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The use of new psychoactive substances among young adults in Romania

Andreea Salcudean[1], Bianca Ioana Teresneu[2], Dora Mihaela Cimpian[3], Andreea Bianca Sasu[3], Andreea Georgiana Nan[3], Elena Ramona Craciun[4], Cristina Bodo[5], Melania Cozma[1], Elena Gabriela Strete[6], Virgil Radu Enatescu[7]

[1]Department of Ethics and Social Sciences, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures, Romania
[2]Faculty of Medicine,"George Emil Palade" University of Medicine, Pharmacy, Science and Technology, Targu Mures, Romania
[3]Psychiatry Clinic 1, Mures County Clinical Hospital, Targu Mures, Romania
[4]Department of Psychology, The Child and Childhood Association, Targu Mures, Romania
[5]Psychiatry Clinic 2, Mures County Clinical Hospital, Targu Mures, Romania
[6]Department of Psychiatry, "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Targu Mures Romania
[7]Department VIII Neuroscience - Discipline of Psychiatry, "Victor Babes" University of Medicine and Pharmacy Timisoara, Romania

ABSTRACT

Background and objectives. The consumption of new psychoactive substances (NPS), particularly among young people, remains a significant public health issue. The principal objective of this study was to identify the incidence and prevalence of NPS use among young people in Romania and the impact of the consumption on their mental health.

Materials and methods. A cross-sectional study was conducted on a sample of 231 Romanian participants on March-April 2023. Data were collected through an online questionnaire and analyzed using GraphPad and Excel statistical software.

Results. The prevalence of NPS use was 38.10% within the sample The analyzed data indicated an increased incidence of NPS use among male participants. Notably, most respondents who reported NPS use were students, accounting for 23.38% of users. Among the total of 88 NPS users, 22.68% consumed synthetic cannabinoids, 14.09% bath salts, and 13.75% used mephedrone. Less frequently consumed substances included synthetic opioids, methamphetamines, synthetic piperazines, *Salvia divinorum*, and MDPV. A significant proportion of users reported severe psychiatric symptoms including psychosis, depression and anxiety. Among non-users, awareness of the side effects of NPS influenced over half of them to avoid such substances.

Conclusions. NPS use impacts predominantly young people. Organizing prevention and information campaigns about the implications of NPS use and its immediate harmful effects could help reduce its prevalence among young individuals.

Keywords: NPS, mental health, psychosis, depression, anxiety

Abbreviations (in alphabetical order):

BZP	– Synthetic piperazines
DSM-5	– Diagnostic and Statistical Manual of Mental Disorders Fifth Edition
EMCDDA	– European Monitoring Centre for Drugs and Drug Addiction
ICD – 11	– International Classification of Diseases 11th Revision
LSD	– Lysergic Acid Diethylamide
MDMA	– Methylene-dioxy-methamphetamine
MDPV	– Methylen-dioxy-pyrro-valerone
NPS	– new psychoactive substances
p	– probability
r	– correlation coefficient
UNODC	– United Nations Office on Drugs and Crime
WHO	– World Health Organization

Corresponding authors:
Dora Mihaela Cimpian
E-mail: dora_cimpian@yahoo.com

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INTRODUCTION

According to the World Health Organization (WHO), the term "psychoactive drug" refers to a chemical substance that affects the functioning of the central nervous system, altering perception, consciousness, cognition, or emotions [1]. As a general definition, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) defines a "new psychoactive substance" (NPS) as a new substance with narcotic or psychotropic properties that has not been included in the Convention on Psychotropic Substances but represents a public health threat [2]. The terms "legal drugs" or "ethnobotanicals" are generic terms that have gained popularity on the Romanian market in recent years, but they are not included in the regulations of the legal instruments that govern these psychotropic substances.

The primary consumers of psychoactive substances are young people. According to recent studies, some of the most frequent motivations include curiosity, desire to experience new things, pleasure, and escapism[3]. Substance use disorders include a range of signs and symptoms specific to each class of substances. Based on their mechanisms of action and effects on the nervous system, these can vary. In most cases, they directly activate the reward pathways of the central nervous system [4]. The types of psychoactive substances consumed are classified into the following categories: stimulants, cannabis, hallucinogens, opioids, and unknown substances [5].

Substance abuse is characterized by a pattern of signs and symptoms, resulting in physical and psychological disorders due to constant intake. According to ICD-11 and DSM-5, substance abuse involves criteria such as mental health and behavioral disorders, neglect of social and professional responsibilities, and loss of control [5,6]. The diagnosis of dependence resulting from substance use is defined by daily or near-daily use of the substance for a minimum of three months, or by the presence of characteristic signs and symptoms for at least twelve months. Dependence can be both physical and psychological. Common symptoms include a lack of control over consumption, which is often associated with social and professional disorders, cravings, and withdrawal symptoms [5,6].

Withdrawal syndrome is characterized by a range of signs and symptoms that appear in the absence or reduction of prolonged substance use. In this stage, the individual often resumes substance use. Symptoms are depending on the severity and the substance administered [5,6]. Intoxication is characterized by the appearance of reversible signs and symptoms after the substance is metabolized and eliminated. In this situation, psychological, physiological, and maladaptive behavioral disturbances can endanger the individual's life. Symptoms alter consciousness, perception, and judgment [5,6].

The consumption of new psychoactive substances (NPS) continues to be a current issue on the international market, with a negative impact on the population's health. Despite efforts by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) to register and monitor newly emerging substances, along with regulations and policies from the United Nations Office on Drugs and Crime (UNODC) to combat their spread, the number of NPS continues to increase [2]. An important aspect regarding the frequency of NPS use among young people and the complications resulting from consumption is the difficulty of diagnosis. Toxicological tests for new psychoactive substances often yield inconclusive results, which present challenges both for diagnosis and subsequent therapeutic approaches.

The comorbidities associated with substance use vary depending on the method of administration, the substance used, and the characteristics of the individual. Another obstacle in establishing a diagnosis is the large number of substances consumed.

MATERIALS AND METHODS

This study is a cross-sectional, observational research conducted between March 5, 2023, and April 5, 2023. A total of 231 participants were included in the study. The inclusion criteria were individuals aged between 18 and 40 years and Romanian nationality, while the exclusion criteria involved the failure to provide informed consent or incomplete responses to the questionnaire.

Data were collected through an online survey, which consisted of 31 questions, administered via the Google Forms platform, along with a consent form. The survey sections addressed various aspects including socio-demographic information, knowledge of new psychoactive substances (NPS), consumption habits, the types of substances used, motivations for starting use, age of initiation, frequency of use, methods of administration, sources of acquisition, polydrug use, and symptoms associated with NPS use, as well as treatment measures adopted. Statistical analysis was performed using Microsoft Excel and GraphPad software.

RESULTS

Of the 231 respondents, 38.1% reported using new psychoactive substances (NPS), while 61.9% were non-users. Regarding gender distribution, 54.55% of respondents were female, with 13.42% of females reporting NPS use, and 45.45% were male, with 24.68% of males being users (Figure 1) A Chi-squared test ($\chi^2 = 21.4$, $p < 0.001$) demonstrated a statistically significant association between gender and NPS consumption.

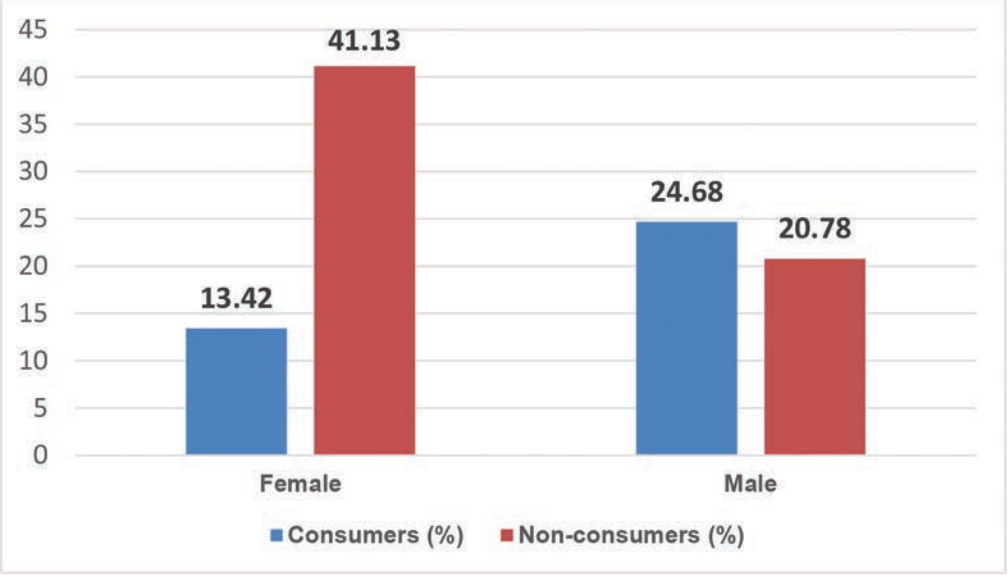


FIGURE 1. Gender based distribution of consumer and non-consumer of NPS

TABLE 1. The distribution of new substances with psychoactive properties being consumed

	Frequency	%	(%) Cases
Synthetic cannabinoids	66	22.68%	75%
Baths salts	41	14.09%	46.59%
Mephedrone	40	13.75%	45.45%
Met-amphetamines	33	11.34%	37.5%
Synthetic opiodis	33	11.34%	37.5%
Synthetic piperazines (BZP)	26	8.93%	29.55%
Salvia divinorum	25	8.59%	28.41%
MDPV (Metilendioxipirovalerona)	21	7.22%	23.86%
Khat	3	1.03%	3.41%
Kratom	3	1.03%	3.41%

TABLE 2. Methods of administration preferred by NPS users

Methods	Frequency	%	(%) Cases
Smoke or inhalation	70	51.09%	79.55%
Oral	33	24.09%	37.5%
Intranasal or snorting	31	22.63%	35.23%
Injection	3	2.19%	3.41%
Total	**137**	**100%**	

In terms of age, 16.45% of respondents aged 18-25 reported using NPS, and 12.55% of those aged 26-30 were users. Among respondents aged 31-35 and 36-40, the incidence of NPS use was lower. The association between NPS consumption and age was statistically significant (Chi-squared test, $\chi^2 = 18.19$, $p < 0.001$).

When considering the environment of origin, 31.17% of NPS users were from urban areas, while the remaining 68.83% were from rural areas. However, no statistically significant association was found between NPS use and the place of residence (Chi-Squared-test, $\chi^2 = 1.82$, $p = 0.177$). Educationally, 29% of NPS users were university students or graduates, and 9.09% had completed high school. Among non-users, 39.39% had completed university studies, 21.21% had finished high school, and 1.3% had attended post-secondary education. A statistically significant correlation was found between education level and NPS consumption (Chi-squared test, $\chi^2 = 7.82$, $p = 0.02$).

Regarding family structure, 11.26% of NPS users lived alone, while the same percentage lived with family. A smaller percentage (8.23%) lived with a partner, and 7.36% lived with friends or roommates. Among non-users, 23.81% lived with family, 14.29% lived with a partner, 12.55% lived alone, and 11.26% lived with friends/roommates. An analysis of family relationship quality revealed that 21.21% of NPS users reported having harmonious family relationships, compared to 44.16% of non-users. Additionally, 10.82% of users and 10.39% of non-users reported having tense family relationships.

The most recognized NPS were Spice (19.08%), followed by Bath Salts (14.74%) and Mephedrone (13.87%). Other substances included Magic (8.82%) and Salvia divinorum (8.53%) (Figure 2). Synthetic cannabinoids were the most frequently consumed NPS, followed by Bath Salts, Mephedrone, and synthetic opioids, with similar incidences. Other substances consumed less frequently included synthetic piperazines (BZP), Salvia divinorum, MDPV (Methylendioxypyrrovalerone), Khat and Kratom (Table 2). The most reported reasons for consumption included curiosity (26.24%), peer influence (15.59%), the desire for adventure (14.07%), pleasure (10.27%), and mood enhancement (8.37%).

In terms of consumption frequency, 44.32% of users reported occasional use (e.g., only at parties), 17.05% consumed on weekends, 17.05% once or

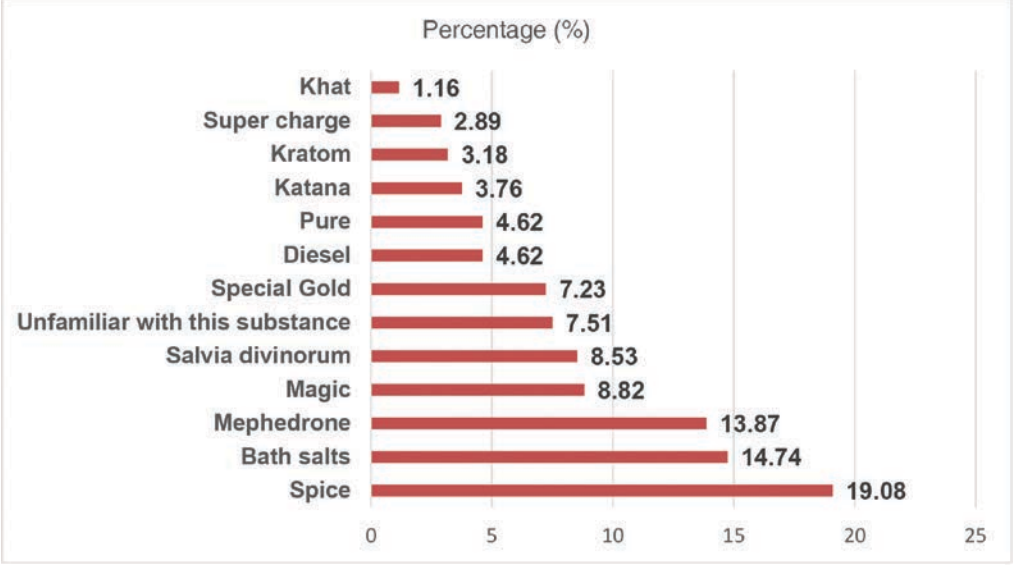


FIGURE 2. Awareness of new psychoactive substances (NPS)

TABLE 3. The distribution of preferred places for NSP use

Preferred places	Frequency	%	(%) Cases
Home	49	28.65%	55.68%
Friends' place	49	28.65%	55.68%
Parties	48	28.07%	54.55%
Anywhere	13	7.6%	14.77%
Parks or abandoned places	12	7.02%	13.64%
Total	**171**	**100%**	

twice a year, 13.64% monthly, and 7.95% daily. The predominant method of administration among respondents was smoking or inhalation (51.09%), followed by oral administration (24.09%), intranasal use (22.63%), and injection (2.19%) (Table 3).

Among consumers, 22.35% had used cannabis, 13.82% MDMA (Methylendioxypyrrovalerone), 12.06% hallucinogenic mushrooms, and 10.29% amphetamines. The use of other illicit substances such as ketamine, cocaine, LSD, methadone, and heroin was less frequent (Table 4). Among non-consumers of NPS, 54.30% had not used other illicit drugs. However, 20.97% had used cannabis, 5.91% MDMA, 4.84% amphetamines, 4.84% cocaine, and 2.69% hallucinogenic mushrooms (Table 4).

Alcohol intake was reported by 36.80% of NPS consumers, whereas 54.11% of non-consumers reported drinking alcohol. A statistically significant association was found between NPS consumption and alcohol use (Chi-squared test, $\chi^2 = 5.55$, $p = 0.018$). The most reported psychological and physical symptoms associated with NPS consumption included paranoia (86.6%), hallucinations (8.86%), anxiety (8.46%), concentration difficulties (7.48%), nausea and vomiting (7.48%), loss of appetite (6.69%), energy depletion (6.50%), insomnia, and depression (both 5.91%). Less common symptoms included mood disorders (5.51%), palpitations, speech difficulties, weight loss, delirium, seizures, and loss of consciousness.

TABLE 4. The distribution of poly-subtance use among users and non-users of NPS

	Users of NPS			Non-users of NPS		
	Frequency	%	% of Cases	Frequency	%	% of Cases
Cannabis	76	22.35%	86.36%	101	54.3%	70.63%
Never used	51	15%	57.95%	39	20.97%	27.27%
MDMA (Methylene-dioxy-methamphetamine)	47	13.82%	53.41%	11	5.91%	7.69%
Hallucinogenic mushrooms	41	12.06%	46.59%	9	4.84%	6.29%
Amphetamine	35	10.29%	39.77%	9	4.84%	6.29%
Cocaine	33	9.71%	37.50%	8	4.3%	5.59%
LSD (Lysergic acid diethylamine)	32	9.41%	36.36%	5	2.69%	3.5%
Ketamine	14	4.12%	15.91%	2	1.08%	1.4%
Methadone	6	1.76%	6.82%	1	0.54%	0.7%
Heroine	5	1.47%	5.68%	1	0.54%	0.7%
Total	**340**	**100%**		**186**	**100%**	

Treatment measures followed by NPS consumers included psychological support (20%), inpatient medication-based detoxification (9.23%), follow-up treatment (10%), psychiatric comorbidity treatment (8.46%), non-medication detoxification (6.15%), and outpatient detoxification (3.8%). A total of 43.08% of users did not seek any therapeutic intervention. A significant association was found between the frequency of NPS consumption and the therapeutic measures followed (Mann Whitney test $U = 580$, $p = 0.006$, $r = 0.31$).

DISCUSSION

This study examined attitudes toward the use of new psychoactive substances (NPS) among young people in Romania and the prevalence of poly-consumption. The findings of this research provide valuable insights into the demographic, social, and psychological factors influencing NPS use. The incidence of NPS use among youth varies depending on socio-demographic factors such as age, gender, place of origin, occupational status, educational level, and family relationship structure. Data from recent years demonstrate that cultural aspects, peer influence, living conditions, and family relationships significantly influence substance use.

One notable finding of this study is the distribution of NPS consumption by gender. The data analyzed in this study reflect a higher incidence among male consumers, a trend that has been supported by various studies focusing on substance use. However, a study conducted in Brazil reported a higher incidence of NPS use among females [7]. Another recent study from 2022, conducted in Serbia, also supports a higher incidence among females, with a reported proportion of 76.73% [8]. These conflicting findings underscore the complexity of gender-related factors in substance use, which may include cultural norms, access to substances, and psychological predispositions. This highlights the need for gender-sensitive approaches in addressing NPS use.

Literature consistently identifies young people as the most vulnerable group to substance use. The STRIDA project, conducted over six years (2010-2016), confirms a high incidence of NPS use among young people aged 18-30 [9]. In the current study, a higher prevalence of 16.45% was observed in the 18-25 age group among NPS users, with an incidence of 12.99% in the 26-30 age group. This trend reflects the critical role of adolescence and early adulthood as periods of experimentation and increased susceptibility to external influences, including peer pressure and social norms. These findings underline the importance of targeting prevention efforts at young adults to mitigate the risks of NPS use.

Our research also highlights the role of education in NPS consumption patterns. Most of respondents were students, representing 23.38% of NPS users and 44.16% among non-users. This previous findings suggest educational settings may influence exposure to substances, whether through peer networks or the stress associated with academic performance. Interestingly, a statistically significant correlation was found between education level and NPS consumption. This suggests that while higher education levels are generally associated with greater awareness of the risks, they do not necessarily provide immunity to substance use. Universities and educational institutions should incorporate substance use education into their curricula to address this gap.

Family dynamics emerged as another crucial factor influencing NPS use. The literature indicates that risk factors associated with psychoactive substance abuse include conflicting family structures and low parental involvement in child education [10]. Correlated results suggest that family conflicts or emotional detachment by parents predispose young people to develop maladaptive antisocial behaviors, especially during adolescence. The current study describes that 10.82% of NPS users come from families with tense family structures, and 8.23% come from families with indifferent family structures. Conversely, harmonious family relationships were more common among non-users (44.16%). These findings emphasize the protective role of supportive family environments in mitigating the risks associated with substance use.

Awareness of NPS and sources of information also play significant roles in shaping consumption patterns. The results highlighted increased incidences among respondents whose primary sources of information were friends, colleagues, the internet, or television. The rapid evolution of the "legal highs phenomenon", or NPS, is reflected in the variety and increasing number of substances marketed, distributed, and identified. The internet plays an important role in the distribution of NPS. In recent years, significant increases in the drug market have been reported, with significant increases in NPS trade through darknet websites. Furthermore, anti-COVID measures altered the drug supply on the market, leading to changes in availability and access. A global heroin shortage and other substances likely forced manufacturers to find substitute alternatives, such as NPS. Recently, the abuse of prescription drugs has also been reported among individuals with substance use disorders. The most sought-after and used drugs include fentanyl analogs, antidepressants, benzodiazepines, and cognitive performance-enhancing medications [11].

A 2022 study from Serbia reported that the most well-known NPS include Mephedrone, M-Cat, Spice,

and Charge [8]. In our study, the most well-known NPS were Spice, Bath Salts, and Mephedrone. Out of a total of 231 respondents, 7.51% had never heard of these substances, while other identified substances included Magic, Salvia divinorum, and Special Gold. This diversity of substances reflects the evolving landscape of NPS availability and highlights the challenges in regulating and controlling their spread.

The incidence of NPS use in this study was 38.10% from a sample of 231 subjects. The study describes that out of the total of 88 NPS users, 22.68% consumed synthetic cannabinoids, 14.09% consumed bath salts, and 13.75% consumed Mephedrone. Other consumed NPS included synthetic opioids, methamphetamines, synthetic piperazines (BZP), Salvia divinorum, and MDPV (Methylone). These findings align with global patterns, where synthetic cannabinoids and cathinones dominate the NPS market due to their potency and ease of production.

Understanding the motivations for NPS use provides crucial insights for intervention strategies. The main factors influencing the absence of NPS use among non-users are awareness of the harmful effects on the body (50.14%) and the belief that it does not solve problems (42.70%). Conversely, among NPS users, the reasons for starting use include curiosity (26.24%), peer influence (15.59%), adventure (14.07%), pleasure (10.27%), and the desire to change mood (8.37%). Other reasons include the low cost of substances and emotional or family problems. These findings highlight the need for awareness campaigns that not only inform about the risks but also address the social and emotional factors driving substance use.

Our study highlights a higher incidence of poly-substance use among NPS users. The most consumed substances include Cannabis, MDMA, and Hallucinogenic Mushrooms. Regarding alcohol use, non-users of NPS report higher prevalence compared to NPS users. Among non-users, half have not consumed illicit drugs, while 20.97% have used Cannabis. Relatively low incidences of consumption were observed for substances like MDMA, Amphetamines, Cocaine, LSD, and Hallucinogenic Mushrooms. This poly-consumption trend amplifies the risks associated with NPS use, as the interactions between multiple substances can lead to unpredictable and severe health outcomes.

According to the latest EMCDDA reports, Cannabis is the most consumed substance in Europe, followed by stimulant substances such as Cocaine, MDMA and Amphetamines. Alcohol consumption remains one of the most significant public health concerns [12]. Alcohol, when used in combination with other substances, can alter the pharmacokinetics of the drugs involved, increasing the risk of intoxication and other adverse effects. The consumption of alcohol associated with NPS is particularly concerning due to the increased risk of overdose. According to recent studies in the literature, repeated association between mephedrone and alcohol has been shown to significantly increase cardiovascular effects, with alcohol potentiating the psychostimulant effect of mephedrone [13]. Interactions between substances can have significant consequences on the body, further complicating the therapeutic measures implemented afterward. The most severe consequences resulting include overdoses, intoxications, hepatotoxicity and associated psychiatric disorders [2].

Among the most common psychiatric comorbidities reported following NPS use are suicide, depressive disorders, anxiety, psychosis and bipolar disorders. A high number of intoxications and suicide attempts have been reported following the abuse of mephedrone and synthetic cathinones [14]. Other symptoms reported in the literature include insomnia, appetite loss, vomiting, behavioral disorders, cardiovascular and liver conditions, nephrotoxicity, and seizures [15-17]. In our study, the most frequent symptoms associated with NPS use were paranoia, hallucinations, anxiety, concentration difficulties, and digestive disorders (nausea and vomiting). Symptoms like delirium, psychoses, insomnia, depression, and seizures had lower incidence rates. These findings highlight the urgent need for medical and psychological interventions tailored to the unique challenges posed by NPS use.

Treatment measures for NPS use remain a critical area of focus. Out of the total number of NPS users, more than one-third (36.36%) underwent one or more therapeutic measures associated with substance abuse. The distribution of therapeutic measures reveals psychological assistance, inpatient detoxification, treatment of psychiatric comorbidities, and non-medical detoxification as notable interventions. However, a significant proportion of users (43.08%) did not seek any therapeutic intervention. This underscores the barriers to accessing treatment, including stigma, lack of awareness, and insufficient healthcare infrastructure.

Due to frequent poly-consumption and the emergence of numerous new substances, diagnostic and treatment measures remain challenging [18]. Additionally, there is a relatively high frequency of NPS use during weekends and occasionally (at parties) among those who underwent treatment following NPS. Managing substance abuse is complex, requires increased attention, and involves an interdisciplinary team

CONCLUSION

According to the results obtained, a higher proportion of male consumers is observed. The 18-25 age

group reports more frequent NPS use, with smoking or inhalation being the most common administration method. An increased incidence of NPS consumption is also noted among those with university education. Among NPS, increased consumption is observed for synthetic cannabinoids, bath salts, mephedrone, synthetic opioids, and methamphetamines. The main symptoms caused by NPS use reported were hallucinations, paranoia, anxiety, nausea, vomiting, and concentration difficulties. More than one-third of NPS users underwent therapeutic measures such as psychological assistance, long-term monitoring,detoxification, and treatment of psychiatric comorbidities.

NPS consumption remains a public health issue and a major challenge for the healthcare system. The lack of specific multidrug tests to identify NPS remain a significant challenge case of acute complications and comorbidities. Organizing prevention and information campaigns on the implications of NPS use among young people could reduce the incidence of consumption in this age category. Furthermore, coordinated efforts involving policymakers, healthcare providers, and educational institutions are essential to creating a robust framework for early intervention, treatment, and rehabilitation. Public health strategies should also prioritize research and development of advanced diagnostic tools to address the challenges posed by the evolving nature of NPS.

Authors' contributions:
Conceptualization, Andreea Salcudean and Bianca Ioana Teresneu; methodology, Andreea Salcudean and and Bianca Ioana Teresneu; software, and Bianca Ioana Teresneu; validation, Andreea Salcudean, Elena Gabriela Strete; formal analysis, Elena Ramona Craciun; resources; writing Andreea Salcudean, Bianca Ioana Teresneu; writing, review and editing, Dora Mihaela Cimpian, Andreea Bianca Sasu, Andreea Georgiana Nan, Cristina Bodo, Melania Cozma, Virigil Radu Enatescu; supervision Elena Gabriela Strete.
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