



Use of synthetic cathinones and cannabimimetics among injection drug users in San Diego, California



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ABSTRACT

Background: Use of synthetic cathinones (SC) and cannabimimetics (i.e., “THC homologues” [TH]) is associated with adverse health effects. We investigated the epidemiology of synthetic drug use among a cohort of injection drug users (IDUs) in San Diego, California.

Methods: We used logistic regression analysis to identify correlates of SC and TH use among 485 IDUs enrolled from June 2012 to September 2013.

Results: Seven percent of participants reported ever using SC and 30% reported ever using TH. In multivariate logistic regression, age and recent hospitalization were significantly associated with odds of SC use (Adjusted Odds Ratio [AOR] 0.93, 95% Confidence Interval [C.I.] 0.90, 0.97; and AOR 2.34 95% C.I. 1.00, 5.49, respectively) and TH use (AOR 0.96, 95% C.I. 0.94, 0.98; and AOR 2.62, 95% C.I. 1.47, 4.68, respectively). Use of methamphetamine (AOR 9.35, 95% C.I. 1.20, 72.79) and club drugs in the past six months (AOR 3.38, 95% C.I. 1.17, 9.76) were significantly associated with SC use. Being on probation/parole (AOR 2.42, 95% C.I. 1.44, 4.07), initiating injection drug use with stimulants (AOR 1.89 95% C.I. 1.13, 3.16), and past six-month marijuana (AOR 9.22, 95% C.I. 4.49, 18.96) and prescription drug use (AOR 1.98, 95% C.I. 1.20, 3.27) were significantly associated with TH use.

Conclusions: A considerable proportion of IDU use synthetic drugs and may experience harms associated with their use. Findings have implications for criminal justice system management. Prevention efforts should emphasize the risks associated with rapidly changing synthetic formulations, and the potential harms associated with polydrug use.

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1. Introduction

In recent years, synthetic drugs of abuse have emerged as a significant public health issue in the U.S. and elsewhere (European Monitoring Centre for Drugs and Drug Addiction, 2013; Maxwell, 2014). While a multitude of synthetic chemicals are available, two primary classes have increasingly become the focus of concern: (1) synthetic/substituted cathinones (SC) and (2) synthetic cannabinoids/cannabimimetics, or “THC homologues” (TH).

Both SCs and THs are typically synthesized as legal compounds and are sometimes referred to as “legal highs” or products labeled “not for human consumption.” SCs have been marketed under monikers such as “bath salts” and “plant food,” while

THs are sometimes referred to as “herbal smoking blends,” “incense,” or “synthetic marijuana” (Bruno et al., 2012; European Monitoring Centre for Drugs and Drug Addiction, 2013; Fattore and Fratta, 2011). Since 2012, the US Controlled Substances Act has included some synthetic compounds as Schedule I substances, and emergency scheduling guidelines continue to evolve (US Drug Enforcement Administration, 2014b). However, because of the rapidly changing composition of the ingredients and ability for chemists to manufacture chemical homologues that are functionally similar but not chemically identical, the regulation of these drugs is an ongoing challenge (Maxwell, 2014).

SCs are stimulant-type psychoactive synthetic drugs. Common active ingredients include: 3,4-methylenedioxypropylvalerone (MDPV), 4-methyl-N-methylcathinone (mephedrone), 3,4-methylenedioxy-N-methylcathinone (methylenone), ethcathinones, methcathinones, and fluoroamphetamines (Gershman and Fass, 2012; US Drug Enforcement Administration, 2014a). SCs are

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typically administered orally, or via inhalation (insufflation/snorting) or injection (Karila and Reynaud, 2011; NIDA, 2012b). They have central nervous system stimulant and hallucinogenic effects and have been compared to other stimulants such as cocaine, MDMA, and amphetamines, depending on the compound (Baumann et al., 2012; Gershman and Fass, 2012; Winstock et al., 2011a, 2011b). Repeat exposures to chemical compounds in SCs may have addictive potential (Aarde et al., 2013a, 2013b; Baumann et al., 2012; Winstock et al., 2011a). Clinical effects include: cardiovascular effects (e.g., tachycardia, chest pain); rhabdomyolysis; organ failure; neurological symptoms; psychiatric effects including violent behavior, paranoia, suicidal ideation, hallucinations/delusions, anxiety, and panic attacks; and death (Carbone et al., 2013; Gershman and Fass, 2012; Murray et al., 2012; Wyman et al., 2013; Zawilska and Wojcieszak, 2013).

THs can contain a variety of synthetic compounds, including: cannabicyclohexanol; JWH-018, -019, -073; AM 2201; RCS-4; AKB48; STS-135; AB-PINACA; FUB-PB-22; XLR-11; UR144; and PB-22 (US Drug Enforcement Administration, 2014a). These chemicals are functionally similar to delta9-tetrahydrocannabinol (THC), the active ingredient in marijuana, and are sprayed onto dried, shredded plant material that is smoked (Fattore and Fratta, 2011; NIDA, 2012a). Clinical effects include: nausea; cardiovascular effects (e.g., tachycardia, chest pain); and psychiatric effects including anxiety, agitation/panic attacks, paranoid ideation, suicidal ideation, and hallucinations (Fattore and Fratta, 2011; Thomas et al., 2012; Wells and Ott, 2011). THs may also lead to physical withdrawal and dependence (Zimmermann et al., 2009). Though more rare than with SCs, fatal effects have also been reported (Fattore and Fratta, 2011). THs mimic the effects of THC, but when new variations are created they are usually not detectable using a drug test for cannabis (Berry-Cabán et al., 2012). Therefore, some users seek THs as a substitute for cannabis in order to avoid detection (Maxwell, 2014; Perrone et al., 2013).

To date, little is known about the characteristics of individuals who use synthetic drugs and/or their rationale for use, since the majority of data have obtained through clinical case reports from Emergency Departments or Poison Centers (e.g., Berry-Cabán et al., 2012; Centers for Disease Control and Prevention, 2013; Jinwala and Gupta, 2012; Maxwell, 2014; Schneir et al., 2011; Thomas et al., 2012). Current knowledge about SCs comes mostly from research among people associated with the “dance music” or “party” scenes. In these studies, SC use has been associated with: sexual minority status, use of other psychedelic and inhalant drugs, and risky behaviors such as binge use and unprotected sex (Bruno et al., 2012; Kelly et al., 2013). Reports of drug use practices among men who have sex with men (MSM) in the United Kingdom include use of mephedrone (an SC) along with other psychoactive substances, including methamphetamine and MDMA, which may contribute to elevated risk for HIV infection (Hunter et al., 2014; Kirby and Thornber-Dunwell, 2013).

Current information about TH use comes mostly from studies among school-aged youth, criminal justice system-involved individuals, and internet users around the world. In these studies, TH use is associated with younger age, polydrug use, and a desire to avoid testing positive for cannabis (Schifano et al., 2009; Vandrey et al., 2012; Wish et al., 2013). School-aged youth participating in the US Monitoring the Future survey reported lower perceptions of harm associated with synthetic drugs compared with other drugs (Johnston et al., 2013).

The European Monitoring Centre for Drugs and Drug Addiction (2013) has voiced concern that injection drug users (IDUs) are using synthetic drugs as a substitute for traditional drugs of abuse (e.g., heroin). IDUs may be at particularly elevated risk for the adverse health effects of synthetic drugs, for at least three reasons. First, use and injection of synthetic drugs may exacerbate injection and

non-injection-related consequences. For example, injection of SC has been associated with soft tissue damage such as cellulitis, abscesses, and infection with necrotizing fasciitis (Dorairaj et al., 2012; Russo et al., 2012; Zawilska and Wojcieszak, 2013). The limited available data also suggest that polydrug use (i.e., sequential or simultaneous use of different drugs) is common among users of synthetic drugs (Bruno et al., 2012; Van Hout and Bingham, 2012; Vandrey et al., 2012), and polydrug use is known to be associated with more severe drug dependence, overdose, and HIV/STI risk (Coffin et al., 2003; Lankenau and Clatts, 2005; Leri et al., 2003; Peters et al., 1998). Second, since they are already established in their drug-using careers, IDUs may have rationales for and experiences of synthetic drug use that differ from those who are newly initiated or who do not use other illicit drugs. Third, IDUs are known to be at risk for HIV via the use of contaminated injection supplies (Garfein et al., 1996), and the stimulant and euphoric effects of synthetic drugs may contribute to behaviors that put users at even greater risk for HIV and other bloodborne and sexually transmitted infections (Bruno et al., 2012; Shoptaw et al., 2013).

Given the ongoing clinical and public health concern over the use of synthetic drugs, the aims of the current study were to (1) investigate the prevalence of synthetic drug use, (2) identify behavioral and demographic correlates of use, and (3) describe the rationale for use and behavioral and health consequences of SC and TH use in a sample of IDUs.

2. Methods

2.1. Sample

Data for the current study were drawn from the baseline interview of an ongoing longitudinal study of IDUs recruited in San Diego, California. A full description of the study methods is available elsewhere (Robertson et al., 2014). Briefly, a convenience sample of IDUs was recruited through street- and venue-based outreach, targeted advertising, flyers, and peer referrals. Eligibility criteria included: (1) being at least 18 years of age, (2) having evidence of injecting illicit drugs in the past 30 days (confirmed by observation of injection stigmata or other physical evidence of injecting), (3) being able to converse in English or Spanish, (4) living in San Diego with no plans to move in the next 2 years, and (5) not currently participating in any intervention studies. Participants completed a brief eligibility screener administered by study staff in a private location. Eligible individuals were invited to participate and provided written informed consent. The Institutional Review Board of the University of California San Diego approved all study procedures.

2.2. Measures

Data were collected using interviewer-administered Computer Assisted Personal Interviews (CAPI) on a laptop computer. Use of SCs and THs was assessed with two questions that asked about any lifetime use. Because these drugs can contain a variety of chemical compounds and are known by a range of different brand names, we provided examples of brand names and chemicals that were common at the time of assessment (2012–13). For example, the question assessing SC use asked, “Have you ever used bath salts/synthetic cathinones (e.g., mephedrone, MDPV, methy-lone)? They are sometimes known by brand names like Vanilla Sky, Purple Wave, or Bliss. They might also be called plant food.” The question assessing TH use asked, “Have you ever smoked synthetic cannabinoids? (e.g., Spice, K2, Genie, etc.) They are also known as ‘synthetic THC’ or ‘synthetic marijuana.’”

Among those who reported use of SCs and THs, we assessed: (1) age at first use, (2) what other drugs have similar effects (check all that apply), (3) route of administration (SC only), (4) whether the user had ever been hospitalized or sought medical care due to the effects of the drug, (5) the source from which the respondent obtained the drugs (response options included: internet, friends/acquaintances, sex partners, strangers, family members, adult store, gas station or convenience store, head shop, drug dealer, other), (6) rationale for first use (response options included: curiosity, to avoid testing positive on a drug test, to avoid the legal risks associated with using other drugs, to use something safer than other drugs, because this drug was more available than other drugs, because this drug was less expensive than other drugs, and other, which was later further categorized into two additional options (thought they were a different drug and peer influence)), and (7) whether the respondent believes that the drugs are legal in California. Each of the questions was asked separately for SCs and THs.

The questionnaire also included basic demographic items, including: age, sex, sexual orientation, race/ethnicity, homelessness status, experiences with the criminal justice system (parole/probation), and other drug use in the previous six months. Additionally, we asked about drug first injected, receptive syringe sharing in the past

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