Spicing up the military: Use and effects of synthetic cannabis in substance abusing army personnel[☆]

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HIGHLIGHTS

- SC was the most prevalently abused illicit substance at 38% among Army personnel.
- SC users indicated fewer and lower severity depression symptoms.
- SC was the only substance perceived to be used more by soldiers than by civilians.
- SC-using soldiers experienced abuse and dependence problems related to their use.

ARTICLE INFO

ABSTRACT

Synthetic cannabis (SC) use has been increasing within the United States. Due to difficulties with its detection through standard testing, it may be an attractive substance of abuse for military personnel. However, few studies have examined the consequences of its use in this population, including evidence for its potential for abuse and dependence. Participants included 368 active-duty Army personnel who expressed interest in participating in a "check-up" around their alcohol or substance use, of whom 294 (80%) met DSM-IV criteria for substance abuse or dependence (including alcohol, illicit drugs, and prescription medications) and were not engaged in substance abuse treatment. Forty-one participants (11%) reported using SC in the last 90 days. Of those, 27 listed SC as their drug of choice. There were no significant differences in race, ethnicity, deployment history, or religion between SC users and others. Users of SC were generally younger and had less education and income than those who used only alcohol. Among SC users, 12% met criteria for drug abuse and 68% for dependence. Participants perceived SC use to be significantly more prevalent among military personnel than among civilians. Results suggest that SC is prevalent among substance-using soldiers and that DSM-IV criteria for abuse and dependence apply to SC. In addition, results highlight the importance of assessing and treating SC use among active-duty military personnel.

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1. Introduction

A 2012 Institute of Medicine report urged the Department of Defense to "acknowledge that the current levels of substance use and misuse among military personnel and their dependents constitute a public health crisis" (p. 6, IOM, 2012). The report also recognized that a new class of synthetic substances including synthetic cannabis (SC) poses unique new challenges for military public health authorities.

Synthetic cannabis, also known by the brand names "Spice", "K2" and "Bliss" contains shredded plant material coated with chemicals manufactured to mimic THC—the psychoactive compound in marijuana (Auwärter et al., 2009). The substance remains in a legal gray area that varies across jurisdictions, yet it remains available for purchase online, in the black market, and in some retail establishments where it is labeled as "potpourri" or "incense." Entering the market around 2008, empirical analysis of the drug and its effects is an emerging area of interest across disciplines.

Early in 2011, shortly after recruitment for the present study began, the US Drug Enforcement Administration listed several of the main compounds found in SC as schedule 1 substances, making their production and sale illegal (Harris & Brown, 2013). At the same time, the Board of Pharmacy in Washington State, where the study recruited, took the

same action to ban SC (Washington State Department of Health, 2010). Then, in 2012, the Synthetic Drug Abuse Prevention Act expanded the list of prohibited compounds used in SC. However, as rapidly as legislation bans specific subsets of the compounds (JWH-018 for example), producers sidestep regulation by synthesizing alternative cannabinoid molecules not listed in existing laws (Hughes & Winstock, 2012). The Federal Analog Act of 1986 was designed to control this process of evasion in response to earlier designer drugs; however, poorly defined standards and a scarcity of case law have weakened its enforceability (Kau, 2008). Though now more difficult to obtain, SC remains available to those who wish to use it.

Qualitative studies have illustrated that a primary reason for its use among college students and the general public is that SC is perceived to be largely undetectable in standard drug screens used by employers and the criminal justice system (Perrone, Helgesen, & Fischer, 2013; Schifano et al., 2009). The difficulty in testing, paired with over-the-counter availability, may understandably make SC an attractive drug for soldiers who want to minimize their risk of detection while still experiencing an intoxication effect similar to marijuana. Observing this trend of SC use among soldiers, the US military issued a ban on SC in each of its branches, with the Army's rule being issued in February of 2011 (DoD, 2011, Vardakou, Pistos, & Spiliopoulou, 2010). Additionally, the Army recently added SC to the random drug urinalysis panel (Army Substance Abuse Program, 2013), the Army's primary method of drug detection. However, it remains difficult to reliably detect SC use. Just as authorities struggle to ban an ever-changing set of compounds, urinalysis producers struggle to develop reliable tests (Gunderson, Haughey, Ait-Daoud, Joshi, & Hart, 2012; Seely, Lapoint, Moran, & Fattore, 2012).

While little is still known about SC and its health consequences, there have been numerous case studies from emergency departments reporting a wide range of adverse effects. These include seizure, convulsion, nausea, vomiting, and cardiovascular and respiratory problems (Forrester, Kleinschmidt, Schwarz, & Young, 2011; Jinwala & Gupta, 2012; Schneir & Baumcacher, 2012; Simmons, Cookman, Kang, & Skinner, 2011). Adverse psychological effects may include anxiety, confusion, agitation, irritability, depressed mood, and memory changes (Bebarta, Ramirez, & Varney, 2012; Castellanos, Singh, Thornton, Avila, & Moreno, 2011; Schneir, Cullen, & Ly, 2011; Seely et al., 2012; Simmons et al., 2011). Synthetic cannabis consumption also may have triggered brief or lasting onset of psychosis (Hurst, Loeffler, & McLay, 2011), with individuals that have histories of mental illness potentially at higher risk (Every-Palmer, 2010).

While these health effects are similar to consequences of marijuana consumption, some evidence suggests that SC is an even stronger agonist of the CB1 and CB2 cannabinoid receptors. Harris and Brown (2013) report that JWH-018, the original compound found in SC, has a four-fold affinity for the CB1 receptor and a ten-fold affinity for CB2 when compared to THC. CB1 affects mood elevation, anxiety and panic, while CB2 affects immune tissue, emesis and inflammatory response. While further analysis is needed, the potential for greater health effects related to this higher potency is noteworthy. Additionally, as producers introduce novel variants, potency and effects will remain uncertain.

Beyond anecdotal evidence suggesting SC is attractive to individuals who undergo routine drug testing and case reports discussing the medical effects on users presenting in emergency departments, little is known about the psychological correlates and consequences of SC use. Nor is it currently known to what extent SC has potential for abuse and dependence. The present study addresses some of these gaps. Further, as drug use among service members is of great concern to the military, and SC has thus far evaded assured detection, this study provides some data on how this drug may be impacting Army personnel.

The Warrior Check-Up (WCU), the parent project of the current study, is a randomized clinical trial of a brief telephone-based motivational enhancement intervention for substance-using US Army soldiers. Employing a check-up model approach (Walker, Roffman, Picciano, & Stephens, 2007), the intervention uses social marketing to attract soldiers who are abusing or dependent upon alcohol or other drugs, but are ambivalent about changing behavior.

Synthetic cannabinoids quickly emerged as a prevalent issue for participating soldiers. Accordingly, protocols and measures were adapted within the first six months of recruitment to include an investigation of their use. The present study uses baseline data from WCU to explore prevalence of use and characteristics of soldiers who are attracted to the drug in terms of demographics, mental health indicators, and use of other substances. Finally, with alcohol we know that perceived social norms of use impact individuals' own drinking behavior. Moreover, normative misperceptions have been an effective point of intervention for populations similar to that of the WCU (Pemberton et al., 2011; Williams, Herman-Stahl, Calvin, Pemberton, & Bradshaw, 2009). Therefore, we were also interested in examining soldiers' perceptions of SC use among relevant referent groups relative to other substances.

2. Methods

2.1. Participants and procedures

Participants included 368 active-duty Army personnel stationed at a large post in the Pacific Northwest who completed a screening assessment for a larger study that included measures of substance use. Of these, 294 met criteria for substance abuse or dependence (including alcohol, illicit drugs, and prescription medications). Eligible callers were invited to participate in a longitudinal trial and complete a more extensive baseline assessment including measures of perceived norms, depression, anxiety and additional demographic data. Eligibility requirements included: abuse or dependence on alcohol, drugs, or prescription medications; active-duty military status; no evidence of psychosis; no current engagement in substance abuse treatment; and no planned deployment to a combat zone within the next seven months.

The enrolled sample (N = 199) included 8.0% women and the racial composition was 57.3% Caucasian, 17.1% African American, and 25.6% who endorsed one or more other categories (i.e., American Indian, Asian, Native Hawaiian, other, or refused). Sixteen percent of participants indicated a Hispanic identity. Most participants (77.6%) had been deployed at least once. Of participants who provided their rank, most were enlisted (93.2%), and 6.8% were commissioned or warrant officers. Nearly half the sample (45.0%) had been in the military for four years or less, 33.3% had served between five and eight years, 11.6% between nine and twelve years, and 10.1% had served more than twelve years.

2.2. Measures

2.2.1. Substance use

The *Customary Drinking and Drug Use Record* (*CDDR*) was developed to assess current (past 3 months) and lifetime use of alcohol and drugs. This measure was adapted to include SC. The CDDR has demonstrated good psychometric properties with young and middle-age adults (Brown et al., 1998).

The *Psychoactive Substance Use Disorders section of the Structured Clinical Interview for DSM-IV* (SCID) served to assess abuse and dependence diagnoses. The SCID was developed to improve inter-rater diagnostic reliability and kappas for substance abuse/dependence disorders typically range from .75 to .84 (First, Spitzer, Gibbon, & Williams, 1997).

The *Short Inventory of Problems* was adapted to assess 22 negative consequences related to substance use. Six military specific items were added to the measure, including, for example, "I had a drop in my Physical Training Score because of drinking or drug use" (Forcehimes, Tonigan, Miller, Kenna, & Baer, 2007).