RESEARCH

Bath salt use in the military: Experiences with synthetic cathinone use among justice-involved Veterans

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ABSTRACT

Introduction: Ring-substituted cathinone derivatives emerged in Europe in the mid-2000s. These synthetic stimulants, colloquially called bath salts, reached the United States and Canada around 2008 and may have been disproportionately used by populations facing strict screening programs for traditional recreational drugs. Military personnel in most countries are subject to frequent drug tests, but the hypothesis that routine drug screens affect bath salt use decisions within the military has not been assessed. **Methods:** Between 2016 and 2018, 312 U.S. Veterans charged by civilian authorities with a criminal offence were interviewed. Respondents were drawn from eight sites within three states. **Results:** Bath salt use was reported by 2.3% of the sample. Instrumental reasons for use (increasing focus and staying awake) were commonly reported, followed by recreational purposes. All bath salt users reported extensive prior substance use histories. Qualitative analysis of responses identified four major themes: 1) bath salt use is limited (to one event or a brief time frame), 2) bath salts are associated with an intense effect relative to other drugs, 3) bath salts are perceived as a passable substitute for cocaine or methamphetamine, and 4) drug testing policies did not affect bath salt use. **Discussion:** Even among Veterans with extensive substance use histories, bath salt use is limited. There was no indication bath salt users were actively trying to elude detection in the military. This suggests current testing programs are not leading service members to substitute potentially more risky drugs for traditional substances.

Key words: 3,4-methylenedioxypyrovalerone, MDPV, bath salts, drug testing, justice-involved, mephedrone, methamphetamines, military, substance use, synthetic cathinones, U.S. Veterans, Veterans

RÉSUMÉ

Introduction : Les dérivés de la cathinone de substitution ont émergé en Europe au milieu des années 2000. Ces stimulants synthétiques, qu'on appelle familièrement sels de bain, ont atteint les États-Unis et le Canada aux alentours de 2008 et ont peut-être été démesurément utilisés par les populations devant respecter de rigoureux programmes de dépistage des drogues récréatives habituelles. Dans la plupart des pays, le personnel militaire de la plupart des pays doit se soumettre à de fréquents tests de dépistage de drogues, mais l'hypothèse selon laquelle les dépistages systématiques influent sur la décision d'utiliser les sels de bain dans l'armée n'a pas été évaluée. **Méthodologie :** Entre 2016 et 2018, 312 vétéran(e)s américain(e)s accusé(e)s d'une infraction pénale par les autorités civiles ont participé à une entrevue. Les répondant(e)s provenaient de huit établissements répartis dans trois États. **Résultats :** Au total, 2,3 % de l'échantillon a déclaré utiliser des sels de bain. Les principales raisons d'utilisation (accroître la concentration et rester éveillé[s]) étaient souvent invoquées, suivies d'une consommation à des fins récréatives. Tous les utilisateur(trice)s de sels de bain ont admis avoir été de grand(e)s utilisateur(trice)s de substances psychoactives. L'analyse qualitative des réponses a fait ressortir quatre thèmes majeurs : 1) l'utilisation des sels de bain est limitée (à un évènement ou à une brève période), 2) les sels de bain accroissent l'intensité des autres drogues, 3) les sels de bain sont perçus comme un substitut passable de la cocaïne ou de la méthamphétamine et 4) les politiques de dépistage des drogues n'influaient pas sur l'utilisation des sels de bain. **Discussion :** Même chez les vétéran(e)s ayant une longue histoire d'utilisation de substances psychoactives, l'utilisation de sels de bain est limitée. Rien n'indique que les utilisateur(trice)s de sels de bain essayaient activement d'éviter d'être dépisté(e)s pendant qu'ils/elles étaient dans les Forces armées canadiennes. Ainsi, les programmes actuels de dépistage n'incitent pas les membres en service à remplacer des substances traditionnelles par des drogues au potentiel plus dangereux.

Mots-clés : 3,4-méthylènedioxypyrovalérone, cathinones synthétiques, dépistage des drogues, démêlés avec la justice, méphédrone, méthamphétamines, MDPV, militaire, sels de bain, utilisation de substances psychoactives, vétéran(e)s, vétéran(e)s américain(e)s

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LAY SUMMARY

Drugs called bath salts were created to mimic illegal stimulants. These synthetic drugs were briefly sold legally, but their largest appeal may have been to individuals who wanted a cocaine- or methamphetamine-like high without the same risk of detection. Since individuals in the military are subject to frequent urine tests for cocaine and methamphetamine, it was suggested they may disproportionately use bath salts (along with other oft-tested groups like athletes and individuals on probation). This study used interviews with 312 Veterans to test that assumption and found bath salt use was relatively rare even among Veterans with extensive drug use histories. Veterans did not substitute bath salts for other stimulants to avoid positive urine tests. Use was described as very brief, and the drug was found to be overly powerful and similar to cocaine, but users did not select bath salts because they were less likely to get caught. Military drug testing programs did not lead Veterans to experiment with newer, potentially more dangerous substances.

INTRODUCTION

Members of the military often find themselves in environments that are physically and emotionally exhausting, which may lead to a cycle of substance (ab)use.[1-3] Synthetic stimulants, referred to as bath salts, emerged as a concerning trend on military installations around 2008, with military physicians describing several acute reactions in the academic literature.[4–6] Novel psychoactive substances (NPS), including bath salts, are compounds often designed to be legal alternatives to controlled substances.[7,8] NPS may appeal to many civilians but are believed to be particularly attractive to service members because they are perceived as less likely to be detected in standard military drug screens.[5,9-11] Limited research exists on bath salt use in the military, and no studies have detailed the experiences of military bath salt users through extensive interviews. A sample of 312 Veterans and service members charged by civilian authorities with a criminal offence was used to explore the use of these substances among military personnel.

Bath salts

Bath salts is a colloquial name generally used when referring to synthetic cathinones.[5,10,12] This terminology is not based on these substances ever being used as a bathing aid, but rather an initial marketing ploy intended to circumvent legal restrictions.[12,13] In the United States, analogues of controlled substances would be subject to the 1986 Federal Analogue Act and controlled to the same extent as the scheduled compound, unless marketed for a purpose other than human consumption.[12] Accordingly, early synthetic cathinones were sold under labels such as plant food, detergent, bath salts, and even ladybug attractant with "not for human consumption" clearly indicated on the package.[13] While the packaging and price made mistaking these substances for anything other than recreational drugs unlikely, bath salts became the common moniker for these drugs.[14] Several compounds in this grouping were classified as Schedule I in 2012,[15] eliminating the utility of labelling them bath salts, but the nomenclature remains.[16]

Bath salts are ring-substituted synthetic cathinones or β-keto phenethylamines that are structurally similar to amphetamine.[5,17-19] The most common substances identified in these products are 3,4-methylenedioxypyrovalerone (MDPV), mephedrone, and other cathinone derivatives, all of which produce a sympathomimetic effect.[20] Some of the side effects are akin to those of methamphetamine, ecstasy, khat, or cocaine, including paranoia, violent behaviour, hallucinations, decreased need for sleep, lack of appetite, chest pain, self-mutilation, and even death.[21,22] Bath salts' ability to amplify violent tendencies[23,24] and provoke paranoia[25,26] puts nearby non-users at risk, particularly when a user has combat training and access to weapons. Additional studies tie bath salts to other aggressive behaviours, tachycardia, seizures, hypertension, and drowsiness.[27-29]

Bath salt use has been limited relative to other NPS categories (e.g., synthetic cannabinoids).[30-34] Reports of lifetime bath salt use among U.S. high school seniors peaked at 11.0% in 2012, dropped to 5.2% four years later, and has now stabilized around 1.0%.[30] Other studies show bath salt use as lower than that of other drugs in distinct civilian populations,[31-34] although underreporting may be a concern.[35] While samples are generally small, bath salt users tend to be male, white, young, and with at least a high school education.[34,36] Additionally, NPS use is more prevalent among individuals with past substance problems and/or mental illnesses.[37-40] Groups subject to frequent drug testing, like military personnel, are hypothesized to be more likely to use bath salts and other NPS,[5,41,42] but the accuracy of this assumption has yet to be fully validated.

Bath salts and the military

Military personnel may use substances for instrumental purposes, including to manage the stress associated with a violent and dangerous career, sleep in uncom-

fortable situations, combat operational fatigue, and remain physically and mentally alert after exhausting efforts.[2,43,44] The latter two of these motivations make stimulants appealing, but it is unclear if bath salts have been used for this purpose among military personnel or if use is solely recreational.[5,9,11] Reports from health care providers confirm that bath salts did reach some U.S. bases and vessels, but these are generally limited to situations requiring acute care.[22] It is possible that military physicians being at the forefront of summarizing clinical presentations of bath salts, synthetic cannabinoids, and other NPS[5,45] contributed to the notion that NPS were a particular problem for the military. Anecdotal evidence and media reports of military NPS use also supported this argument.[46] However, evidence of bath salt use clustering around military bases can be inferred from an analysis of poison centre call records.[11] Of all bath salt exposure cases across 100 counties, 19% were reported from the five counties that house military installations, despite these counties having lower population density than average.[11] Relatedly, an emergency department on a domestic military base suspected NPS use in 155 cases over a one-year period; toxicology confirmed bath salt use in 13 of these cases and nearly one-fifth of NPS cases that warranted hospital admission.[22] Though most reports tie bath salt use specifically to the U.S. military,[4-5,42] substances in this grouping were recovered on European military bases,[47] and an argument has been made that decreasing UK military drug screens positive for cocaine were largely due to bath salts acting as a replacement.[48] It is plausible that reports of bath salt use in the U.S. military are more pervasive than in other countries, mainly because of the size of the U.S. military, and that other countries face similar concerns.[49]

While military personnel are subject to routine drug testing programs,[41] NPS use is more likely to evade identification.[50] One of the biggest problems with NPS testing is that, as soon as one substance is identified and included in tests, a newer compound may take its place among substance users.[28] Limited financial resources for testing make keeping up with emerging compounds challenging, particularly as many NPS tests are associated with high costs.[51] Thus, it may be impractical to test soldiers en masse for uncommon substances during routine and random urinalyses. As a result, assessing NPS use is inconsistent unless use is specifically suspected as part of an active investigation.[51,52-54] This facilitates a perceived ability to avoid positive drug screens, which may contribute to military personnel using bath salts over traditional substances[49,50,52,53] and prompts the question: does drug testing within a military unit create an environment that encourages replacing traditional banned substances with more problematic analogues?

Whether bath salt use was truly pervasive in the military at any point remains unresolved because of testing insufficiencies, and the role of drug testing in bath salt use decisions among military personnel is also currently speculative. If soldiers used bath salts believing they could avoid positive screens, it is necessary to increase the perception that NPS are routinely assessed in military urinalyses. If evading detection was not a pressing factor, understanding the motivations that led to bath salt use can inform educational campaigns and military policy. Further, as little is currently known about risk factors for bath salt use specific to the military,[42] an exploration of traits, military obligations, mental health issues, and combat experiences that may be correlated with bath salt use has utility for creating targeted intervention and assistance programming. Interviewing at-risk Veterans separated from the military is an ideal mechanism for determining whether bath salt use was common, how effects were subjectively interpreted, and what motivated use initiation, persistence, and desistence.

METHODS

Sample and data collection

This study uses data from the National Institute of Justice's Multisite Evaluation of Veterans Treatment Courts (MEVTC), which were collected, analyzed, and reported in accordance with Missouri State University Institutional Review Board protocol-2016-83. Research protocols and instruments related to the MEVTC were also reviewed by the Veterans Health Administration's Research and Development Office. Following emergence of a variety of other problem-solving courts (e.g., drug courts, mental health courts), over 600 Veteran treatment courts (VTCs) were implemented to connect justice-involved Veterans (JIVs) with treatments and services to meet their specific needs.[55] Though the MEVTC was primarily designed to summarize, assess, and interpret the function and potential success of these courts, rather than NPS use,[56] interviews with VTC participants included items tied to bath salts, providing insight into use patterns and correlates during military service. This sample is not representative of all Veterans and, thus, not generalizable to that group. However, the rarity of bath salt use[30,34] makes a targeted approach more efficient. VTC partici-

pants are often charged with substance use offences (as violent offences are ineligible for VTC inclusion in many jurisdictions),[55] increasing the likelihood JIVs have used or been exposed to a variety of psychoactive substances.

The MEVTC study included court observations and interviews with participants at eight sites in three U.S. states. These jurisdictions were purposely chosen to provide representation from VTCs of various sizes, structures, lengths of operation, and participant populations with distinct demographic profiles.[56] In total, 579 Veterans physically appeared in one of eight courts between July 1, 2016, and June 30, 2018. In-court announcements, recruitment flyers, and phone calls informed Veterans about the study and noted a $20 gift card was offered as an incentive to participate in a one- to two-hour interview. Researchers were present before and after VTC dockets to schedule interviews and gather contact information. The principal investigator (PI), co-PI, or one of eight research consultants interviewed each of the 312 Veterans who agreed to participate (response rate 54.9%) in a quiet setting (e.g., conference rooms, faculty offices, library rooms). Voluntary consent was obtained and documented prior to collecting any data. Interviewers used physical instruments to record answers to fixed-response quantitative items and an audio-recorder to capture responses to open-ended questions and unprompted commentary. Fixed-response items recorded on the interviewer's paper instrument were entered into a database. Audio recordings were transferred to the PI, transcribed verbatim, de-identified, and entered into NVivo, version 14 (Lumivero, Denver, CO).[56]

The resulting sample was overwhelmingly male (n = 292; 91.8%) with 57.8% serving the Army, 8.6% in the Air Force, 17.6% in the Marines, and 16.0% in the Navy. Within the sample, 42.4% described themselves as non-Hispanic white, 24.8% as non-Hispanic Black, 27.4% as Hispanic, and 5.4% as Native American, Asian American, or multiracial. Most were not married (65.2%) and reported no completed degree beyond high school (62.5%).

Measurement

MEVTC instrumentation followed a single VTC site pilot study that did not include items related to bath salts.[57] The colloquial term bath salts was substituted into the same questions that were previously asked about marijuana and cocaine. Additional fixed-response options were provided to some questions because of the potential of bath salts to be used to decrease detection risk. An initial item asked, "In your lifetime, have you ever used bath salts?" Those acknowledging bath salt use were then asked, "Did you use bath salts before joining the military?", "during military service?", and whether they used "after serving?" Participants were then asked yes/no questions to determine whether they used in the last year, six months, three months, and one month. Veterans acknowledging any use of bath salts were prompted, "Can you tell me about why you used bath salts and your experiences?" The interviewer then read a list of 16 possible reasons for use, asking the respondent to indicate yes/no whether that reason was tied to any use of bath salts. Respondents were also queried, "Did you mix bath salts with other substances?"

Analytic strategy

Quantitative results from the fixed-response items are presented first. Descriptive statistics, such as the prevalence of bath salt use among VTC participants, the timing of use relative to military service, and the number reporting various reasons for use, are presented in text. Table 1 presents the results of χ^2 tests to assess potential associations between bath salt use and demographic characteristics, location, military branch, and post-service experiences to determine whether any sub-groups may be at enhanced risk for reporting use.

Narrative responses to open-ended questions about bath salts are explored next. A list of potential codes was developed based on prior research and theory. Two senior members of the research team reread each transcript separately to identify any additional codes. Following a collaborative evaluation, inductively derived codes were incorporated into the initial list. Closely related codes were merged into an overarching theme. The senior author re-evaluated each transcript, indicating themes in NVivo. This iterative categorization process assists with data interpretation.[58] Interview data remained paired to identification codes indicating the respondent's sex, VTC site, and military service branch; these demographics did not appear to affect bath salt use. Finally, the authors interpreted themes appearing in three or more interviews.

RESULTS

Fixed-response items

Prevalence of bath salt use among the JIVs was 2.3%. Bath salt use was reported by 7 members of the sample (2 refused to answer this question; 8 did not reach this

portion of the interview). Only 1 reported using prior to military service, 2 first used bath salts while in the military, and 4 first used after exiting. All reported ceasing bath salt use more than 6 months before the interview. As bath salt use is a somewhat recent phenomenon, the authors partitioned the sample to examine only those whose service overlapped or followed the emergence of bath salts as reported by the media. Use still did not exceed 5% of JIVs.

Bath salt users were queried about motivations for use and allowed to identify multiple reasons for use. The majority reported use was at least sometimes driven by the goals of increasing focus, staying awake, and thinking more clearly. Some reported social/party aspects of use — 1 labelled peer pressure as driving his initial use and 3 reported using to be social. Similarly, fun was reported as a reason by 2 and boredom by 3. One described using bath salts to manage pain, while another reported curiosity as a factor. As would be expected because of their pharmacological profiles, no Veterans used bath salts to aid sleep and/or relaxation.

All 7 users of bath salts were males between the ages of 24 and 45 years, discharged between 2001 and 2014. Four were white, and 3 identified as Hispanic. Two served in the Army, 2 in the Marine Corps, and 3 in the Navy. Bath salt users were identified in each of the study states. Six of 7 reported injuries resulting from their service, four were currently receiving compensation for their injuries. Six reported periods of homelessness post-service. All reported dealing with insomnia and depression, while 6 believed they experienced posttraumatic stress disorder (PTSD), paranoia, obsessive-compulsive disorder, and suicidal thoughts. Four reported concussions. Reported bath salt use within various demographic and descriptive categories is displayed in Table 1. While this table appears congruent with known correlates of bath salt use outside the military (with white and Hispanic males being more likely to report use),[22,41] these factors do not reach thresholds for statistical significance within this small sample.

Bath salts did not appear to appeal to JIVs who otherwise had limited drug experience or solely used stimulants. Users of bath salts all reported previous use of alcohol, marijuana, opioids, and other illicit stimulants (cocaine, methamphetamine and/or amphetamine). All but one reported using lysergic acid diethylamide (LSD) or other hallucinogens. Substance use was pervasive in the sample (99.0% had used alcohol, 59.2% other illicit stimulants, 82.3% marijuana, 45.8% had used depressants, and 34.5% had used hallucinogens), but bath salt use was only reported by these 7 (2.3%). Even another newer group of substances, synthetic marijuana, was reportedly used by nine times as many Veterans as bath salts. Figure 1 depicts bath salt use among users of other substances; bath salt use was significantly associated with illicit stimulant use ($p = 0.044$ [Fisher exact test]), opioids ($p = 0.004$), hallucinogens ($p = 0.008$), and synthetic marijuana ($p < 0.001$). Use of these substances

Table 1. Non-users and users of bath salts in demographic, service, and other groupings

Characteristic	Non-users	Bath salt users	χ^2 p value
Race, ethnicity			
White, non-Hispanic	124	3	4.719, 0.194
Black, non-Hispanic	76	0	
Hispanic	76	4	
Other	17	0	
Biological sex			
Male	274	7	0.561, 0.454
Female	22	0	
Age, y			
18-29	51	3	4.543, 0.208
30-39	113	3	
40-49	49	1	
50+	83	0	
Branch of service			
Army	172	2	5.370, 0.147
Air Force	26	0	
Marine Corps	48	2	
Navy	46	3	
Service-related injuries			
Yes	251	6	0.002, 0.967
No	40	1	
Injury compensation			
Yes	181	4	0.074, 0.785
No	110	3	
Homeless/housing issues			
Yes	147	6	3.357, 0.067
No	143	1	
Reintegration training			
Yes	143	3	0.114, 0.736
No	147	4	
Veterans' Court location			
Florida	153	1	5.668, 0.059
North Carolina	43	3	
Texas	101	3	

may indicate enhanced risk for bath salt use, but use was still limited among users of these substances.

Qualitative data

Four themes emerged from the JIV qualitative responses to bath salts items: 1) bath salt use is limited (often to one event or a brief time frame), 2) bath salts are perceived as a passable substitute for cocaine or methamphetamine, 3) bath salts are associated with an intense effect relative to other drugs, and 4) drug-testing policies did not affect bath salt use. These themes are explored below.

Once is (generally) enough

Most of the bath salt users reported an initial experience that did not lead to repeated or habitual use. Peer influence and curiosity are seemingly tied to experimental-only use; without those factors exerting a continuing influence, use did not reoccur:

> I tried it once when some guys were doing it. ... I haven't done it after.
>
> (4 years of service, Navy)

One JIV reported his first experience with bath salts was so unnerving he did not have any interest in using again. The limited use of bath salts indicates they were not being used habitually in lieu of other stimulants to avoid positive drug screens, but rather to satiate curiosity or fit in with peers in an isolated setting. Two Veterans who reported repeated/habitual use described using multiple times per day for a period of less than two months and then never using again after that period.

Suitable substitute

Multiple respondents believed the bath salts they used could be passed off as other illicit stimulants. Whether substituted for methamphetamine or cocaine, they argued that an unsuspecting user may not realize they used bath salts:

> It was the same thing though. It pretty much is. It's just ... all that stuff, it's all meth.
>
> (4 years of service, Navy)

> I believe you could sell that on the street and pass it off as coke. Except you wouldn't get the numbness. That's the only difference, with bath salts you wouldn't get the numbness ... and I didn't like the numbness really.
>
> (3-4 years of service, Marines)

These individuals did not claim they chose bath salts to replace a preferred illicit stimulant but rather described bath salts as an analogue with a similar perceived effect. Saying it was the same as "meth" was their way of describing it to the interviewer and not the reason for using it. They believed it would be a suitable substitute if someone wanted a replacement for other stimulants, but none mentioned blocked access to cocaine or methamphetamine to queries about reasons for use. Language implied a person distributing drugs could package bath salts as cocaine and buyers likely would not be able to tell they were deceived. Indirectly, these comments may indicate concern street dealers previously substituted bath salts for cocaine to unsuspecting clients.

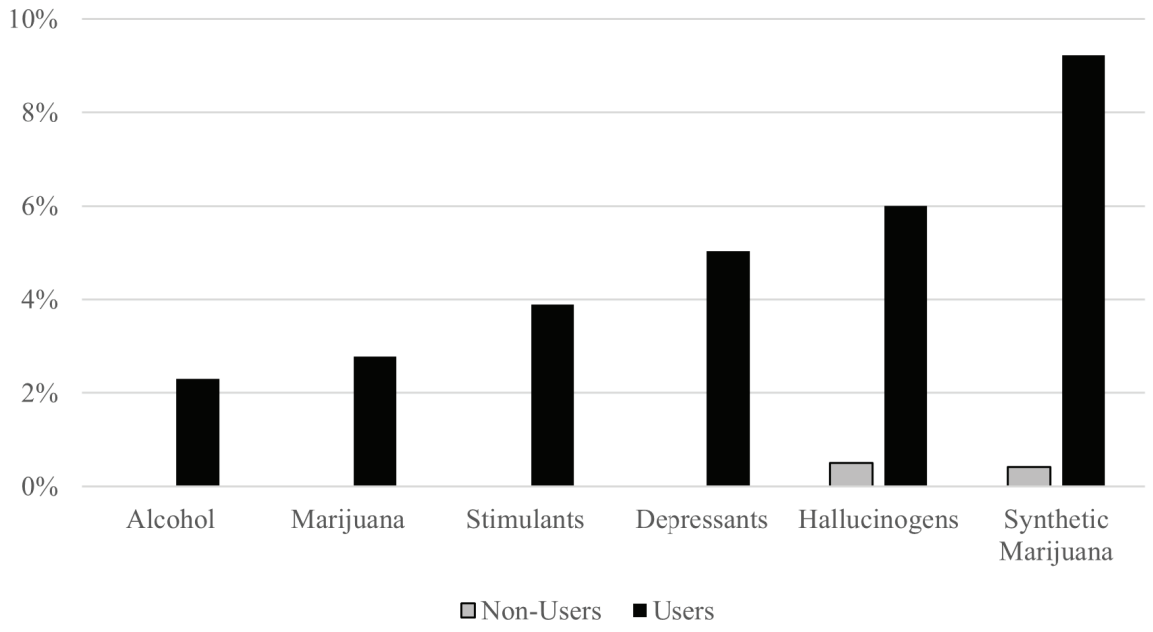

Figure 1. Percentage of other substance users who reported bath salt use

Intense experience relative to other substances

JIVs described bath salts as extremely potent with intense effects relative to other substances. Those that repeated use seemingly enjoyed the energy, focus, and attention to detail resulting from bath salt use; however, they described effects they interpreted as positive eventually evolving into paranoia and delusions:

> I was on that [bath salts] pretty hard because I just like to be geeked out and I would clean for field day Thursdays. I'd just be up there at three, four o'clock cleaning, I loved the geeked feeling, I enjoyed it, I had no problem with it, and there's a couple guys in there with me, probably every day, every other day, for a month, month and a half. ... It gave me that geeked feeling, I was always antsy, always moving around. I could focus if I wanted to, but if I did too much, I'd become paranoid .... the longest I've stayed up was a week and a half on bath salts. We didn't sleep for 7 to 10 days, started hearing shit because we had not slept so much ... a line or two every couple of hours, even though we didn't need it, we just wanted to do it. And they wouldn't be no little lines either; they would probably, yeah, just they were big.
>
> (3-4 years of service, Marines)

Another reported the drug's effects might drive him to commit acts of violence — labelling it the "one drug that's — it's bad stuff," acknowledging his history of cocaine and heroin use:

> JIV: You hear the stories of it [bath salts]. It's really bad stuff. I felt ... The one time I did take it, it was during Thanksgiving. And I felt like if I was gonna talk to someone like you, that I'd have to kill you. That's how weird it is. [chuckle] It really is that bad. I couldn't talk 'cause if I would talk to you, it would've killed you or something. It was weird. And it just made me feel like I..."
>
> INTERVIEWER: That you would've thought that you would've killed me?
>
> JIV: Yeah, or something like that. It was weird. It made me ... I don't know. It's really a weird drug. Definitely, that's the one I stayed away from.
>
> (2 years of service, Army)

In conjunction with the previous theme, this suggests bath salts are perceived as similar to cocaine and methamphetamine, albeit potentially much more intense. Longer periods of use or greater quantities were associated with more extreme and concerning effects, perhaps more than users associated with other stimulants and certainly produced effects that they did not desire.

Drug tests do not affect bath salt use, specifically

Five of the seven bath salt users described use of all substances, other than alcohol, decreasing or ceasing when joining the military. The threat of drug tests and culture emphasizing alcohol use, rather than other drugs, largely contributed to their behaviours. It seems military drug testing had its desired effect on most individuals: "Yeah. I completely stopped doing everything. I drank on occasion with my battle buddies. But other than that, no drug use whatsoever" (2 years of service, Army).

The two that used bath salts while in the military did not recall being affected by drug testing requirements: "No, I didn't think about it at all" (3–4 years of service, Marines). This suggests bath salts were not being used to subvert testing. Bath salts' exclusion from many drug screens was not a factor, as the bath salt users were not engaging in strategic decisions to mitigate risk. Whether they were unconcerned with the ramifications of a positive screen, falsely believed themselves invulnerable to policy, or suffered from substance use dependence/cravings that prevented rational decision making, these bath salt users were unaffected by military drug policy. In sum, military drug testing curtailed substance use for some but not for others. It did not lead any to use bath salts in lieu of more traditional (and more frequently tested for) substances.

DISCUSSION

Bath salt use was clearly not pervasive among JIVs in the MEVTC sample. While a sample of JIVs is not representative of active duty military personnel,[55,56] the implications of this study are still powerful and imply bath salt use was uncommon in the U.S. military. This targeted sample is largely composed of Veterans with extensive substance use histories due to inclusion criteria for VTCs.[55] While a history of substance use arrest was common, bath salt use was reported by only 2.3% of this group. Use within the military overall is likely much lower. The small prevalence should not drive inferences that bath salts are a minor military problem, given their potential for extreme acute effects,[16,59] association with uncontrolled and violent behaviour,[23,24] and potential to interfere with the cognitive and physical ability of individuals operating heavy machinery and weaponry.[60]

All bath salt users in the sample were male and either non-Hispanic white or Hispanic. This is consistent

with other work tying novel drug use to these two groups.[22,41,61,62] No use was reported by those identifying as African American or Asian American. No female participants reported use, but the sample contained only 22 females (consistent with the U.S. military, Veteran, and correctional populations all being overwhelmingly male). Bath salt users were dispersed among the different service branches and in different study locations. Many bath salt users reported struggling with homelessness, service-related injuries, and self-reported mental health concerns, but these issues were also reported extensively by non-bath salt users. These issues are also common among Veterans not under the supervision of the justice system.[1-3] As statistically significant associations were not found; this study should not serve as a basis for describing risk factors for bath salt use in the military.

Bath salt use was reported only by those with extensive substance use histories. Use of harder substances was significantly associated with, and generally preceded, bath salt use. Yet, gateway, replacement, and transition interpretations of this finding are not necessarily warranted. First, the temporal ordering of bath salt use relative to other substances may be tied to bath salts' availability; older Veterans (> 25 years) likely had access to other substances prior to bath salts reaching the United States around 2008.[12-14] The order in which they used substances may simply be the result of what was available to them first. Second, none of the participants indicated bath salts were used to replace cocaine, methamphetamine, or any other stimulant. They described the effects as similar, even claiming bath salts could be deceptively passed off as cocaine or methamphetamine but did not seek out bath salts in lieu of these drugs. Veterans in this study did not use bath salts as a temporary replacement when these other stimulants were unavailable or sequentially transition from them to bath salts. Third, motivations to use bath salts seem to mirror those associated with illicit stimulants,[2,63] suggesting that common dispositions and rationalizations underpin the connection, as opposed to one stimulant being used as a replacement for another.

Absent evidence bath salts are used as replacements for illicit stimulants, and because of the similarity to prevalence findings from non-military samples,[30,32,35,64] there seems to be no support for the argument that bath salt use is disproportionately common among military personnel or linked to military service. Thus, concerns military drug testing protocols pushed potential substance users to bath salts were not substantiated by this study. While reasonable to suspect that stimulant users under frequent testing may substitute rarely screened for synthetic cathinones for methamphetamine and/or cocaine,[11,54,65] it appears not a single JIV in the sample used this approach. The testing protocols seemed to have the desired effect, as most respondents reported curtailing use of substances, other than alcohol, while serving. There was no indication any bath salt user actively tried to elude detection in the military — most even reported using only outside of the military.

Limitations

While this study illuminates an underexplored form of substance use, it is not without limitations. The sample was drawn from JIVs in eight VTCs rather than at random from a sampling frame of all Veterans. Therefore, prevalence estimates are not reflective of Veterans as a whole.[55,56] As with most illicit or stigmatized behaviours, under-reporting is a concern[35]; however, because members of this sample frequently recounted violence, trauma, criminal and deviant behaviour, and use of heroin and/or cocaine, it is unlikely they would be deceptive about bath salt use. The study also did not differentiate from the numerous stimulants that may have been colloquially referred to as bath salts.[16] Although this is reasonable, given many novel drug users are not aware of what compounds they are using,[10,66,67] it prevented the authors from determining whether individuals were using MDPV, mephedrone, or another drug packaged as bath salts. Relatedly, as bath salts were viewed as a passable substitute for cocaine and methamphetamine by the users in this sample, it is possible some individuals used bath salts believing they were using a more traditional stimulant. Further, this sample is limited to U.S. Veterans whose experiences may differ from Veterans of other militaries.[68] After this study concluded, at least one state expanded its definition for Veterans in the context of VTC eligibility to include current or former members of foreign allied countries (e.g., Florida Statute 394.47891). It was also noted findings for one type of novel psychoactive substance may not necessarily extend to other emerging drugs.[8]

Acknowledging limitations, this study supports continued routine drug testing of military populations, as cessation or reduced use of all non-alcohol substances was reported by bath salt users. Testing programs did not result in bath salts being used as a replacement for cocaine or methamphetamine. Three potential drug-related responses to military service could be inferred

from previous works:[5,42,45] 1) the general avoidance of all non-alcohol substance use during service either because of the military's structure and drug testing programs, 2) substance use that is unfazed by the threat of drug tests, and 3) strategic substance use intended to mitigate risks associated with positive tests. While each of the first two responses was clearly espoused by some Veterans,[5,69] it was unclear to what degree the third may exist within the context of bath salt use, particularly as these substances presented an opportunity for some to engage in stimulant use with relatively lower detection risk.[50] The authors found no evidence of the third behavioural response — not a single Veteran reported replacing more traditional stimulants with bath salts in an attempt to evade a positive drug test.

Conclusion

Bath salt use appears no different from the use of other substances — a portion of military personnel chose to use them despite risk to health and employment. While this study clarifies that military testing does not enhance risk by turning individuals from one drug to a more dangerous alternative, it also reiterates the extent to which Veterans face substance-related problems.[1-3] Programs are clearly warranted to assist Veterans with reacclimating to civilian life, managing the emotional and physical toll of their service, and using coping mechanisms other than substance use.[2]

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COMPETING INTERESTS

The authors have nothing to disclose.

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ETHICS APPROVAL

The study protocol was approved by an ethics committee and the ethics certificate information is available from the authors upon request.

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PEER REVIEW

This article has been peer reviewed.

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