Coombs, T, Abdelkader, A, Ginige, T, Van Calster, P, Corazza, O and Assi, S

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International Journal of Mental Health and Addiction
https://doi.org/10.1007/s11469-022-00988-7

ORIGINAL ARTICLE

New Psychoactive Substances in the Homeless Population: A Cross-Sectional Study in the United Kingdom

Thomas Coombs[1,2] · Tilak Ginige[1] · Patrick Van Calster[3] · Amor Abdelkader[1] · Ornella Corazza[4] · Sulaf Assi[5]

Accepted: 8 December 2022

Abstract

The last few years have seen the emergence of new psychoactive substance among the homeless population, specifically synthetic cannabinoid receptor agonists. The purpose of this study is to investigate the knowledge and experiences of new psychoactive substances amongst users from the homeless population. An explanatory research design was applied using a semi-structured questionnaire with the focus on gaining insights on the prevalence, motivations and effects. Participants were recruited through convenience sampling from support organisations and charities UK-wide. Descriptive statistics and logistic regression were applied to analyse the data obtained from participant surveys. A total of 105 participants met the inclusion criteria and were in the age range of 18 to 64 years old. Almost 70% consumed new psychoactive substance products, which "Spice" was the most prevalent substance. Homeless users had consumed new psychoactive substance to escape reality and to self-treat themselves and stopped consumption due to the adverse effects. Adverse events were reported from the majority of the participants and led to more than 20% of the participants requiring medical treatment following hospitalisation. Findings from this study can contribute to the development of guidelines and policies that specifically address the needs of the homeless population who use new psychoactive substances.

Keywords New psychoactive substances · Homeless population · Spice · Synthetic cannabinoid receptor agonists · Substance misuse

✉ Thomas Coombs
tcoombs@bournemouth.ac.uk

[1] Faculty of Science and Technology, Bournemouth University, Poole BH12 5BB, UK

[2] Faculty of Science and Technology, Department of Life and Environmental Sciences, Christchurch House, Talbot Campus, Fern Barrow, Poole BH12 5BB, UK

[3] Faculty of Health and Social Sciences, Bournemouth University, Poole BH12 5BB, UK

[4] School of Life and Medical Sciences, University of Hertfordshire, Hatfield AL10 9AB, UK

[5] School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University, Liverpool L3 3AF, UK

Published online: 28 March 2023

New psychoactive substances (NPS) have emerged over the last decade as derivatives of classical drugs of abuse such as amfetamine and cocaine (UNODC, 2020). Since their emergence, NPS rise has been continuous and it reached about 1047 derivatives in 2020 (United Nations World Drug Report, 2021). Their increased number, alongside the variable constituents, represented a challenge to healthcare professionals, regulatory bodies and policy makers (Higgins et al., 2019; Sumnall et al., 2011) as only some NPS are controlled under the 1961 Single Convention on Narcotic Drugs or the 1971 Convention on Psychotropic Substances (UNODC, 2020). It was only until 2016 that all NPS became controlled under the Psychoactive Substances Act (2016) in the UK. The delay in the latter legislation to control NPS contributed to their increase in popularity (Coppola & Mondola, 2012; McGraw & McGraw, 2012; Vardakou et al., 2011).

NPS prevalence in the general population was highest among young adults aged between 16 and 24 years old in Australia, New Zealand, Poland, Spain, the UK, and the USA prior to 2016/17 (McCutcheon et al., 2019; Palamar et al., 2015; Pirona et al., 2017; Sheridan & Butler, 2010; Tarján et al., 2017; Yeung et al., 2017). Nonetheless, NPS use is not limited to the general population but is also encountered among vulnerable populations such as the homeless population (EMCDDA, 2018). This ban, however, did raise additional concern from law enforcement about driving the supply underground, impacting the quality and purity of the substances (Blackman & Bradley, 2017).

The prevalence of homelessness globally is estimated to be roughly 150 million individuals at any given time (Busch-Geertsema et al., 2016). In the UK, recent data from the Shelter organisation estimated that 320,000 people were homeless in 2019/2020 (Bramley & Fitzpatrick, 2018). Problematic drug use among this population has been extensively documented in the scientific literature (O'Flaherty et al., 2018; Paudyal et al., 2017; Van den Bree et al., 2009; Krupski et al., 2015; Linton et al., 2013; Narendorf et al., 2017). Homelessness and drug misuse often coexist, and the recorded prevalence of drug use among homeless individuals in different countries is consistently above the national average (Doran et al., 2018; Johnson & Chamberlain, 2008; Krupski et al., 2015). Although the high prevalence of traditional drugs has been extensively documented within the homeless population, NPS have become an increasing risk to this population, with particular concern regarding the use of synthetic cannabinoid receptor agonists (SCRAs) due to their underdefined toxic effects, difficulty in treating them and lack of confidence from clinicians (Sulaiman and MP, 2019; Thornton, 2018; Williams, 2017).

The extent of literature on NPS use within the homeless population consists mostly of research undertaken at one geographical location, making it difficult to generalize the findings (Bowpitt et al., 2014; Devany, 2019; Giese et al., 2015; Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016). The latter studies found that a large portion of the homeless population was using SCRAs to alleviate the stress of homelessness and/or to self-medicate physical health issues. Within these research studies, NPS consumption was reported between 20 and 87%, and users were motivated to escape the realities of homelessness (Bowpitt et al., 2014; Devany, 2019; Giese et al., 2015; Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016). While studies reporting adverse events within the general population have not differed significantly from studies conducted into the homeless population, the NPS derivatives, doses and routes of administration have not been fully explored. The question of whether a specific NPS derivative, dose and route of administration induces a specific adverse event within this population is currently unknown. Additionally, where prevalence and motivations have been investigated, it has predominantly focused on specific geographical areas and not countrywide. Therefore, a more in-depth investigation into

NPS consumption among the homeless must be developed. Without this, the knowledge and experiences of homeless users of NPS will remain unclear.

This research aimed to understand the attributes of the UK homeless population and the associated issues with their NPS use. This allowed the knowledge and experiences of the homeless population to emerge as information was missing from research into NPS and homelessness.

Methods

Study Design

Informed by a literature review, a semi-structured questionnaire exploring the knowledge and experiences of NPS among the homeless population was developed. The tool was initially piloted among rough sleepers in three homeless shelters in England. The study questionnaire consisted of five sections, including sociodemographic characteristics, NPS consumption, motivations, desired effects and adverse events, and the completion of each questionnaire lasted between 5 and 20 min.

A convenience sampling of homeless adults in a variety of homeless service providers in the UK was recruited by street-based outreach services or referred by their peers. Participants originated from 11 locations, including eight homeless shelters, two street outreach sites and one drop-in service centre. Homeless charities were first contacted via email advising on the nature of the study before contacting them by phone to discuss the dissemination of the study to their participants, inclusion and exclusion criteria and duration of the study. To be eligible, participants had to be aged between 18 and 64 years old, homeless and a resident of the UK. Homeless participants completed a self-administered questionnaire on NPS consumption in the waiting room of the service provider where the centre managers would offer support for those with poor literacy. In total, 650 homeless individuals were approached for this study, of which 105 (16.15%) consented to complete the semi-structured questionnaire between March 1st 2019 and September 1st 2019.

Data Collection and Measures

Each questionnaire was completed by the participants by hand with a centre manager present. It was later evaluated and reviewed by a panel of four experts. The panel reviewed the results of each questionnaire and its validity and reliability were further tested by the test–retest method using the Kappa coefficient. Sociodemographic measures for participants included characteristics such as age, sex, ethnicity, duration of homelessness and employment status. NPS consumption measures included NPS consumption (yes or no). The dose consumed was an open-ended question, so participants were free to write their dose. Duration of effects and onset of action was scaled (1 h, 2 h, 3 h, etc.). The duration of homelessness was categorised as ‘acute’ (homeless for less than 1 year), ‘intermittent’ (homeless for 1 to 2 years) and ‘chronic’ (homeless for more than 3 years). Questionnaires were completed and collected over a 6-month period between March and October 2019.

Homelessness status was categorised either as ‘rough sleepers’ or ‘statutory homeless’ in accordence to the UK government classification (GOV, 2021). Rough-sleeping homeless individuals were described as not having any physical shelter, sleeping outdoors, in vehicles and abandoned buildings. Statutory homeless included individuals staying in

low-quality shelters or being at risk of losing one's home (sofa-surfing). A logistic regression model was employed to predict how certain sociodemographic characteristics can influence the likelihood of the homeless population using NPS. The variables used in the multivariable regression included the dependent variable, a binary outcome—if the homeless participant had consumed NPS either 'Yes' or 'No'. Independent variables included ethnicity, sex, sexual orientation, drug support, employment and family contact. Thus, the analysis predicted the likelihood of a homeless participant consuming NPS products.

Data Analysis

The data returned in the form of completed questionnaires were transcribed verbatim into Online Survey and imported into SPSS v26 for descriptive statistical analysis. After importing into SPSS, the data was coded into categories and subjected to basic statistical analysis in the form of numbers (n) and frequency distributions (%). We used descriptive statistics to describe the sociodemographic characteristics and NPS consumption in all participants. Bivariable and multivariable logistic regression models were used to characterize the correlation between NPS consumption. Variables with p-values < 0.05 in the bivariate analysis were entered into the logistic regression model. Odds ratio (OR) along with their 95% confidence intervals (CIs) is reported, and a final model was selected through a backward elimination approach.

For the present research, construct validity was chosen and aimed to validate the approximate truth of the conclusion that the sample accurately represents the population (Creswell & Clark, 2017). This was achieved by disseminating the questionnaire and conducting a pilot study between October 2018 and January 2019. To ensure the reliability of typed data, three researchers blindly checked questionnaires to check the degree of agreement, known as inter-rater reliability, using Cohen's kappa coefficient (Cohen, 1960). The level of agreement achieved between researchers in this study was 0.99.

Ethical Considerations

The study was granted ethical approval in compliance with the Bournemouth University Codes of Research Practice (2019), BU Research Ethics Code of Practice (2019) and the Code of Good Research Practice (2019): ethical approval was granted (ID 27,076). As this study involves examining health-related information, the ICH/WHO (1997) Good Clinical Practice Standards and the World Medical Association Declaration of Helsinki (1964) were considered in terms of respecting public health privacy. Verbal informed consent was obtained first before participants signed a consent form enabling them to participate in the research. Participants were informed about the objectives, procedures, the anonymity of data collection and questions' nature. No monetary incentives were given. Additionally, for ethical reasons, participants could refuse to complete, leave or restrict their data for the questionnaire.

Results

A total of 105 homeless individuals participated in the questionnaire, with 82.3% ($n = 86$) originating from homeless shelters, 13.4% ($n = 14$) from street outreach teams and 4.3% ($n = 5$) from drop-in centres. Questions on NPS consumption, motivations behind

consuming NPS and desired effects were reported only from the participants who had voluntarily consumed NPS products.

Sociodemographic Characteristics

The majority of the participants were males ($n=64$, 61%), Caucasian ($n=90$, 85.7%) and heterosexual ($n=79$, 75.2%). With respect to ethnicity, 93.0% ($n=59$) of males and 79.4% ($n=29$) of females were Caucasian, and Asian ethnic background was more common for females ($n=7$, 20.5%) but not males ($n=2$, 3.03%). The homeless population were aged between 18 and 64 years old with the older age groups (>35 years old) comprising of 63.02% of the population. Most homeless individuals had not been previously employed ($n=60$, 66%), but those that had been employed were more in skilled agriculture and related trades ($n=15$, 45.7%), or elementary administration and service occupations ($n=9$, 25.7%). Duration of homelessness ranged between 1 month and 30 years and was divided into three measures—acute, intermittent and chronic. Acute homelessness was reported from one-quarter of the participants ($n=27$, 25.7%), intermittent by 31.4% ($n=33$) and chronic 22.9% ($n=24$). More details on the sociodemographic characteristics of the participants are in Table 1.

NPS Consumption Among the Homeless Population

The results showed that 68.4% ($n=72$) of the participants had consumed at least one NPS. Table 2 shows the prevalence of consumption of NPS and additional related information. No significant differences were observed for NPS prevalence among male and female participants (71.6% vs 72.7%). However, the individuals who were classed as chronically homeless were more likely to consume NPS ($n=19$, 80.0%) than both acute ($n=17$, 64.3%) and intermittent homeless ($n=22$, 66.6%). The most widely consumed NPS among the homeless population was the class of SCRAs named 'Spice', of which 83.3% ($n=60$) of NPS users consumed. Most Spice users smoked ($n=53$, 87.5%) the drug as a herbal preparation ($n=55$, 91.7%) in doses in the range of 0.25 to 3 gm and reported effects that were present within 5 min ($n=49$, 81.9%) after ingestion. The duration of effects from Spice consumption lasted no more than 3 h (83.3%) for most of the participants. For stimulant NPS, 11% of the participants had consumed stimulants with mephedrone the most frequently reported ($n=3$, 4.17%). The consumption of NPS stimulants was done via snorting powder in doses between 0.05 and 0.25 gm and effects that were present in 30 min after ingestion. Additional NPS that the homeless population consumed are presented in Table 2. Homeless individuals who were classed as 'statutory homeless' were more likely to consume NPS than rough sleepers (70.2% vs 64.5%, respectively).

Motivations Behind Using NPS

The primary motivations behind the homeless population using NPS were, by a majority, either escapism ($n=20$, 27.8%) or pain relief ($n=33$, 45.8%). Just under half (45.8%) of the homeless NPS users consumed 'Spice' to relieve physical and psychological pain. Participants would also use 'Spice' to treat anxiety symptoms (26.4%) and depression (18.1%). Depression often results from the bereavement due to the death of a family member or losing contact with their family. The PSA 2016 did not prevent the homeless from using

Table 1 Sociodemographic characteristics of the homeless participants

Demographic characteristics	Frequency *N*	(%)
Age (years)		
18–24	18	17.1
25–29	16	15.2
30–34	7	6.67
35–39	21	20.0
40–49	27	25.7
50–59	13	12.4
60–64	3	2.86
Sex		
Male	64	61.0
Female	36	34.3
Prefer not to say	5	4.76
Ethnicity		
White	90	85.7
Asian	11	10.5
Black	2	1.90
Mixed race	2	1.90
Sexual orientation		
Heterosexual	79	75.2
Homosexual	8	7.62
Bisexual	11	10.5
Not reported	7	6.67
Duration of homelessness		
0–3 months	15	14.3
4–6 months	7	6.67
7–9 months	3	2.86
10–12 months	2	1.9
1 year	19	18.1
2 years	5	4.76
3 years	9	8.57
4 years	9	8.57
5–10 years	8	7.62
10–15 years	2	1.90
15–20 years	3	2.86
> 20 years	2	1.90
Not reported	21	20.0
Location of sleep		
Hostel	43	41.0
Streets	27	25.7
Sofa-surfing	21	20.0
Emergency accommodation	32	30.5
Someone's house	25	23.8
Tent	1	0.95
Forest	1	0.95
Car	1	0.95

Table 1 (continued)

Demographic characteristics	Frequency *N*	(%)
Rented flat	1	0.95
Parks	1	0.95
Family contact		
Yes	60	57.1
No	45	42.9

Participants in this study could report more than one location they would sleep and so adds up to more than 105 participants

Table 2 NPS prevalence and profile for users from the homeless population

NPS consumption	Frequency *N*	%
Yes	72	68.6
No	33	31.4
NPS product		
SCRAs	67	69.4
Stimulants	9	11.1
Dose consumed (g)		
0–0.25	12	16.7
0.25–0.5	7	9.72
0.5–1.0	3	4.17
1–2	24	33.3
> 2	8	11.1
Drug appearance		
Herbal	66	91.7
Powder	8	11.1
Crystals	1	1.39
Tablet/capsule	5	6.94
Duration for drug to take effect (minutes)		
< 1	42	58.3
5	17	23.6
10	8	11.1
30	1	1.39
duration of effects (hours)		
< 1	30	41.7
2	11	15.3
3	19	26.4
4	3	4.17
6	7	9.72
Route of administration		
Smoking	63	87.5
Snorting	9	12.5
Oral	3	4.17
Injection	1	1.39

NPS, and 75% of the users continued the consumption. Five desired effects were sought from homeless participants in this study. Out-of-body experience, typically an effect of ketamine derivatives was the most frequently reported desired effect reported from participants. Anti-anxiety, calming and hallucination effects were also frequently reported from participants who used 'Spice'. Less frequently reported effects included stimulation and were likely due to a low number of NPS stimulant users. More information about NPS motivations is reported in Table 3.

Adverse Events Associated with NPS Consumption

Although participants sought numerous effects from NPS use, the adverse events outweighed the effects sought and greatly varied between individuals. Adverse events were reported from a total of 68.4% ($n=72$) of the participants and affected four systems within the body including the cardiovascular, gastrointestinal, nervous and respiratory systems.

Table 3 Motivations behind using NPS

Motivations	Frequency *N*	(%)
Main reason for consumption		
Escapism	20	27.8
The high	13	18.1
Experiment/curiosity	10	13.9
Treatment	8	11.1
Boredom	4	5.56
Legislation	2	2.78
Potency	2	2.78
Price	2	2.78
Experience	1	1.39
Not Reported	2	2.78
NPS used for pain relief		
Yes	33	45.8
No	39	54.2
Type of pain relief		
Physical	12	16.7
Psychological	8	11.1
Emotional	3	4.17
Withdrawal	2	2.78
NPS used to treat mental health		
Anxiety	19	26.4
Depression	13	18.1
Schizophrenia	6	8.33
Suicidal thoughts	6	8.33
Bipolar disorder	5	6.94
Impact of NPS ban on consumption		
Yes	18	25
No	54	75

The findings showed that 'Spice' users primarily experienced nervous system adverse events including loss of motor control ($n=23$, 31.9%) and paranoia ($n=16$, 22.9%). The participants who had experienced the loss of motor control would usually consume in doses above 1 gm ($n=20$, 87.3%) and reported effects that would last no more than 3 h ($n=21$, 90.1%). Paranoia-induced effects were reported after consuming between 0.5 and 1.0 gm of 'Spice', and the effects lasted between 1 to 2 h. Cardiovascular adverse events induced by 'Spice' were far less prevalent than the nervous system but were present at very low 'Spice' doses. Tachycardia was experienced at doses between 0.25 and 0.5 gm, and more severe symptoms such as chest pains and heart palpitations were encountered after using more than 1 gm. The cardiovascular effects did not last for more than 2 h, and the participants who experienced chest pains and palpitations were hospitalised. Additional adverse events associated with NPS use are reported in Table 4. In respect to hospitalisation, almost one-third (30.5%) had been hospitalised due to NPS consumption and were more likely to receive medical treatment if they had experienced the loss of motor control ($n=12$, 52.17%) rather than paranoia ($n=5$, 31.25%). Additionally, female NPS users were more likely to require medical treatment following hospitalisation than males (41.7% vs 27.9%). Continued Spice use increased both mental (63.9%) and physical health issues (45.8%), and more than half (52.8%) reported family/spousal relationship breakdowns. Thirty percent of the homeless population were receiving drug support, and female participants were slightly more likely to receive drug support than males (33.3% vs 29.5%).

Predictability of NPS Consumption Among the Homeless

The results from the logistic regression model showed that Caucasian homeless individuals were nearly five times more likely (OR = OddsRatio)–4.676, p-value 0.013) than individuals of all the other ethnicities to consume NPS products (Table 5). Heterosexuals were less likely to consume NPS than bisexuals and homosexuals (OR 0.5). Homeless individuals in drug support (OR 0.504) and currently in employment (OR 0.745) were 50% less likely to consume NPS products and homeless participants in contact with their families were 25% more likely to consume NPS than participants who were not.

Discussion

The present study provided a real-world insight into the consumption of NPS among the homeless population. The findings of this research uncovered much information regarding NPS consumption among the homeless population. In this respect, the consumption of SCRA showed to be highly prevalent among the homeless population, particularly for the escapism effects experienced with SCRA. In most cases, the homeless people used NPS to escape reality in the face of homelessness. However, they suffered extreme paranoia and loss of motor control upon the use of NPS. Although NPS consumption was associated with hospitalisation among the homeless population, the majority of the homeless people were not interested in receiving drug support for their NPS use.

Our findings are consistent with national literature on several points. First, the prevalence of NPS use in our sample falls within the range of studies in the UK, i.e. between 20 and 87% (Bowpitt et al., 2014; Devany, 2019; Giese et al., 2015; Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016). Second, SCRA are the most prevalent NPS derivative consumed by the homeless population and used for their escapism and pain relief effects

Table 4 Adverse events associated with NPS use

Adverse events	Frequency *N*	%
Negative effects from NPS consumption		
Yes	72	68.6
No	33	31.4
Type of adverse event		
Nervous system Loss of motor control	23	31.9
Paranoia	16	22.2
Hallucinations	6	8.33
Overdose	6	8.33
Seizures	6	8.33
Disorientation	5	6.94
Loss of consciousness	5	6.94
Anxiety	4	5.56
Depression	3	4.17
Cardiovascular system Tachycardia	4	5.56
Panic attack	3	4.17
Chest pain	1	1.39
GastroIntestinal system Nausea	4	5.56
Vomiting	1	1.39
Duration of adverse event (hours)		
< 1	21	20
2	27	25.7
3	4	3.81
4	3	2.86
5	1	0.95
> 6	15	14.3
Medical treatment		
Hospitalisation	22	21
Non-hospitalised medical treatment	1	0.95
No	82	78.0
Impact of NPS consumption		
Mental health	46	63.9
Relationships	38	52.8
Financial issues	36	50
Physical health	33	45.8
Preventing recovery	30	41.7
Criminal offending	26	36.1
Anti-social behaviour	22	30.6
How widespread are NPS		
Unknown	26	24.8
Dying out	5	4.76
Growing	3	2.86
Widespread	60	57.1
Epidemic	6	5.71

Table 5 Prediction of NPS consumption among the homeless using logistic regression

Independent variable		S.E	*P*-value	OR
Ethnicity White	Ref. Asian, Black and Mixed	0.623	0.013	4.676
Sex Male	Ref. Female	0.49	0.321	0.615
Sexuality Heterosexual	Ref. Bisexual and homosexual	0.618	0.262	0.5
Drug support Yes	Ref. No	0.516	0.185	0.504
Employment Yes	Ref. No	0.504	0.559	0.745
Family contact Yes	Ref. No	0.453	0.621	1.251

S.E standard error, *OR* odds ratio

(Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016; Ralphs et al., 2021). Third, the high prevalence of NPS consumption has been reported in the US homeless population but remains much less prevalent than the UK homeless population (Joseph et al., 2018). It was found that the longer durations of homelessness increased the likelihood of NPS consumption. This finding is consistent with studies conducted into traditional drugs of abuse that reported increased periods of homelessness increased substance use (Caton et al., 2005; Somers et al., 2015; Zlotnick et al., 1999; Zlotnick et al., 2003). One study that followed up 9 months after initial data collection reported that the individuals whose housing status improved significantly reduced their risks of drug use compared to people whose housing status did not change (Aidala et al., 2005). Although their research showed that improving housing status reduces traditional drug use, individuals in this study who were living on the streets were less likely to consume NPS than individuals living in hostels. Doran et al. (2018) showed that the majority of SCRA users started using when they moved into a homeless shelter; therefore, improving the environmental factors for the homeless does not appear to reduce NPS consumption in the UK (Doran et al., 2018).

The high prevalence of mental health issues among the homeless population has been extensively documented throughout literature, but the consumption of NPS to treat mental health symptoms is of particular concern (Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016; Ralphs et al., 2021). One study demonstrated that the homeless use SCRA to escape from the realities of the streets and provide relief from physical and mental health conditions, similar to the motivations for using cannabis, heroin and crack cocaine within the population (Fountain and Howes 2002; Link, 2014; Peacock et al., 2019). While this helps to explain their popularity among the homeless, the use of SCRA resulted in several societal and personal harms making life more unpredictable and dangerous (Peacock et al., 2019). Responding to these harms that threaten this population, policymakers have argued that further legislative change to SCRA is needed. Although it was documented that the PSA 2016 reduced NPS consumption within the general population, our study did highlight that three-quarters of homeless NPS users continued consumption after the introduction of the PSA 2016. Thus, it does appear that legislative changes and improvements in environmental factors did not reduce NPS consumption among the homeless population.

Therefore, considering the vulnerabilities associated with homelessness and NPS consumption, improving the education about NPS risks in hostels and emergency accommodation could help to reduce NPS consumption.

Despite the numerous therapeutic uses of NPS, the adverse events associated with NPS consumption were highly prevalent. The high prevalence and types of adverse events associated with NPS use are consistent with the literature, where SCRA induce nervous and cardiovascular system effects (Gray et al., 2021; Irving et al., 2015; McLeod et al., 2016; Ralphs et al., 2021). Researchers have documented the effects of SCRA on the nervous system, leaving some users in a 'zombie' state. However, despite the documented adverse events, this study further investigated the dose and duration of events of specific events. It was found that lower doses of SCRA induced tachycardia and paranoia, whilst the larger doses induced loss of motor control and cardiac arrhythmia. Both natural and SCRA have been shown to increase cardiac risk factors such as arrhythmia and myocardial infarction through stimulation of the CB1 and CB2 receptors (Lamy et al., 2017; Puhl, 2020).

It is worth noting that the availability of SCRA and the normalisation of their consumption among the homeless population may encourage a diminished perception of the associated harms and risks involved in their consumption. Current public health guidelines suggest that practitioners should adopt the evidence-based approaches used for traditional drugs, which for SCRA is natural cannabis. The results collected in this study contest the traditional approach, and participants in this study reported harms that are usually associated with heroin and not cannabis (Gonzalez et al., 2002; Topp et al., 2003; Warner-Smith et al., 2001). If the several participants that required medical treatment following hospitalisation in this study were medically supervised in detox in-patient rehabilitation centres, the impact of NPS might be reduced. With this in mind, it is also important to note the high level of disengagement from service providers for homeless NPS users. Therefore, improving the education about associated harms with SCRA consumption and rehabilitation programs available in emergency sheltered settings, such as hostel and emergency accommodation would provide a more personal tailored service responding to each homeless individual.

Overall, our findings suggest an urgent need for service providers, medical practitioners and policymakers to prioritise reducing NPS use among the homeless population. Improvement in housing status actually increased NPS use in this study and by raising awareness about the associated risks and harms with NPS use in hostel and emergency accommodation settings could reduce NPS prevalence. The data collected in this study and other available evidence have indicated that improving environmental factors and changing drug legislation did not reduce NPS consumption in the homeless population. Future studies with larger sample sizes and probabilistic sampling methods are needed to strengthen the data and external validity to improve the generalisability of the results.

During this research study, we did encounter some limitations. First, our sampling methods were not probability-based and so the results are not generalizable. However, our methods were comparable to similar studies, and our study design attempted to diversify the sample. Second, questionnaire responses proved to be difficult in this population. Immense efforts were made to contact charity and support organisations, contacting and scheduling meetings with the service managers to help disseminate the questionnaire. Even with the efforts made, only 105 questionnaires were completed over a 6-month period across the UK. Although the response can be regarded as low, for this given vulnerable population, 105 completed questionnaires was a good number, especially among vulnerable populations. Lastly, validating the NPS reported from the participants could not be done as there was no way to confirm that Spice was used or any other derivative.

Conclusion

The findings suggest that NPS use is prevalent among the homeless population in the UK and such an issue needs to be addressed to reduce associated harms and vulnerabilities. Our data showed for the first time that longer periods of homelessness increase the likelihood of NPS consumption but improving their housing status did not. Since the homeless are using NPS to self-manage pain and escape from the realities of homelessness, a key policy priority should therefore be to plan for effective prevention and intervention programs through educating homeless individuals at shared accommodation (hostels and emergency accommodation). Since they are also experiencing a high number of adverse events associated with their consumption, service providers, medical practitioners and policymakers must communicate with one another to facilitate a holistic response. Harm reduction programs should reach and prioritise NPS consumption among the homeless population to improve the impact of risks among this high-risk population, particularly among Spice users who are chronically homeless. In addition, current NPS treatments are based on traditional drugs and greater efforts are needed to specifically treat NPS derivatives. Therefore, a specific design of holistic care and treatment for homeless individuals who are users of NPS will help to reduce the prevalence and any associated adverse events. Future work should research different geographic locations and include a larger sample size so the findings are more generalizable.

Acknowledgements The authors would like to thank Bournemouth Street Support, particularly Ian Jones and Claire Devaney for their contribution to the project in facilitating the dissemination of the questionnaire.

Author Contribution TC carried out this work. All authors discussed the design, analysis and interpretation of data. TG, PVC, SA, AA and SA supervised the project. TC drafted the manuscript. TG, PVC, SA, AA and OC edited the manuscript. All authors have read and approved the final manuscript.

Data availability Data is available at Bournemouth Online Research Data Repository (BORDaR).

Declarations

Conflict of Interest The authors declare no competing interests.

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