

# Crystal Methamphetamine use among Adults: A Systematic Review of Health and Socioeconomic Outcomes and Effective Treatment Strategies

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## Background

Crystal methamphetamine (CM) is one of the world's most commonly used illicit drugs. Global use of amphetamine-type stimulants (ATS), which includes CM, is now second only to cannabis, with growing concern over the impacts of the increasing accessibility and availability of CM in North America and Europe (Shannon et al., 2011). CM is a potent and more commonly injected form of methamphetamine, and for many, a cheaper alternative to heroin with significant potential for addiction and transmission of HIV and other blood-borne infections. Injection of CM appears to be more common in countries with the crystalline form of the drug (Strathdee & Stockman, 2010), such as Canada, the United States and Germany (UHRI, 2013).

In Vancouver, Canada, the use of CM has risen among various injection and non-injection drug-using populations and the prevalence of CM injection among adults in Vancouver doubled from 4.9% to 10.5% between 2010 and 2011 (UHRI, 2013). Among street-involved youth, a significant association between smoking crack and subsequent initiation of CM has been demonstrated (Uhlmann et al., 2014). Despite extensive media attention and new legislation to address the growing problem of CM use in Canada, little research has been conducted to assess purported increase in use of the drug. Similarly, in Ontario, CM has been reported as a growing problem (Scheim et al., 2017).

Research to date has focused largely on health outcomes among youth, men who have sex with men (MSM), and female sex workers (Colyer et al., 2018; Fox & Rodriguez, 2010). In order to prevent adverse outcomes of CM use and to develop effective treatment options, additional data is needed (Damon et al., 2019).

## Methods

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Guidelines were followed.

### *Search strategy*

We conducted a comprehensive review of three electronic databases (Embase, PsychInfo and MedLine) to identify potentially relevant studies. Additionally, relevant articles from cursory searches were added.

1. An initial 947 articles related to effective treatments for CM use were identified. These were subjected to title and abstract screening after which 11 articles remained. Full-texts of these 11 articles were screened and five articles met final inclusion criteria on the treatment strategies for CM use. One of these articles focused on MSM and the second included a more general population of CM users.
2. For socioeconomic impacts of CM use, 160 articles were screened. Twenty-five articles were retained for full text screening and two articles met inclusion criteria for review.

## Results

### **Pharmacological Treatments**

In two separate randomized controlled trials, bupropion and sertraline were found to be no more effective than a placebo in treating CM dependence (Rajasingham et al., 2012).

### **Psychosocial Treatments**

Given the lack of effective pharmacological treatments, researchers have studied the effects of cognitive behavioural therapy (CBT) in treating CM dependence. CBT approaches target the motivations for use, and aid dependent persons in developing behavioural and cognitive skills to abstain and prevent relapse (Rajasingham et al., 2012). One study reported the effectiveness of a psychosocial treatment among HIV-uninfected MSM abusing CM. Findings from this study showed that 10 sessions of Behavioural Activation (BA) with integrated HIV Risk Reduction counselling (RR) led to a significant decrease in CM use over a three-month period (Mimiaga et al., 2012). Significant reductions in depressive symptoms and poly-substance use were also maintained. There is support in the addiction literature for the effectiveness of behavioural activation in reducing CM use (Daughters et al., 2018; Fazzino, Bjorlie, & Lejuez, 2019). For instance, Fazzino et al. (2019) in a systematic review on the effectiveness of behavioural activation on substance use concluded that evidence supports the efficacy of reinforcement-based interventions such as BA in targeting substance use outcomes.

### **Pharmacological and Psychosocial Treatments**

One study examined the effectiveness of Neurofeedback Training and selective serotonin reuptake inhibitors (SSRI) among crystal methamphetamine dependent participants. Findings from the study showed that a two-month neurofeedback Training (30 sessions-50mins per session) plus

pharmacotherapy resulted in decreased severity of addiction, better psychological health, and better quality of life. However, it is worth noting that the authors did not specify the specific SSRI used in their study.

Further searches have indicated that there is more evidence-based treatment available for methamphetamine (Adhikary et al., 2017) and amphetamine (Alharbi et al., 2016) dependency than for CM dependency.

### **Socioeconomic Outcomes**

The use of CM has been found to result in loss of employment, savings and investment among users (Fox et al., 2014). It has also been revealed that users often have challenges integrating into society. They exhibit aggression and lack of sense of obligation. This results in being socially estranged from family and friends, and becoming chronically depressed (Watt et al., 2014).

Given the increased frequency of high-risk sexual behaviour associated with crystal meth use, it is not surprising that both HIV-infected and uninfected MSM who use crystal meth have a greater risk of STIs compared to MSM who do not use crystal meth (Rostami et al., 2017). One study clearly showed that active substance abuse is associated with significantly decreased medication adherence, higher viral loads, opportunistic infections, and increased mortality in HIV-infected persons (Watt et al., 2014).

Evidence abounds for socioeconomic predictors of CM use such as poor/unstable housing (Damon et al., 2018; Shokoohi et al., 2018), forced sex and increase in number of sexual partners (Shokoohi et al., 2018).

### **Medical Outcomes**

Methamphetamine, including crystal meth, has been associated with several health outcomes which contribute to the high mortality reported among users. Evidence exists for poor mental health outcomes such as depression, psychosis and suicidal ideation

(Darke, Kaye, Duflou, & Lappin, 2019; Marshall & Werb, 2010). Meth use has also been associated with DNA and structural brain damages which contribute to impaired cognitive functions among its users (Chen, Hsu, Li, & Huang, 2019; Ropek et al., 2019). Studies among persons living with HIV and abusing crystal meth showed high levels of unsuppressed viral load (Carrico et al., 2019; Feldman, Kepler, Irvine, & Thomas, 2019).

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## Limitations

There is a paucity of studies on crystal meth use related outcomes and evidence-based treatments for its use, particularly among the general population.

## Steps Forward

Further studies are needed within the areas of health and socioeconomic outcomes of CM use as well as effective treatment strategies for CM use.

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