Adverse Mental Health Effects of a New Psychotropic Substance (Synthetic Cathinones): a Literature Review

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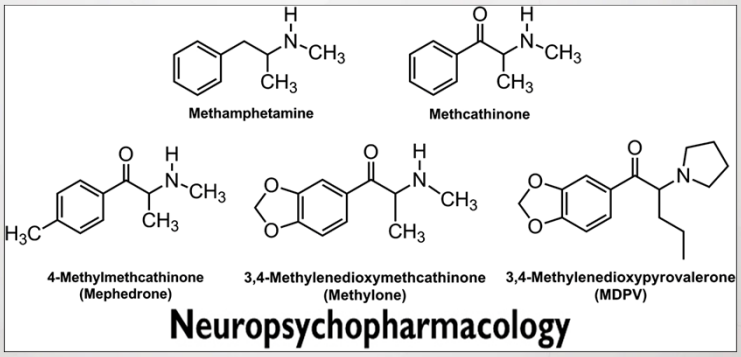
Synthetic Cathinones (SCs)

- A large heterogeneous group of chemical analogues of the naturally occurring compound cathinone
- Cathinone is the main psychoactive ingredient in the **khat plant** Catha edulis.
- Cathinone was initially synthesised by medicinal chemists and investigated for its therapeutic potential.

Synthetic Cathinones (SCs)

- SC are often referred to as **bk-amphetamines**.
- SCs induce powerful psychomotor **stimulant effects** and are known to cause dependency



Types of SC

- SCs are most commonly prepared in the forms of **powders or crystals**, or less commonly, as tablets.
- Their packaging is intentionally labelled to resemble commercially available bath products, hence the use of the name '**bath salts**'.

Types of SC

- SCs have also been labelled as ‘plant food’, ‘plant feeders’, ‘research chemicals’, and ‘not for human use’, with product names including ‘blue silk’, ‘vanilla sky’, ‘white lightning’, ‘meow meow’, ‘bliss’, ‘energy-1’, ‘hurricane Charlie’, ‘white rush’, ‘bloom’, ‘blue magic’, ‘cloud 10’, ‘mind candy’, ‘rocket fuel’, ‘sextasy’, and ‘torpedo’

Pattern of SC use

- SCs were probably used as recreational drugs for the first time in **2010.**
- By year 2017, **more than 100** SCs had been identified worldwide.
- SCs constitute the **second largest group** of new psychoactive substances worldwide.
- The typical SC users are **young adults.**
- SCs often serves as **replacements for ecstasy, cocaine, and amphetamines.**

Prevalence of SC use

- **1.3%** of high school students in US reported SC use during the previous year (Oliver et al., 2018).
- **7.7%** of electronic dance music party attendees in US reported that they had used SCs in a survey (Oliver et al., 2018).
- **20.3%** of school and university students in Scotland reported that they had previously used SCs (Weinstein et al., 2017).
- **63.8%** of attendees in a gay-friendly nightclubs in London revealed lifetime SC use (Karila et al., 2015).
- Data in HK is lacking.

SC in HK

- In 2016-2018, synthetic cathinones accounted for **65%** (414 cases) of the NPS cases reported. Synthetic cathinones is **the major category of NPS** encountered in HK (Cheng & Dao 2020).

Pattern of use

- SCs are consumed via **oral ingestion or snorting.**
- SCs are frequently combined with **other substances**, such as alcohol, cocaine, ecstasy, cannabis, or ketamine.
- Commonly used in a **binge** manner **in social settings,** such as friends' homes, house parties, or night clubs**.**

Low doses of SCs produce typical stimulant effects

- increased energy and alertness;
- Reduced appetite;
- Increases in work capacity;
- Euphoria;
- increased sexual desire and risk-taking sexual behaviour

Other subjective effects

- Empathy;
- Openness in communication;
- Talkativeness;
- Increases in sociability;

- Intensification of sensory experiences;
- Music sensitivity;

High doses or repeated use

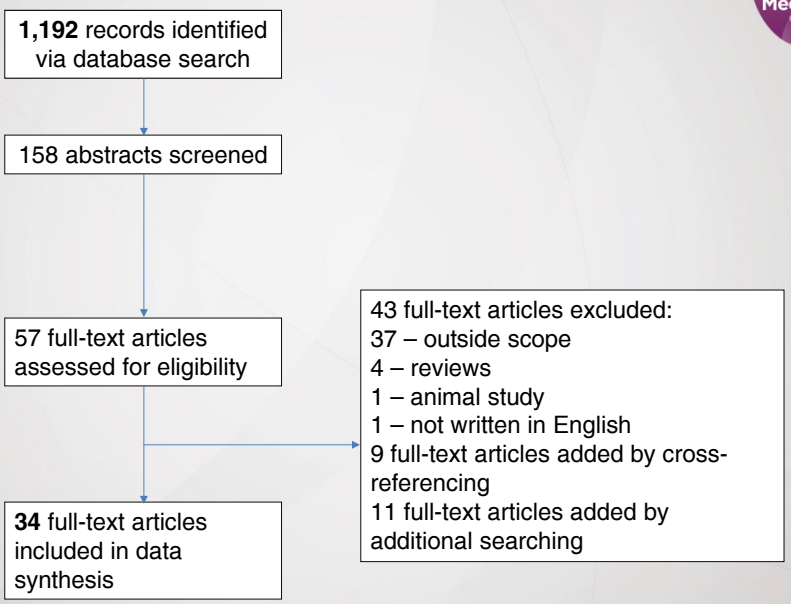
- **Mental effects**: hallucinations, psychosis, excited delirium accompanied by aggressive or violent behaviours

- **Physical effects**: Tachycardia, hypertension, hyperthermia, seizure, death.

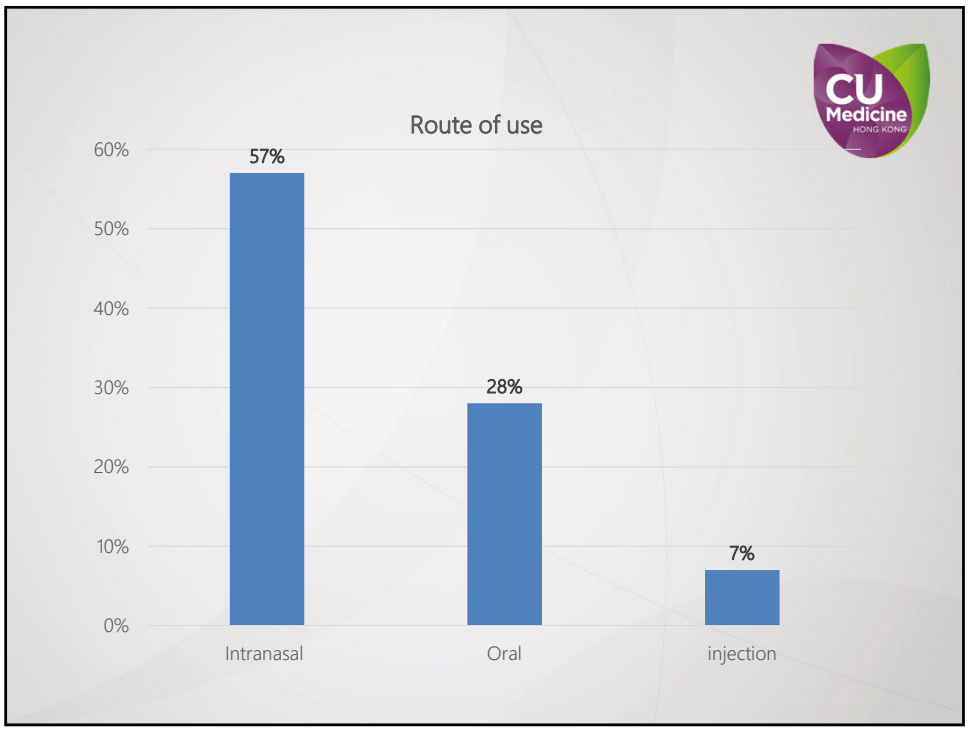
Objective

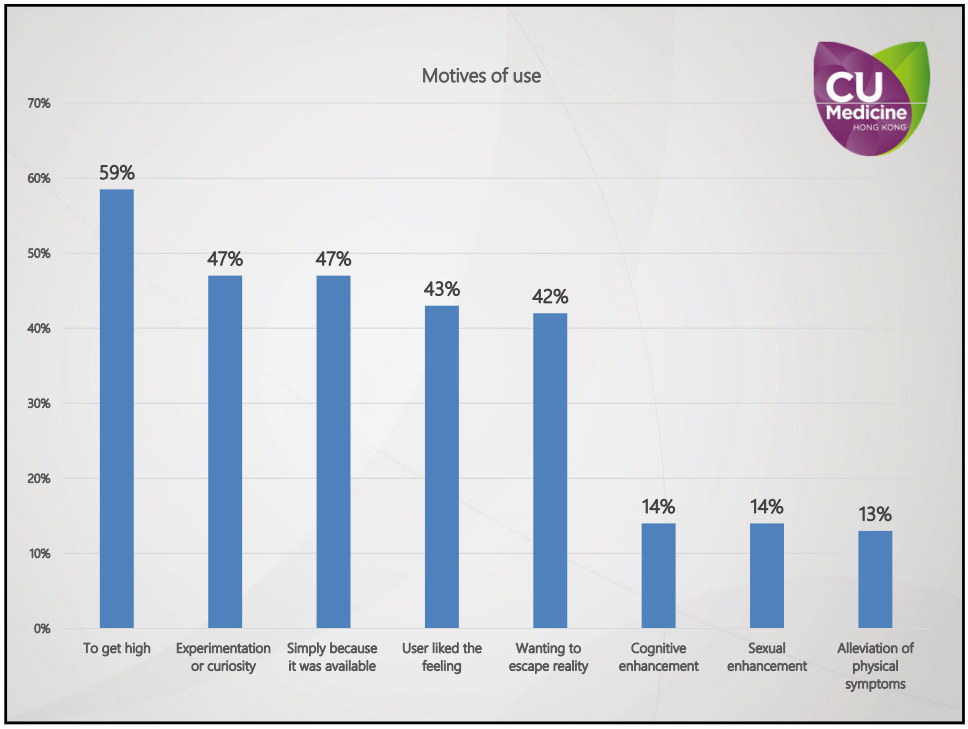
The aim of this study was to identify the risk factors, frequency, symptoms, pathological mechanism, and treatment of SC-related psychiatric disorders via a comprehensive literature review.

Method: systemic searching

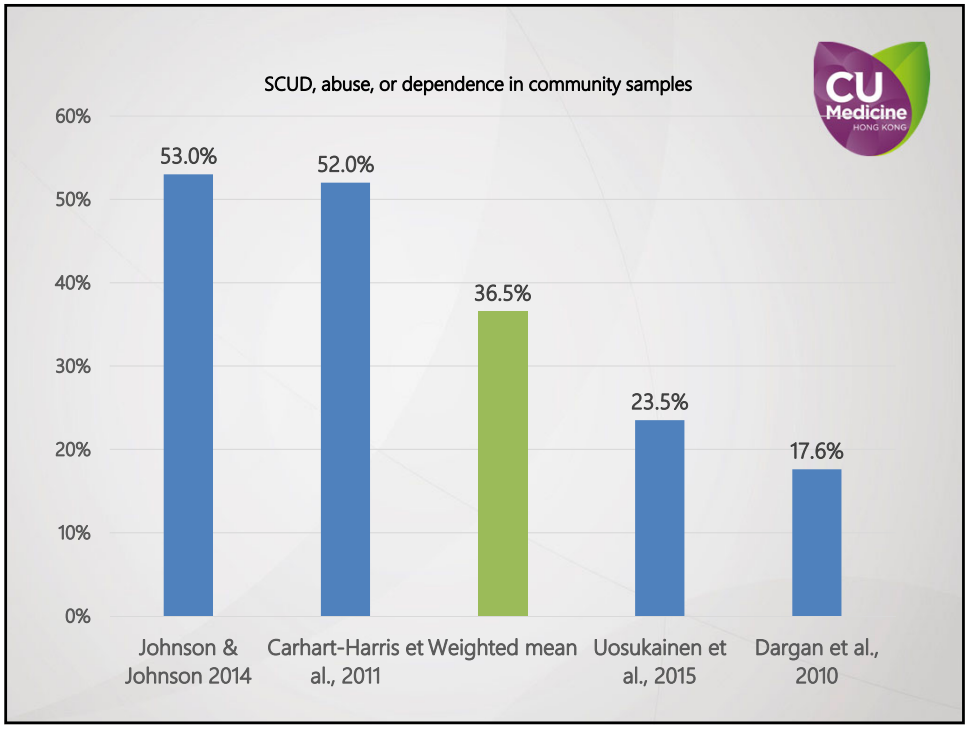


Result 1 – Characteristic of use





Result 2 – SC use disorder (SCUD)



Risk factor

Younger (age <25 years) **users** reported a higher prevalence of dependence, compared to older users, among both male (32.3% vs 16.7%) and female (35.5% vs 12.5%) users.

Treatment of acute intoxication

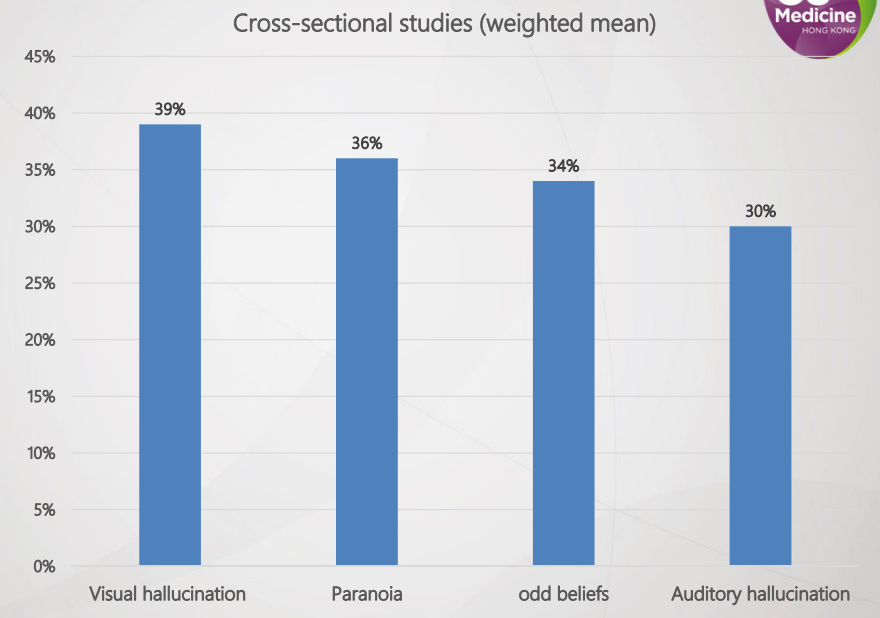
- **No specific antidote**.
- **SC-intoxication**: reassurance, support, and medical monitoring.
- **SC-induced delirium**: controlling agitation and then treating medical complications, such as metabolic acidosis.
- **SC-associated serotonin syndrome**: often associated with agitation, may be managed using both benzodiazepines and cyproheptadine

Treatment of SCUD

- Treatment for patients with chronic SC use should ideally include a drug management plan coupled with psychotherapy.

Result 3 – Psychosis

Psychotic symptoms (1)



Clinical course

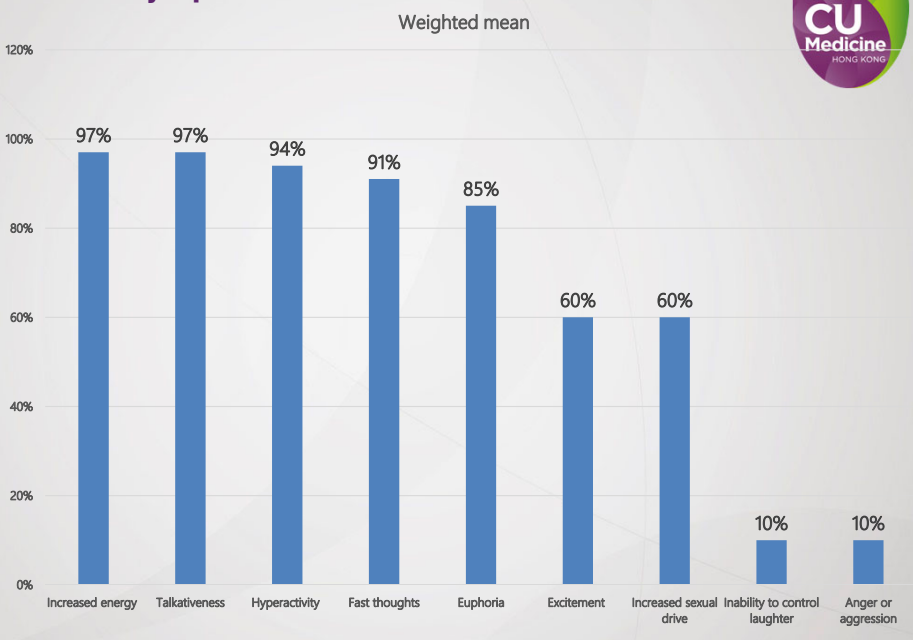
- the duration of SC-induced psychosis varies between **a few hours** and **several months**.
- Some patients continue to have **residual** symptoms of psychosis, which **can recur** following further SC exposure.

Treatment

- The psychosis is commonly treated with **benzodiazepam** (lorazepam or diazepam) and **atypical antipsychotics** (quetiapine, olanzapine, risperidone, paliperidone, or aripiprazole).
- in treatment-resistant cases, **electroconvulsive therapy** may be required to achieve symptom control.

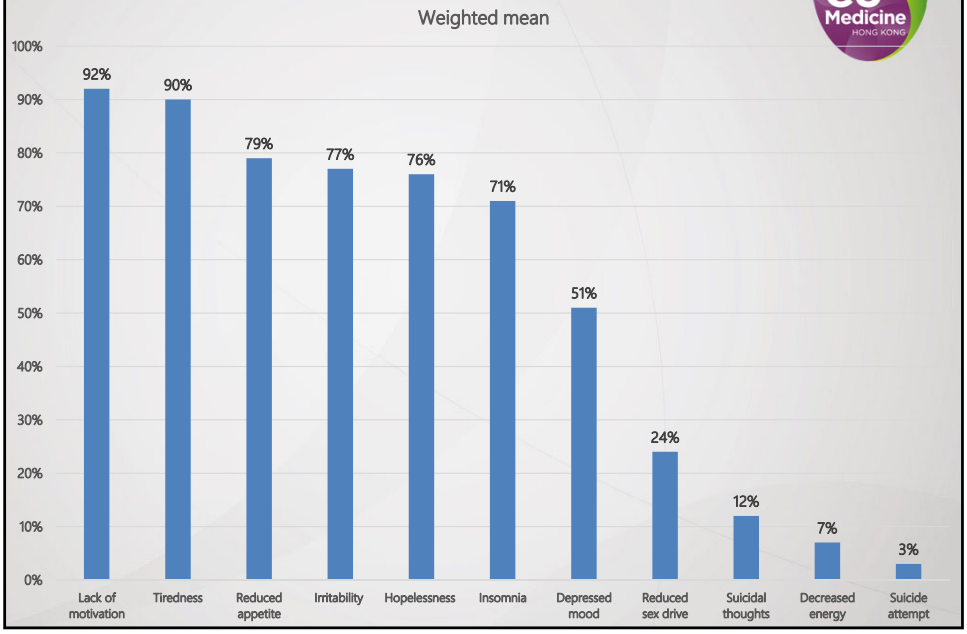
Result 4 – Bipolar disorders

Manic symptoms

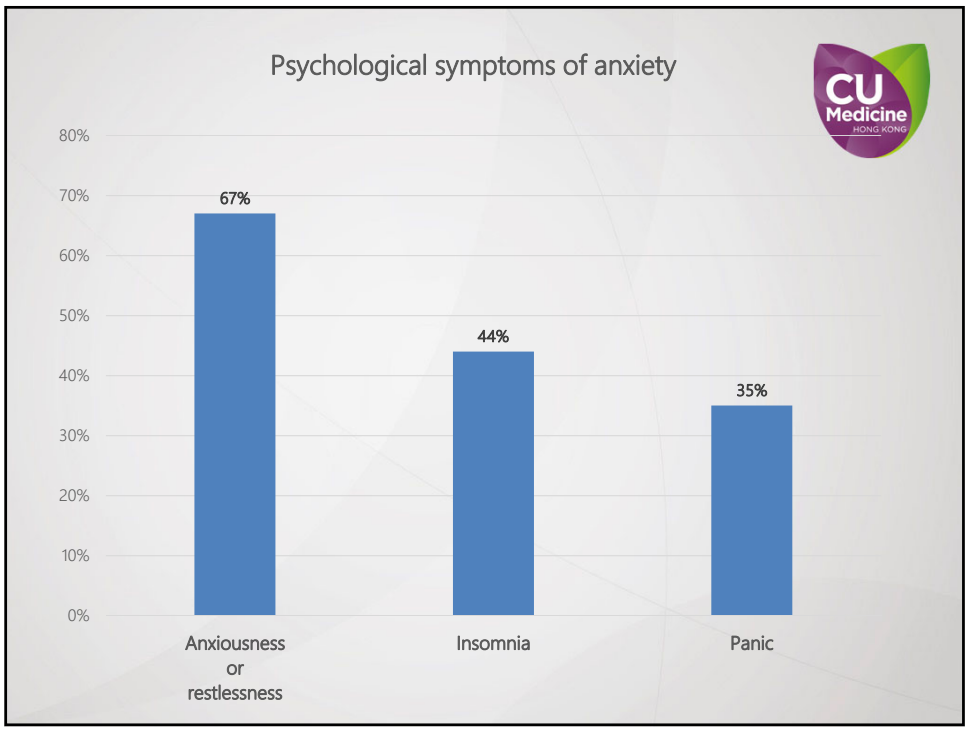


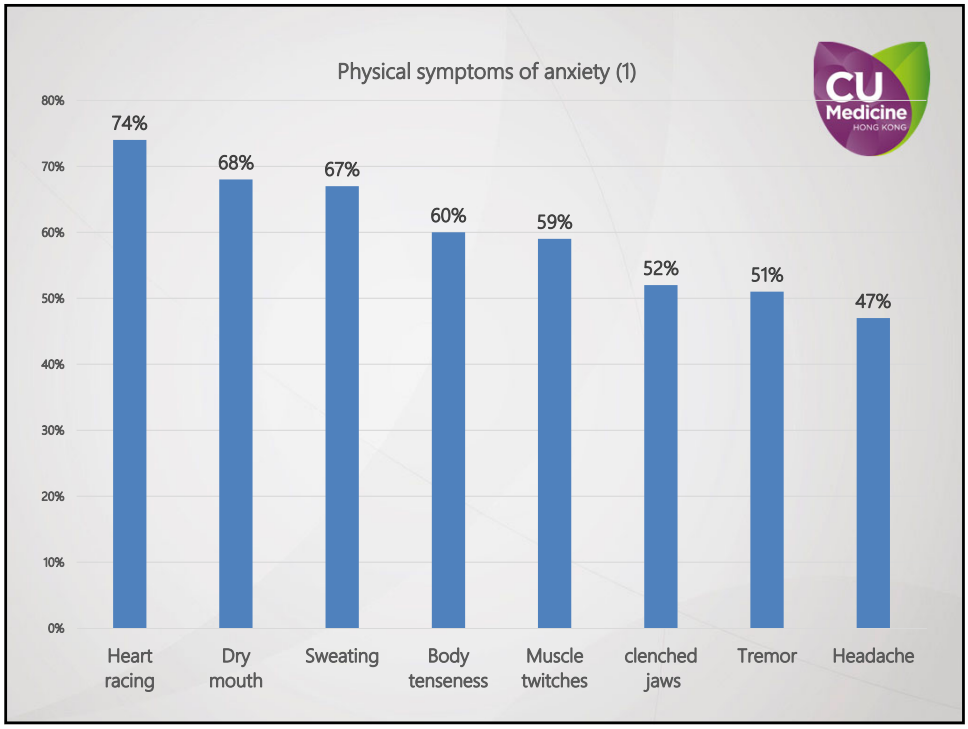
Result 5 – Depression

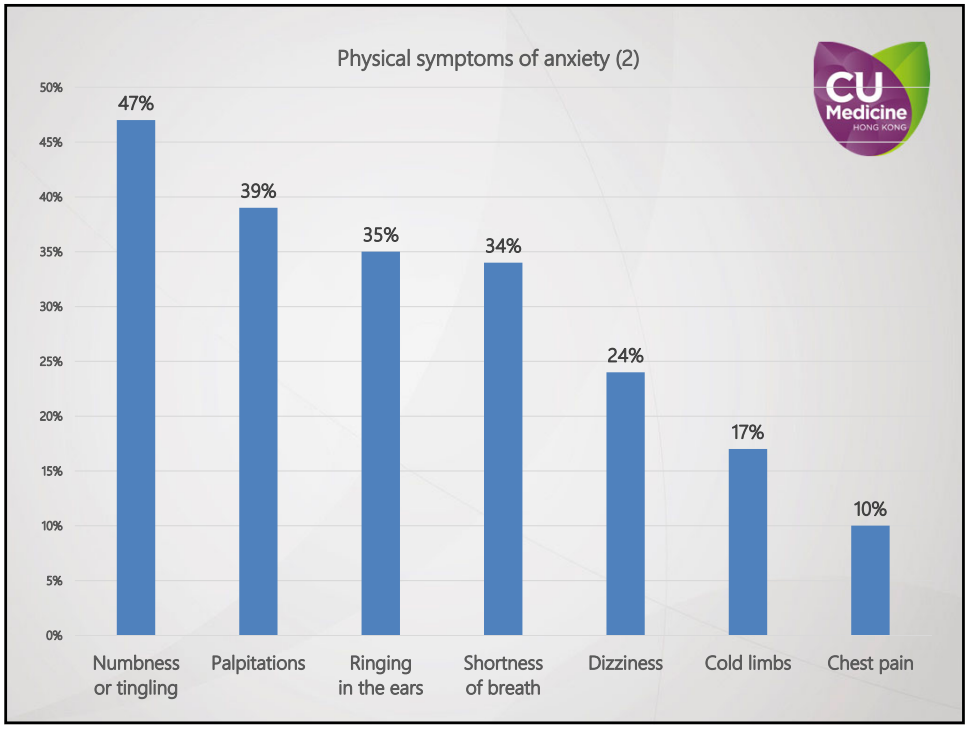
Depressive symptoms



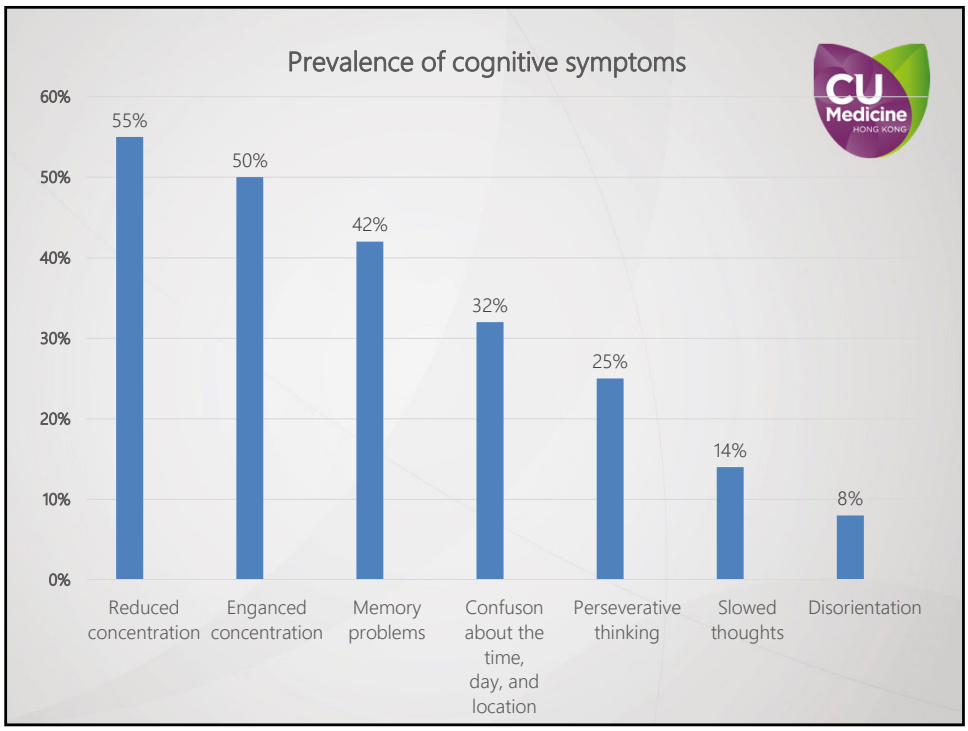
Result 6 – Anxiety




Physical symptoms of anxiety (1)
80%
70%
60%
50%
40%
30%
20%
10%
0%
74%
68%
67%
60%
59%
52%
51%
47%
Heart racing
Dry mouth
Sweating
Body tenseness
Muscle twitches
clenched jaws
Tremor
Headache


Physical symptoms of anxiety (2)
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
47%
39%
35%
34%
24%
17%
10%
Numbness or tingling
Palpitations
Ringing in the ears
Shortness of breath
Dizziness
Cold limbs
Chest pain

Result 7 – Cognition



Limitations of the studies

- Retrospective or cross-sectional **design**
- Computerised or Web-based assessment

- The use of selective **samples**
- Small sample size

- Self-**reporting** or retrospective reporting of SC use
- Failure to **assess** the amount, potency, and type of SC used
- Concurrent use of other drugs

- No formal clinical **diagnosis**
- The use of subthreshold symptoms as an outcome

- **Data** on the risk factors, neurobiology, and course and treatment of SC-related psychiatric disorders are **lacking**.

Conclusions

- Amongst SC users:
- around 40% meet the criteria for a use disorder.
- 14% have psychosis and 35% have psychotic symptoms.
- Up to 97% have manic symptoms like increased energy.
- Up to 92% have depressive symptoms, like lack of motivation
- Up to 67% have anxiety symptoms, like anxiousness.
- Up to 59% have cognitive symptoms, like loss of memory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