't use drugs as a control group.

@chemsexbrain
CHEMSEXBRAIN.COM



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If you are interested in taking part or want more information, scan the QR code or contact Dr Stephen Naulls at Brighton & Sussex Medical School: stephen.naulls5@nhs.net

Multiple populations?

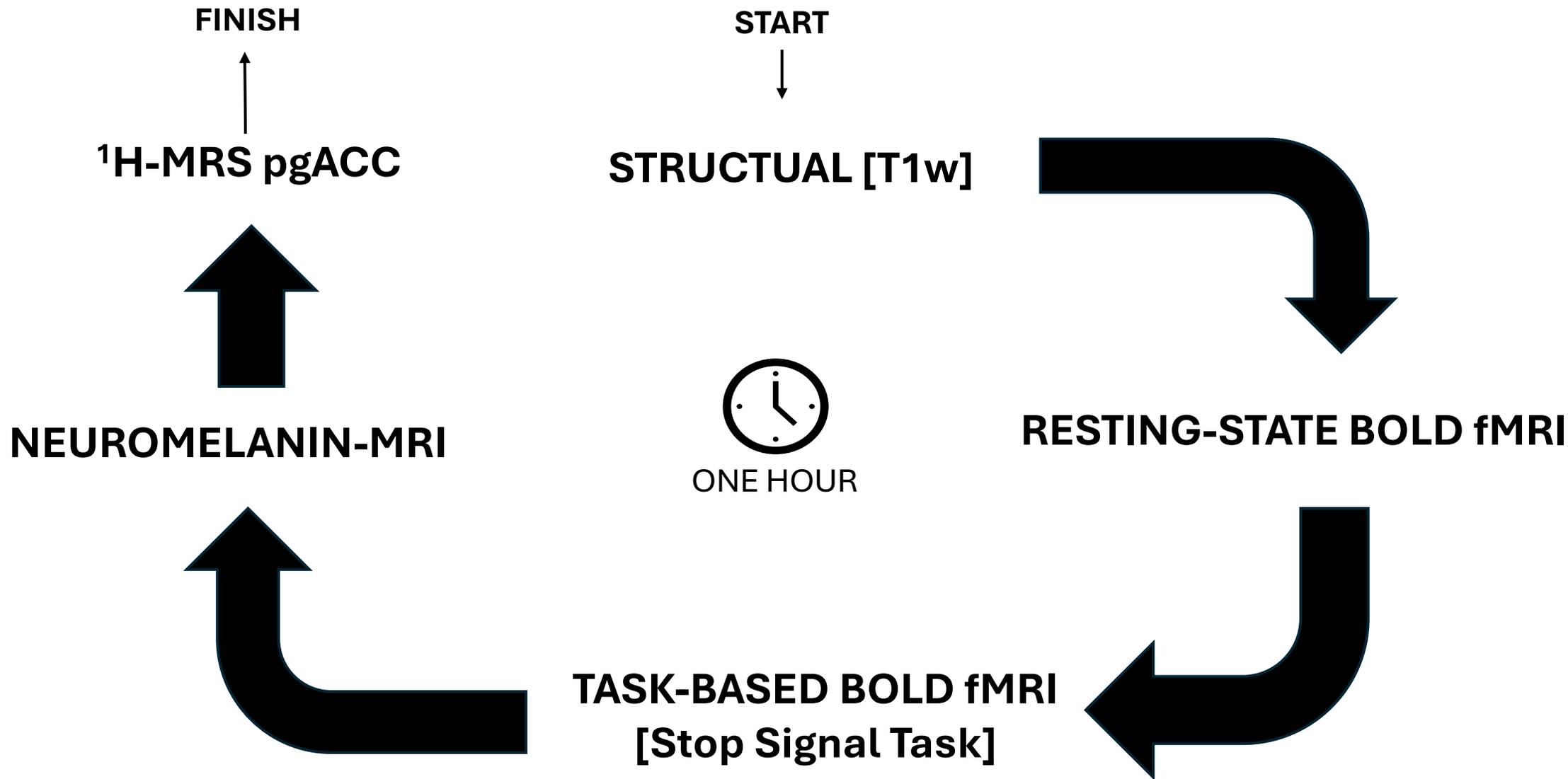
- Minority stress model
- Adverse childhood experiences (*?cPTSD*)
- Neurodivergence (*ADHD, self-medication*)
- Compulsive sexual behaviour
- Hedonism
- Conventional ‘addiction’ cohort (*more deprived SES?*)
 - *What about the rich Kensington lawyers?*

“problematic and non-problematic” vs continuum

Review

Chemsex as a Diagnostic Challenge: Toward Recognition in ICD-12 and Integrated Treatment Approaches—A Narrative Review

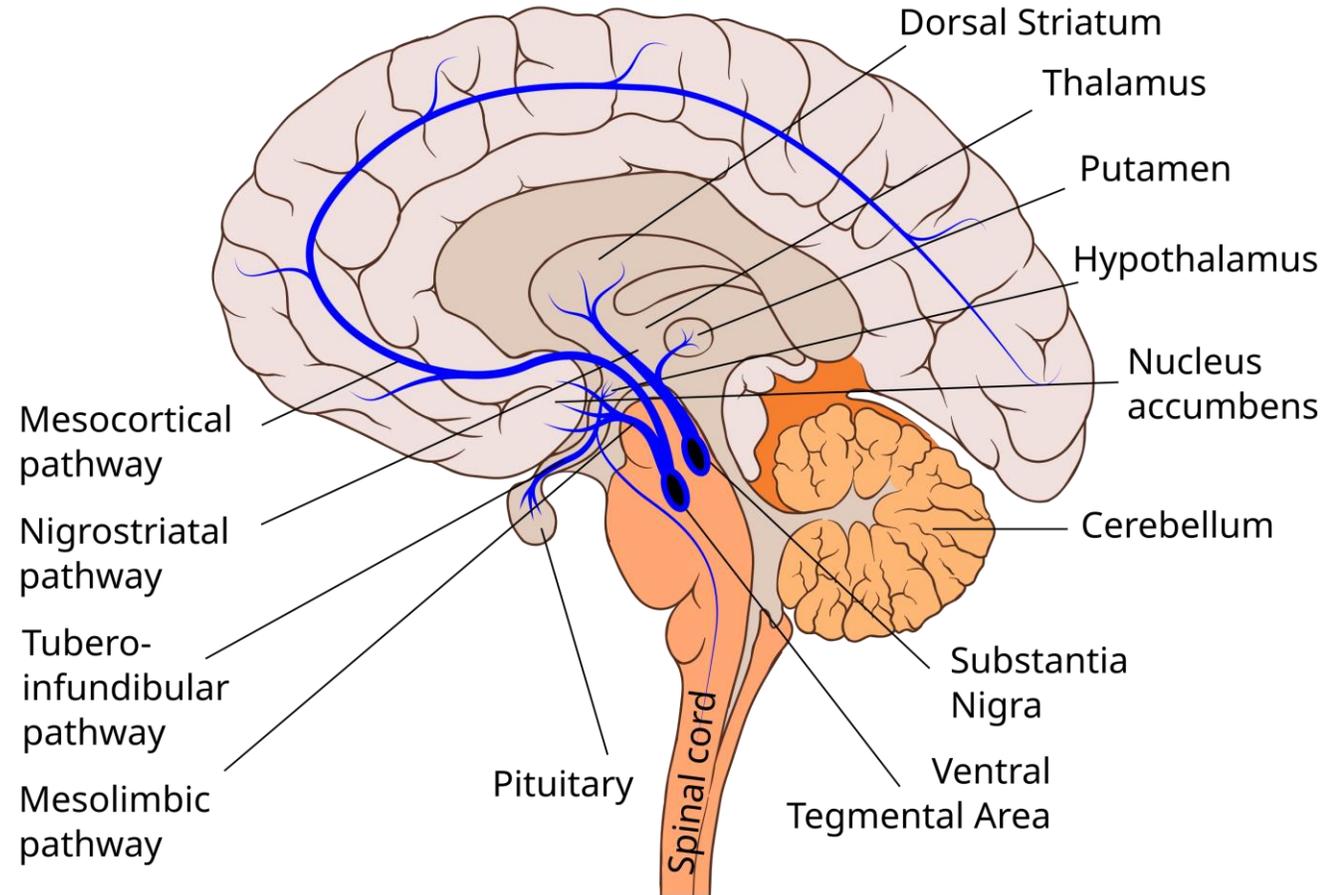
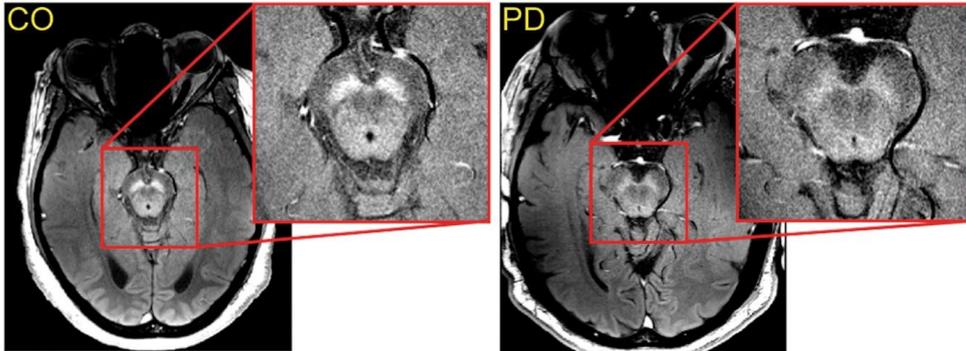
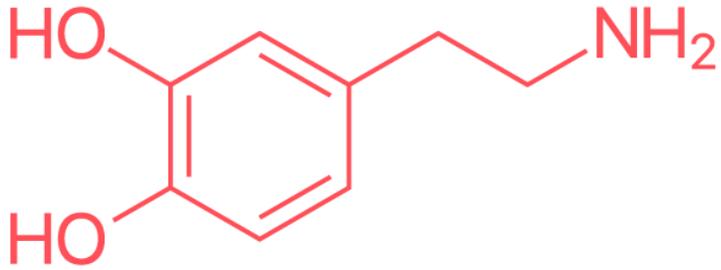
Justyna Śniadach ^{1,*}, Wiktor Orlof ¹, Justyna Sołowiej-Chmiel ¹, Aleksandra Kicman ¹, Sylwia Szymkowiak ² and Napoleon Waszkiewicz ^{1,*} 



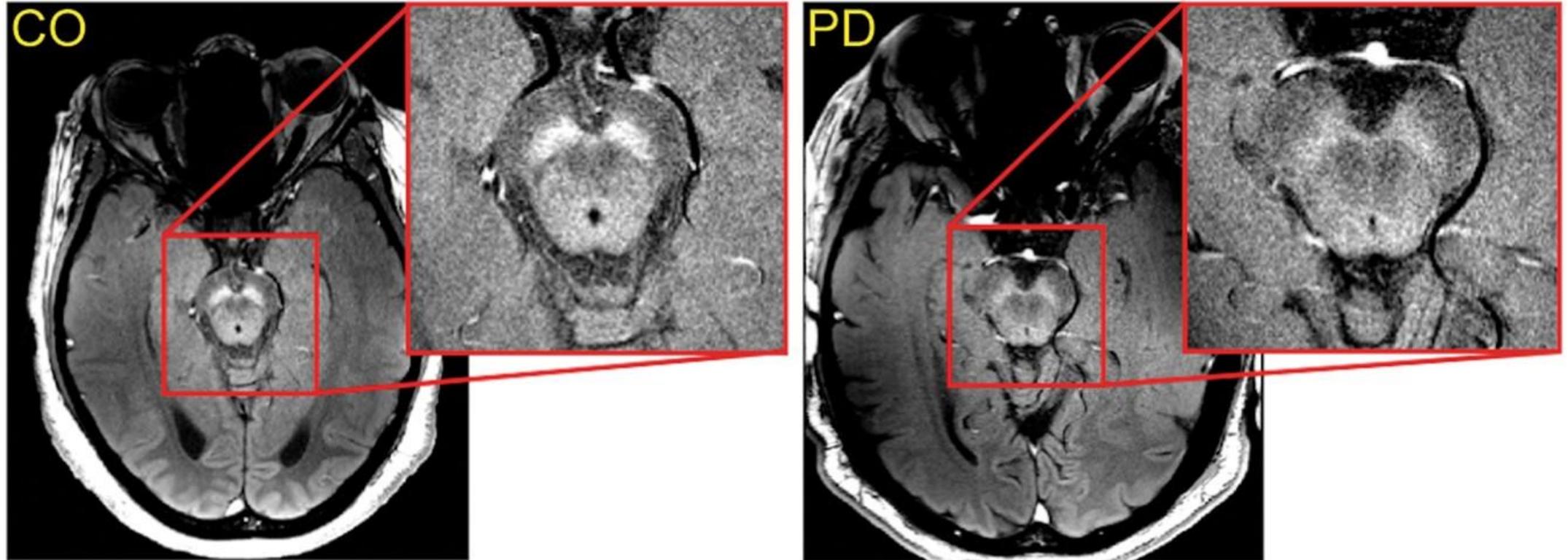
Psychometrics

Measure	Control Mean	Control SD	Chemsex Mean	Chemsex SD	p
PHQ-9	2.71	2.63	5	3.02	0.1449
GAD-7	3	2.31	4.5	3.42	0.3456
BIS-11	55.14	5.4	65.63	10.77	<i>0.0369*</i>
CSBI	22	6.43	28.75	5.47	<i>0.0466*</i>
ASSIST	9	7.4	80	21.36	<i>0.000009*</i>

Unique patterns of **polysubstance use** + Sexual activity = **'Chemsex'**



Neuromelanin-sensitive MRI



is a high-resolution T1-weighted imaging technique that detects neuromelanin-laden dopaminergic and noradrenergic neurons.

Next steps

- Integrate findings across modalities and publish
- Await outcome of funding applications...
- Continue to work with you all

Thanks!



ChemsexBrain

@ChemsexBrain

chemsexbrain.com

Stephen.naulls5@nhs.net / S.Naulls@bsms.ac.uk