



## Associations of substance use patterns with attempted suicide among persons who inject drugs: Can distinct use patterns play a role?



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### ABSTRACT

**Background:** While the elevated risk of suicide attempt among persons who inject drugs (PWID) is well documented, whether use of different substances is associated with varying degrees of risk remains unclear. We sought to examine the associations between substance use patterns and attempted suicide in a prospective cohort of PWID in Montreal, Canada.

**Methods:** Between 2004 and 2011, participants completed an interviewer-administered questionnaire eliciting information on socio-demographics, substance use patterns, related behaviors, and mental health markers. Generalized estimating equations were used to model the relationship between self-reported use of six common substances (cocaine, amphetamine, opioids, sedative-hypnotics, cannabis and alcohol), associated patterns of use (chronic, occasional and none), and a recent (past six-month) suicide attempt.

**Results:** At baseline, of 1240 participants (median age: 39.1, 83.7% male), 71 (5.7%) reported a recent suicide attempt. Among 5621 observations collected during follow-up, 221 attempts were reported by 143 (11.5%) participants. In multivariate analyses adjusting for socio-demographics and psychosocial stressors, among primary drugs of abuse, chronic [adjusted odds ratio (AOR): 1.97] and occasional (AOR: 1.92) cocaine use, and chronic amphetamine use (AOR: 1.96) were independently associated with attempted suicide. Among co-used substances, chronic sedative-hypnotic use was independently associated with an attempt (AOR: 2.29). No statistically significant association was found for the remaining substances.

**Conclusion:** Among PWID at high risk of attempted suicide, stimulant users appear to constitute a particularly vulnerable sub-group. While the mechanisms underlying these associations remain to be elucidated, findings suggest that stimulant-using PWID should constitute a prime focus of suicide prevention efforts.

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### 1. Introduction

Substance misuse constitutes a significant risk factor for suicide, second only to depression and other affective disorders (Cavanagh et al., 2003). Among illicit drug-users, suicide is a substantial

contributor to excess mortality, estimated to account for more than 10% of deaths (Darke et al., 2007). Further, lifetime histories of suicide attempt in this population range between 17% and 43% (Darke et al., 2007). These proportions are far in excess to prevalences reported in the general population, estimated to vary between 3% and 5% (Health Canada, 2009; Kessler et al., 1999).

Persons who inject drugs (PWID) seem to exhibit the greatest risk. Compared to the general population, intravenous drug use carries a nearly 14-fold elevated risk of completed suicide (Wilcox et al., 2004), and PWID are estimated to be four times more likely to experience an attempt compared to non-injection

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drug users (Darke and Kaye, 2004). Studies conducted in the United States (Havens et al., 2004) and Canada (Marshall et al., 2011) among street-based PWID reported six-month prevalences of suicide attempt of 7.0% and 8.0%, respectively.

While the relationship between substance misuse and risk of suicidal behavior is well established, it is unclear how this association varies across different types of substances among drug-using populations (Center for Substance Abuse Treatment, 2008). An extensive literature has focused on cocaine- (Darke and Kaye, 2004; Roy, 2001) and heroin-users (Darke et al., 2005; Roy, 2002, 2010) and reported comparable prevalences of attempted suicide, suggesting that both drugs may carry a similar risk of suicidal behaviors. Investigations conducted among broader drug-using populations noted a positive association between suicide attempt, and use of cocaine (Britton and Conner, 2010) and amphetamine (Marshall et al., 2011). Use of licit non-injectable substances, including sedative-hypnotics and alcohol, which are often co-used by illicit drug users (Darke and Hall, 1995; Public Health Agency of Canada, 2006), has also been reported to be associated with increased odds of attempted suicide (Backmund et al., 2011; Rossow and Lauritzen, 1999). In contrast, a number of studies failed to report an association between use of specific substances and suicide attempt (Havens et al., 2004; Roy, 2003; Wines et al., 2004). Although polysubstance use is highly prevalent among street-based PWID (Leri et al., 2004), few investigations have examined a broad range of commonly used substances within the same study sample (Wines et al., 2004), making it difficult to compare associations with attempted suicide across substances. Moreover, other findings are limited by a lack of control for important confounding factors implicated in suicidal behaviors, such as mental health status (Marshall et al., 2011).

Given that one of the most powerful predictors of death by suicide is a previous suicide attempt (Christiansen and Jensen, 2007), it is important to identify drug users who are most likely to engage in suicidal behaviors. Having a better understanding of the possible risks carried by use of specific substances in this population provides a way to guide and prioritize suicide prevention efforts (Center for Substance Abuse Treatment, 2008). In this study, we sought to examine the relationship between patterns of substance use and attempted suicide using data collected as part of a prospective cohort study of polysubstance-using PWID recruited in Montreal, Canada.

## 2. Methods

### 2.1. Participants

The study sample was selected from the HEPatitis COhort (HEPCO), an ongoing prospective investigation of PWID established in Montreal, in 2004, to study determinants of Hepatitis C Virus (HCV) transmission. Cohort recruitment and follow-up procedures have been described in detail previously (Bruneau et al., 2012). Briefly, eligibility criteria included having injected drugs within the previous six months, being 18 years of age or older, residing in the Greater Montreal area and providing informed consent in compliance with institutional review board regulations of the Centre Hospitalier de l'Université de Montréal (CHUM). Participant recruitment occurred through street-level strategies such as word-of-mouth and community program referrals.

At baseline and each six-month follow-up visit, participants provided blood samples for HCV testing and completed an interviewer-administered questionnaire eliciting information on socio-demographic characteristics, detailed information on substance use patterns and related behaviors in the past month and past six months, and mental health status indicators. The

interviewers and nurses present on-site offered information about, and referrals to addiction, mental health and HCV treatment or support services on a case-by-case basis. A CAD 15.00\$ stipend was offered to all study participants upon completion of the questionnaire, as compensation for their time. Ethical approval for this study was provided through the Ethics Review Board of the CHUM.

Between November, 2004 and March, 2011, a total of 1243 PWID were recruited in the HEPCO cohort, and were eligible for this study. Three participants were excluded from the present analyses, as they had missing data for the outcome of interest.

### 2.2. Measures

Consistent with previous reports (Marshall et al., 2011), the outcome of interest was a dichotomous measure of suicide attempt assessed by the following question: "In the past six months, have you attempted suicide?".

The primary exposure variables were substance use patterns. Participants were questioned on the types of substances used in the previous six months, and on the corresponding number of days of use. A conceptual domain assessing substance use patterns was created, and included the types of substances used and associated patterns of use. Six types of commonly used substances were assessed: cocaine, amphetamine, opioids, including heroin and prescription opioids, cannabis, alcohol and sedative-hypnotics, including barbiturates and benzodiazepines. Given that eligible participants must have injected drugs in the previous six months, cocaine, amphetamine and opioids constitute the primary drugs of abuse in our sample, whereas the remaining substances are typically co-used. Patterns of substance use were operationalized in three groups: chronic, occasional or none, based on the number of days of use in the previous six months. In the absence of formal guidelines distinguishing between chronic and occasional substance use, we relied on the definition used by the United States Office of National Drug Control Policy to describe patterns of illegal drug use (Office of National Drug Control Policy, 2012). Accordingly, chronic drug use is defined as consumption that occurs once a week or more, and occasional use as consumption that takes place less frequently. A similar definition has been successfully employed in a previous study assessing patterns of drug use in relation to suicidal behaviors among drug users (Wines et al., 2004). In line with this definition, in our study, chronic substance use, with the exception of alcohol, was defined as having consumed on 26 days or more in the previous six months, and occasional use as having consumed up to 25 days over the same time period. As alcohol is more widely consumed compared to all of the other drugs, we opted for a less conservative definition to describe chronic use. As such, chronic use of alcohol was defined as having consumed, on average, every other day or more in the past six months (i.e.,  $\geq 90$  days), and occasional use as having consumed less frequently. A third category (none), indicating no consumption in the previous six months, was also included for all substance use variables.

Potential confounders included measured variables previously identified as significant correlates of suicide attempt among drug-using populations (Havens et al., 2004; Marshall et al., 2011), and were grouped into two conceptual domains: socio-demographic characteristics and psychosocial stressors. Age, gender and education were assessed as part of the socio-demographic domain. Variables examined in the psychosocial stressors domain included living in unstable housing conditions, prostitution, incarceration, characteristics of injection drug use relevant to the study population, including the frequency of injection ( $>30$  versus  $\leq 30$  injections, past month), age at first injection and duration of injection drug use, and markers of psychological distress. Two variables were assessed as markers of psychological distress, and included history of a diagnosed psychological disorder and treatment for

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