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Negative consequences of novel psychoactive substances use among the Polish users

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Summary

Aim. The use of the novel psychoactive substances (NPS) is a relatively new phenomenon on the Polish drug scene. At the same time, it is rapidly growing group of substances. The aim of the article is to present the negative consequences to physical, mental and social health due to novel psychoactive substances use.

Method. Fieldwork was conducted in 2016 in four locations: Warsaw, Krakow, Poznan, and Tri-City. A total of 596 users of novel psychoactive substances participated in the study. Among them were: nightlife users (N = 172), marginalised users (N = 86) and users active on the internet (N = 338). A self-administered questionnaire was used.

Results. The substances from the stimulant/empathogen/nootropics group were the most commonly used among nightlife users, marginalised users and users active on the internet. The herbal blends were less popular, and the synthetic cannabinoids appeared on the third position. The acute side effects were most common consequences. Prevalence of medium – and long-term problems with mental and physical health as well as social problems was at a similar level. All types of negative consequences were most prevalent among marginalised users.

Conclusions. Novel psychoactive substances users experience several negative consequences. This poses a challenge to the treatment services that must answer with adequate form of help. This is not easy due to diagnostic difficulties as the effects of NPS use are often indistinguishable to the symptoms of the traditional drugs. Thus, there is a need for further research, which would allow to observe and closely monitor the problem.

Key words: novel psychoactive substances, health, social functioning

Introduction

Using novel psychoactive substances (NPS) is a relatively new phenomenon in the Polish drug scene [1]. At the same time, it is a rapidly growing group of substances. Increasing prevalence of their use goes hand in hand with the growing importance of

the internet and social media as sources of information for users as well as growing drug markets [2].

The United Nations Office on Drugs and Crime, UNODC and the European Union define the NPS as "substances of synthetic or natural origin, which are not controlled by the international law (Convention on Narcotic Drugs of 1961 and the Convention on Psychotropic Substances of 1971), but nevertheless can pose a threat to public health" [3–5]. In Poland, the definition of the new psychoactive substance is included in the Act on Counteracting Drug Addiction. A new psychoactive substance is defined as "every substance or a group of substances of natural or synthetic origin in a pure form or in preparation, affecting central nervous system, other than a psychotropic substance or an intoxicant. In accordance with the recommendation of the Working Group for risk assessment of the hazards to health or life related to use of NPS, the substances or preparations pose health or social risk comparable to the hazards of a psychotropic substance or a narcotic drug, or which imitate their action, specified in the regulations issued pursuant to Article 44f item 3 of the Act on Counteracting Drug Addiction, i.e., a list of new psychoactive substances" (Article 11a) [6].

The report prepared by the National Bureau for Drug Prevention (KBPN) and the data from the European Monitoring Centre on Drugs and Drug Addiction (EMCDDA) shows that in the European Union in 2014 there were more than 101 new psychoactive substances identified, more than in the years 2005–2009 in total. Recently, the number of new psychoactive substances reported to the European early warning system has been starting to decline. In 2016, it was 66 substances, in 2017 – 51, and in 2018 – 55. By the end of 2018, the EMCDDA monitored more than 730 new psychoactive substances. These substances include a wide range of drugs that can be assigned to groups such as: synthetic cannabinoids, stimulants, opioids, and benzodiazepines [7, 8]. There is also another classification that can be found in the literature, that determines seven NPS categories: stimulants/cathinones, GABA activators, hallucinogens, dissociatives, cannabinoids, opioids, and other non-specific and non-categorized substances [9].

In 2011 and 2014, a Eurobarometer telephone survey was conducted among young people (15–24 years old) living in the European Union. Respondents were asked if they have ever used any of the new substances, the effect of which is comparable to the effects of the traditional drugs. Between these two surveys, an increase in prevalence of NPS use was observed from 5% to 8%. In the 2014 study, the use of NPS in the last 12 months reached 3% [10, 11]. Similar questions were asked in the ESPAD study (European School Survey Project on Alcohol and Other Drugs) [12] carried out in 2015 among students aged 15–16. Of these, 4% declared using NPS at least once in their lifetime, and 3% during the year prior to the year of the survey. The estimates from the European countries show that the prevalence of the use of NPS in the last 12 months prior to the study in the group aged 15–34 years ranged from 0.1% in Norway

to 3.2% in the Netherlands [13]. In Poland, the prevalence of NPS use at least once in lifetime does not exceed 2%. Similarly to studies conducted in other countries, the highest prevalence of use can be noticed among the young adults. It reached 8% among people aged 20–24 and 4% among 15–19 year-olds [7]. The CBOS research conducted in 2008, 2010, 2013, and 2016 showed an increase in the use of these substances over the years among people aged 18–19 from 3.5% in 2008 to 11.4% in 2010. However, data from the last two studies carried out in 2013 and 2015 showed a decrease in the use of NPS to the level from 2008 [14–17]. Recent study conducted in Poland as part of the international project I-TREND [18] has identified the motives of NPS use. Respondents used these substances to create social bonds, be more open to others, get high, and to relax. Hallucinogens were used to change the perception of reality. Legality and addictive potential were not the motives for which New Psychoactive Substances were used.

The use of NPS is associated with the occurrence of the negative consequences for the user, but also indirectly for the family and the society. Their occurrence is linked to the individual user's characteristics, his/her susceptibility to the substance's effects, the dosage taken, the toxicity of the substance and the level of its contamination, the pattern of use, and the place where it is used. The consequences most often relate to somatic, mental and social functioning. NPS affect the cardiovascular system, respiratory tract, digestive system, contribute to the transfer of the HIV and hepatitis C viruses (HCV), cause neurological and psychiatric disorders (e.g., psychoses, suicidal thoughts), and, in some cases, may also result in addiction and death [19–24].

The aim of this article is to present the negative consequences to physical, mental and social health due to the use of new psychoactive substances by users in Poland.

Material and method

Research material presented in this paper refers to the data collected in the international research project named NPS-T (New Psychoactive Substances: transnational project on different user groups, user characteristics, extent and patterns of use, market dynamics, and best practices in prevention). The study was carried out in six European countries: in the Netherlands, Ireland, Germany, Portugal, Hungary, and Poland, and was financed by the European Commission (DG HOME). Three groups of new psychoactive substances users participated in the study: the socially marginalised users, the nightlife users and the users active on the internet. The aim of the survey was to assess characteristics of NPS users, patterns and motives of use, procuring NPS, and perceptions of prevention and strategies limiting occurring negative consequences of NPS use.

A detailed description of the research methodology and discussion of the challenges that have arisen during the implementation of the project, mainly during the

fieldwork, was presented in the paper [25]. The analysis presented below refers only to the Polish part of the NPS-T study.

Sample selection

The fieldwork was conducted from June to August 2016 in four locations: in Warsaw, Krakow, Poznan, and Tricity. The choice of locations was not accidental. These cities are characterized by a high prevalence of NPS use in comparison with other parts of the country. The second criterion for choosing the location for the study was to ensure the reliability of the research material. One of the ways to obtain complete and reliable data on NPS use was to employ experienced and qualified street/party workers with the knowledge on local market of NPS. The study involved the total of 596 users of new psychoactive substances (NPS). Among them were: the nightlife users, using NPS recreationally (N = 172), the socially marginalised users (N = 86) and the users active on the internet (N = 338).

The criteria for inclusion to the study, were common for all of the above groups: 1) using NPS at least once during the last 12 months prior to the study, 2) living in the country participating in the project (in this case – in Poland), 3) 18 or more years of age. The nightlife users were characterized as the recreational drug users who frequently attend clubs, raves and/or festivals. They were recruited by the party workers at event venues, as well as by using the snowball method, according to which the individual respondent indicates other potential respondents. The respondents completed the questionnaire themselves, with the assistance of the interviewer, whose task was to ensure correct implementation of the study.

The socially marginalised users were defined as high-risk drug users, being homeless or living in hostels/shelters. These respondents were recruited in the area of the treatment facilities, as well as in social assistance centers, shelters and night shelters. Correspondingly to the nightlife users, the marginalised users completed the survey by themselves with the assistance of an interviewer.

The last of the studied groups – users active on the internet were recruited online via forums dedicated to the use of psychoactive substances, for example, Hyperreal. The announcement of the study was published in two groups and on three Facebook profiles. The respondents from this group completed the questionnaire posted on the secured website dedicated to the NPS-T project.

Sociodemographic characteristics of the NPS users

Men predominated in all studied groups (Table 1). The highest percentage of women was recorded among the nightlife users using NPS recreationally (33.3%), while the lowest was among the users active on the internet (12.7%). The users active on the internet were the youngest fraction of the respondents with mean age 23.4

years, and 70% of this group was aged 18–24. The mean age of the nightlife users was 24.8 years. The oldest group was found in the marginalised sample. The mean age in this group was 33.2 years. The vast majority of the nightlife users and the marginalised people lived in large cities with more than 100,000 inhabitants, whereas in the group of people active on the internet, over 35% of users lived in small towns, not exceeding 50,000 inhabitants. The majority of respondents from the groups of the nightlife users and those active on the internet lived in rented apartments (48.8% and 26.2%, respectively) or with their parents (26.2% and 56.6%, respectively). Over 40% of the marginalised respondents lived in the residential care centers or in homeless shelters. The recreational users and the users active on the internet had a higher level of education compared to people from the marginalised group. Over half of the respondents from these groups had secondary education (50.9% and 60.2%, respectively) or higher education (41% and 25.2%, respectively). In the marginalised group, over 40% had primary education only and 53% had secondary education. Less than 4% of respondents in this group had higher education. The professional situation of the nightlife users and the users active on the internet was similar – about one third of respondents from each group studied or were full-time employees. On the other hand, among the marginalised users, over 80% were receiving support from the social security, disability or unemployment benefits or were out of work without any benefits.

Table 1. **Sociodemographic characteristics of the NPS users**

Variable		Nightlife (N = 172)		Marginalised (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
		%	N	%	N	%	N	
Sex	Male	66.7%	114	79.1%	68	87.3%	290	0.000
	Female	33.3%	57	20.9%	18	12.7%	42	
Age	18–24 years	56.1%	96	25.6%	22	70.1%	237	0.000
	25–34 years	39.8%	68	29.1%	25	26.6%	90	
	35 or more	4.1%	7	35.4%	39	3.3%	11	
Place of residence	Small town (up to 50,000 inhabitants)	12.3%	21	14.0%	12	35.5%	116	0.000
	Medium sized town (50,000-100,000 inhabitants)	13.5%	23	18.6%	16	15.3%	50	
	Large city (more than 100,000 inhabitants)	74.3%	127	67.4%	58	49.2%	161	

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Accommodation	Own apartment	20.3%	35	6.8%	5	16.0%	52	0.000
	Rented apartment or room	48.8%	84	11%	8	26.2%	85	
	With parents/family	26.2%	45	23.2%	17	56.6%	184	
	Residential care center	1.7%	3	15.1%	11	0.0%	0	
	Homeless shelter/ hostel	0.0%	0	31.5%	23	0.0%	0	
	Other	2.9%	5	12.3%	9	1.2%	4	
Education	None or primary	8.2%	14	43.4%	36	14.7%	49	0.000
	Secondary	50.9%	87	53.0%	44	60.2%	201	
	Higher	41%	70	3.6%	3	25.2%	84	
Employment situation	Student (school/ university)	31.0%	53	3.6%	3	33.3%	111	0.000
	Full-time employment	36.8%	63	3.6%	3	30.9%	103	
	Part-time employment	18.7%	32	8.4%	7	13.2%	44	
	Self-employed	8.2%	14	1.2%	1	7.8%	26	
	Disability pension/ social benefits	0.6%	1	30.1%	25	1.8%	6	
	Unemployed	4.7%	8	53.0%	44	11.4%	38	
	Other	0.0%	0	0.0%	0	1.5%	5	

Research tools

The survey questionnaire was prepared in English and translated into Polish, using the method of reverse translation – from English to Polish and then back from Polish to English.

The questionnaire was divided into five sections: sociodemographic data, prevalence of the use of novel psychoactive substances and drugs, patterns and motives of use, consequences of use, sources of procurement, prevention.

At the beginning of the questionnaire, questions introducing the criteria for inclusion to the study were presented. This section regarding sociodemographic data included questions about gender, age, the country of residence, place of residence, education, and employment situation. The questions about prevalence of NPS use comprised inquiry on herbal blends (e.g., "spice"), synthetic cannabinoids (in a pure form), stimulants sold under trade names (so-called "bath salts"), stimulants/empathogens/nootropics in a pure form (e.g., mephedrone, MDPV, alpha-PVP), psychedelics (e.g., NBOMe-x; 2C-x), dissociatives (e.g., methoxetamine – MXE), and other NPS. In this section, also the questions about the prevalence of traditional drug use were asked. Questions in

the section on consumption patterns addressed the places where NPS are used, social environments, motives for use, modes of NPS intake, creation of own mixes on the basis of NPS and mixing various substances on one occasion. The questions about the consequences of the use of the new substances raised issues such as: experiencing acute and unpleasant symptoms resulting from NPS intake, medium – and long-term health effects related to the use of these substances and the consequences for social functioning. In the section "NPS procurement", questions were asked about the most common ways to obtain the substances and where to buy them. The purpose of the questions regarding modes of prevention was to make recommendations based on the users' suggestions. Respondents were asked about the three most effective ways to reduce drug-related problems and the professional group best qualified for this purpose. In total, 60 questions were included in the questionnaire. The questionnaire was prepared in two forms: a paper form to fill in 'face-to-face' and an electronic version of the questionnaire. In this article, only the data from the section addressing the consequences of NPS use are presented.

Data analysis

Data were analyzed using SPSS v. 21. Data analysis began with the analysis of the distribution of explanatory variables for a logistic regression model, including socio-demographic characteristics such as gender, age, place of residence, housing, education, and employment situation. Then, logistic regression analysis was performed to determine the associations between the sociodemographic characteristics of users, NPS use during the last 12 months and the occurrence of acute side effects, medium – and long – term problems with mental and physical health and experiencing social problems due to the use of NPS. With the aim to deepen the knowledge on NPS-related health risks, the analysis was supplemented with the factor analysis. Obtained results were incorporated into the second model of logistic regression to learn about the determinants of health risks among the NPS users in Poland.

Ethical issues

The study obtained the consent of the Bioethics Committee at the Institute of Psychiatry and Neurology, Warsaw, Poland (ref. 11/2016). Participation in the study was voluntary. Before completing the questionnaire, the respondents were informed on the issues of anonymity, purposes, estimated time of completing the questionnaire, and the contact details of the researchers. Each respondent had to give oral consent to participate in the study. The statement of consent was then signed by the interviewer in the presence of the interviewed person. This was a prerequisite for participation in the study. The questionnaires were marked only with a number, as the personal data were not collected. The respondents did not receive any gratification for participating in the survey.

Results

Prevalence of the use of novel psychoactive substances

Among the respondents from all of the research groups, the most popular were the substances from the stimulants/empathogens group sold in a pure form, both in terms of the use of these substances in lifetime and in the last 12 months as well as during the last 30 days, with the exception of the use of these substances among the marginalised users in the last year (Table 2). Next in terms of popularity were herbal blends and synthetic cannabinoids in pure form. The substances from the group of psychedelics and dissociatives were the least popular drugs, except for the group of users active on the internet. Current use of psychedelics (in the last 30 days) was declared by 13% and dissociatives by 8.3% of users active on the internet.

Table 2. **Prevalence of the use of novel psychoactive substances**

Substance group	Use	Nightlife (N = 172)		Marginalised (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
		%	N	%	N	%	N	
Herbal blends	At least once in a lifetime	68.6	118	66.3	57	72.2	244	0.000
	During last 12 months but not during last 30 days	35.5	61	37.2	32	24.6	83	
	During last 30 days	15.1	26	19.8	17	8.6	29	
Synthetic cannabinoids in a pure form	At least once in a lifetime	44.2	76	36	55	57.7	195	0.003
	During last 12 months but not during last 30 days	18.6	32	18.6	16	21	71	
	During last 30 days	8.7	15	3.5	3	11.5	39	
Stimulants sold under trade names (e.g., "bath salts")	At least once in a lifetime	34.9	60	40.7	35	44.4	150	0.007
	During last 12 months but not during last 30 days	16.9	29	17.4	15	18.6	63	
	During last 30 days	1.7	3	14	12	8.9	30	
Stimulants/ empathogens sold in a pure form	At least once in a lifetime	73.3	126	67.4	58	84.3	285	0.000
	During last 12 months but not during last 30 days	40.7	70	25.6	22	35.5	120	
	During last 30 days	27.9	48	30.2	26	35.8	121	

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Psychedelics	At least once in a lifetime	22.7	39	29.1	25	55	186	0.000
	During last 12 months but not during last 30 days	9.3	16	15.1	13	24.6	83	
	During last 30 days	2.9	5	7	6	13	44	
Dissociatives	At least once in a lifetime	11.6	20	17.4	15	40.2	136	0.000
	During last 12 months but not during last 30 days	1.7	3	9.3	8	14.2	48	
	During last 30 days	2.9	5	3.5	3	8.3	28	
Other	At least once in a lifetime	9.3	16	9.3	8	54.1	183	0.000
	During last 12 months but not during last 30 days	2.9	5	1.2	1	16.6	56	
	During last 30 days	2.9	5	4.7	4	20.1	68	

Negative consequences of the use of novel psychoactive substances

The issue of the prevalence of the negative health and social consequences was one of the research questions – the respondents could indicate occurrence of the acute side effects, medium – or long-term mental and physical health problems as well as the social problems, based on their own, subjective assessment.

Acute side effects resulting from the use of novel psychoactive substances were the most common negative consequences in all respondent groups (Table 3). Most often, this kind of consequences was experienced by the people from the marginalised group (80.2%), whereas users active on the internet experienced them least often (70.1%). Medium – or long-term mental and physical health problems ($p < 0.001$) resulting from NPS use were also the most prevalent in the marginalised group (57.1%). The prevalence of social problems was similar (63.5%) ($p < 0.001$). Among the nightlife users and the people active on the internet similar rates of medium – or long-term problems with their mental and physical health (36.5% and 32.5%, respectively) as well as the social problems (35.3% and 32.8% respectively) were reported.

Table 3. **Experiencing any negative consequences of using novel psychoactive substances at least once during lifetime**

Variable	Nightlife (N = 172)		Marginalised (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
	%	N	%	N	%	N	
Acute side effects	74.3%	127	80.2%	69	70.1%	230	0.069
Medium – or long-term problems with mental and physical health	36.5%	62	57.1%	48	32.5%	106	0.000
Social problems	35.3%	60	63.5%	54	32.8%	107	0.000

Regarding the experience of acute, unpleasant side effects of NPS use, it can be noticed that the higher prevalence was found among the marginalised people (Table 4).

Among the recreational users and those who were active on the internet, the most common acute side effects resulting from the use of NPS were: accelerated heart rate, which was declared by about two-thirds of respondents in each group, followed by dizziness, nausea and vomiting as well as anxiety. In addition, people who were active on the internet also frequently reported occurrence of higher body temperature. Among the marginalised respondents, the most common acute and unpleasant side effects of NPS were: anxiety (55.8%), accelerated heart rate (50%), dizziness (50%), and headache (46.5%).

Table 4. **Acute side effects experienced after taking novel psychoactive substances**

Variable	Nightlife (N = 172)		Marginalisedi (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
	%	N	%	N	%	N	
Accelerated heart rate/ palpitations	57.6%	99	50.0%	43	62.1%	210	0.111
headache	41.3%	71	46.5%	40	29.9%	101	0.003
Nausea/vomiting	42.4%	73	45.3%	39	38.8%	131	0.469
Stomach ache	29.1%	50	39.5%	34	24.0%	81	0.014
Dizziness	54.1%	93	50.0%	43	38.8%	131	0.003
Muscle cramps	23.8%	41	37.2%	32	25.4%	86	0.054
Loss of consciousness/ coma	20.3%	35	39.5%	34	16.6%	56	0.000
Anxiety/"bad trip"	42.4%	73	55.8%	48	51.5%	174	0.070

Shallow breathing	27.9%	48	36.0%	31	32.0%	108	0.390
Elevated body temperature	30.8%	53	32.6%	28	38.8%	131	0.171
Aggression/violence	25.6%	44	34.9%	30	10.7%	36	0.000
Paranoia	26.7%	46	47.7%	41	37.0%	125	0.003
Other	5.2%	9	2.3%	2	4.1%	14	0.546

As in the case of the acute consequences of NPS use, occurrence of medium – and long-term mental and physical health problems was most prevalent among the marginalised persons (Table 5).The respondents in this category most often experienced weight loss (45.3%), depression (36%) along with addiction, withdrawal symptoms and craving (33.7%). Respondents from the group of nightlife users most often experienced depression (23.8%), weight loss (20.9%) and paranoid disorders (15.1%). The outcomes were similar for the users active on the internet, except that, as far as they are concerned, about a quarter declared occurrence of addiction, withdrawal symptoms and craving.

Table 5. **Medium – and long-term mental and physical health problems occurring after the use of novel psychoactive substances**

Variable	Nightlife (N = 172)		Marginalised (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
	%	N	%	N	%	N	
Addiction/withdrawal symptoms/craving	14.0%	24	33.7%	29	23.1%	78	0.001
Depression	23.8%	41	36.0%	31	25.1%	85	0.083
Paranoid disorders	15.1%	26	32.6%	28	16.6%	56	0.001
Weight loss	20.9%	36	45.3%	39	18.3%	62	0.000
Injuries after needle insertion (infections and/or inflammation)	0.0%	0	24.4%	21	1.2%	4	0.000
Other medium – or long-term mental problems with mental health	14.0%	24	16.3%	14	21.3%	72	0.110
Other medium – or long-term problems with physical health	9.9%	17	10.5%	9	12.4%	42	0.664

Moreover, the marginalised respondents experienced social problems more often than the people from other groups (Table 6). Conflicts with a partner or in the fam-

ily were most often indicated as the consequences of using NPS, but the scale of the problem varied. Almost half of the marginalised respondents and one third of the users active on the internet and the nightlife users experienced this type of problems. Over 40% of the marginalised users experienced housing problems and conflicts with the law.

Table 6. **Social problems arising from the use of noel psychoactive substances**

Variable	Nightlife (N = 172)		Marginalised (N = 86)		Active on the internet (N = 338)		Statistical significance (X^2)
	%	N	%	N	%	N	
Conflicts at school, university	9.9%	17	8.1%	7	13.6%	46	0.248
Conflicts at work	11.6%	20	9.3%	8	7.4%	25	0.281
Conflicts with a partner or family member	27.3%	47	45.3%	39	32.5%	110	0.014
Housing problems	9.3%	16	41.9%	36	8.9%	30	0.000
Conflict with the law/the police	14.5%	25	41.9%	36	16.0%	54	0.000
Other	1.7%	3	5.8%	5	2.1%	7	0.105

Causes of negative health and social consequences

The results of the logistic regression analysis indicate that the risk of the acute side effects is neither correlated to any particular type of NPS, nor to the majority of the sociodemographic variables, except for housing. Compared to the persons who are apartment owners, the users most often exposed to this type of damage are those who are homeless or in residential care facilities (OR = 8.550), people who rent apartments (OR = 2.995) and who live with their families (OR = 1.870).

Medium – and long-term problems with mental and physical health mostly affect those with primary (OR = 3.948) and secondary (OR = 2.165) education, and the unemployed (OR = 2.114). The use of stimulants and empathogens in a pure form also had an effect on the occurrence of such problems (OR = 1.753).

A similar situation is observed when social problems are concerned. Comparing to the users with higher education, the risk of suffering from such problems is almost five times higher (OR = 4.845) for the users with primary education only, and more than three times higher (OR = 3.171) for the users with secondary education. Likewise, the unemployed are at risk of social problems (OR = 2.728) as well as the users of herbal blends (OR = 2.074) and the substances from the group of stimulants and empathogens in a pure form (OR = 2.191).

Table 7. **Prevalence of the negative consequences to health and social functioning. Logistic regression results**

Variables in the model	Acute side effects					Medium – and log-term health consequences					Social problems				
	B	Stat. error	Wald	p	OR	B	Stat. error	Wald	p	OR	B	Stat. error	Wald	p	OR
Women	0.246	0.296	0.693	0.405	1.279	0.079	0.263	0.089	0.765	1.082	-0.336	0.275	1.5	0.221	0.714
Ref.: Age 35+			1.823	0.402				0.034	0.983				1.237	0.539	
Age 18–24	0.484	0.495	0.957	0.328	1.622	-0.061	0.455	0.018	0.894	0.941	0.058	0.466	0.016	0.901	1.060
Age 25–34	0.123	0.466	0.069	0.792	1.131	-0.08	0.439	0.033	0.855	0.923	0.335	0.45	0.554	0.457	1.397
Ref.: Large city (100,000+)			2.889	0.236				0.514	0.773				0.358	0.836	
Small town (up to 50,000)	0.392	0.284	1.906	0.167	1.48	-0.005	0.257	0.000	0.985	0.995	-0.054	0.263	0.043	0.837	0.947
Medium-sized town (50,000–100,000)	0.468	0.355	1.735	0.188	1.597	-0.204	0.298	0.471	0.493	0.815	0.14	0.304	0.213	0.644	1.151
Ref.: Own apartment*			16.54	0.001				0.305	0.959				0.746	0.862	
Homeless or residential care	2.146	0.81	7.014	0.008	8.550	0.214	0.515	0.173	0.678	1.239	0.229	0.517	0.196	0.658	1.257
With family	0.626	0.316	3.921	0.048	1.870	-0.003	0.316	0.000	0.993	0.997	-0.08	0.338	0.056	0.812	0.923
Rent	1.097	0.314	12.238	0.000	2.995	0.082	0.308	0.07	0.791	1.085	-0.162	0.328	0.246	0.620	0.850
Ref.: Higher education			1.081	0.583				13.039	0.001				19.818	0.000	
None or primary education	-0.261	0.424	0.377	0.539	0.771	1.373	0.387	12.598	0.000	3.948	1.723	0.405	18.136	0.000	5.603
Secondary education	-0.299	0.288	1.081	0.299	0.741	0.772	0.278	7.694	0.006	2.165	1.162	0.304	14.634	0.000	3.195

table continued on the next page

Ref.: Employed**			2.962	0.227				7.539	0.023				11.343	0.003	
Unemployed	0.543	0.385	1.984	0.159	1.721	0.748	0.329	5.176	0.023	2.114	1.004	0.34	8.703	0.003	2.728
Studying	-0.2	0.275	0.529	0.467	0.819	-0.243	0.254	0.914	0.339	0.784	-0.227	0.262	0.753	0.386	0.797
Herbal blends (12M)	0.237	0.258	0.843	0.358	1.267	0.141	0.238	0.35	0.554	1.151	0.73	0.246	8.787	0.003	2.074
Synthetic cannabinoids (12M)	0.193	0.265	0.531	0.466	1.213	-0.061	0.243	0.064	0.800	0.94	-0.149	0.26	0.328	0.567	0.862
Stimulants under trade name (12M)	0.082	0.266	0.095	0.759	1.085	0.275	0.235	1.367	0.242	1.317	0.226	0.244	0.851	0.356	1.253
Stimulants in a pure form and empathogens (12M)	0.114	0.275	0.173	0.677	1.121	0.561	0.256	4.811	0.028	1.753	0.785	0.267	8.608	0.003	2.191
Psychedelics (12M)	-0.404	0.269	2.264	0.132	0.668	0.168	0.252	0.443	0.506	1.183	0.254	0.265	0.92	0.337	1.289
Dissociatives (12M)	-0.128	0.337	0.145	0.704	0.88	-0.142	0.322	0.194	0.660	0.868	-0.36	0.336	1.149	0.284	0.697
Other NPS (12M)	-0.133	0.277	0.23	0.631	0.875	0.135	0.26	0.268	0.605	1.144	0.239	0.27	0.787	0.375	1.270
Constant	0.071	0.526	0.018	0.892	1.074	-1.586	0.534	8.817	0.003	0.205	-2.407	0.566	18.081	0.000	0.09

*category “other” was excluded from the analysis.

**category “employed” includes the users employed full – and part-time, as well as self-employed users.

B – Beta coefficient; Stat. error – statistical error; Wald – Wald coefficient; *p* – level of statistical significance;

OR – odds ratio; Ref. – reference category for other variables included in the regression model

Types of health consequences experienced by users

In order to deepen understanding of the negative health effects of the NPS, the principal component analysis (PCA) with the direct Oblimin rotation was used. The three dimensions selected during the analysis explained together 54.34% of variance (KMO = 0.888, $\chi^2 = 2508.791$; $p < 0.001$). Correlation matrix of the three factors reached the following values: C1 vs. C2 = 0.326, C1 vs. C3 = 0.344, C2 vs. C3 = 0.252.

The first group of health consequences was characterized by the acute side effects experienced after NPS use. It included cardiac disorders, anxiety and paranoia, shallow breathing, and hyperthermia. The second group of health consequences comprised of the chronic conditions caused by long-term harmful use of NPS: addiction/withdrawal symptoms, weight loss, depression, paranoid disorders, as well as damage associated with intravenous use/infections. The third group of consequences posed relatively the least serious health risks. It consisted of ailments such as stomach ache, headache and nausea (Table 8).

Table 8. **Types of health consequences. Principal component analysis results***

Health consequences	C1	C2	C3
Accelerated heart rate/palpitations	0.758	-0.149	0.209
Anxiety/"Bad trip"	0.737	0.098	0.023
Paranoia	0.640	0.307	-0.101
Shallow breathing	0.623	0.18	0.019
Hyperthermia	0.521	0.012	0.23
Addiction/withdrawal symptoms/craving	0.093	0.759	-0.037
Weigh loss	-0.010	0.716	0.200
Depression	0.176	0.688	-0.023
Paranoid disorders	0.223	0.679	-0.181
Damage assoc. with intravenous use/infections	-0.197	0.518	0.253
Stomach ache	-0.061	0.162	0.728
Nausea/vomiting	0.171	-0.022	0.678
Headache	0.143	0.043	0.624
Dizziness	0.405	-0.072	0.498

* Due to low loadings, three elements were excluded from the analysis: muscle spasms, loss of consciousness and aggression attacks.

The types of health problems, which were determined during the factor analysis presented in three above-described groups, were summarized and then used as explanatory variables in the logistic regression analysis. In order for the subject to be classified as a person experiencing acute adverse effects or damage associated with the harmful use of NPS, it was assumed that he/she had to indicate the presence of at least two of the five side effects in each of these dimensions (59% and 28.2% of respondents, respectively). In the case of pain and nausea, it was at least one of the three effects indicated above (57% of respondents).

We found that the occurrence of acute conditions was affected by the use of stimulants and empathogens in a pure form (OR = 1.612). The chronic conditions were more common among those with primary education (OR = 3.844), the unemployed (OR = 1.932), and those using stimulants and empathogens in a pure form (OR = 2.383). Pain was experienced irrespectively of the type of NPS used. The only variable differentiating the presence of pain-related complaints was the housing situation – complaints of pain were more often reported by the homeless users or those in residential care (OR = 2.760) and persons renting flats (OR = 1.804).

Table 9. **Occurrence of health consequences. Logistic regression results**

Variables in the model	Acute states after NPS use					Chronic conditions resulting from NPS use					Pain-related complaints				
	B	Stat. error	Wald	p	OR	B	Stat. error	Wald	p	OR	B	Stat. error	Wald	p	OR
Women	-0.010	0.235	0	0.983	0.995	0.282	0.275	1.050	0.305	1.326	0.756	0.247	9.359	0.002	2.129
Ref.: Age 35+			0.216	0.898				3.038	0.219				1.256	0.534	
Age 18–24	0.094	0.408	0.054	0.817	1.099	-0.680	0.443	2.332	0.127	0.508	-0.010	0.407	0.000	0.987	0.993
Age 25–34	-0.020	0.393	0.002	0.967	0.984	-0.310	0.424	0.520	0.471	0.737	-0.250	0.391	0.421	0.516	0.776
Ref.: Large city (100,000+)			3.131	0.209				0.582	0.748				2.756	0.252	
Small town (up to 50,000)	0.283	0.231	1.511	0.219	1.328	0.199	0.261	0.581	0.446	1.220	0.161	0.228	0.500	0.480	1.175
Medium-size town (50,000–100,000)	0.432	0.273	2.506	0.113	1.541	0.086	0.308	0.078	0.780	1.090	0.449	0.273	2.706	0.100	1.566
Ref.: Own apartment			2.222	0.528				1.662	0.645				6.985	0.072	
Homeless or residential care	0.065	0.463	0.02	0.888	1.067	0.500	0.500	1	0.317	1.648	1.015	0.483	4.423	0.035	2.760
With family	0.313	0.288	1.186	0.276	1.368	-0.030	0.334	0.008	0.930	0.971	0.360	0.286	1.582	0.209	1.433
Rent	0.385	0.276	1.944	0.163	1.47	-0.100	0.331	0.097	0.755	0.902	0.590	0.276	4.556	0.033	1.804
Ref.: Higher education			1.239	0.538				12.05	0.002				0.367	0.832	
None or primary education	-0.340	0.347	0.929	0.335	0.715	1.347	0.393	11.73	0.001	3.844	0.017	0.345	0.002	0.96	1.017
Secondary education	-0.250	0.245	1.077	0.299	0.776	0.591	0.302	3.824	0.051	1.806	-0.110	0.243	0.197	0.657	0.898
Ref.: Employed			4.787	0.091				5.670	0.059				0.049	0.976	

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Unemployed	0.309	0.304	1.037	0.308	1.363	0.658	0.308	4.563	0.033	1.932	-0.070	0.293	0.049	0.825	0.937
Studying	-0.380	0.228	2.732	0.098	0.686	-0.110	0.273	0.173	0.677	0.893	-0.010	0.229	0.001	0.975	0.993
Herbal blends (12M)	-0.08	0.211	0.155	0.694	0.92	0	0.247	0	0.999	1	0.218	0.209	1.093	0.296	1.244
Synthetic cannabinoids (12M)	0.419	0.218	3.712	0.054	1.521	0.066	0.252	0.069	0.793	1.068	0.214	0.214	1	0.317	1.239
Stimulants under trade name (12M)	0.294	0.219	1.792	0.181	1.341	0.238	0.239	0.994	0.319	1.269	0.287	0.217	1.749	0.186	1.332
Stimulants in a pure form and empathogens (12M)	0.478	0.222	4.641	0.031	1.612	0.868	0.286	9.185	0.002	2.383	0.284	0.223	1.62	0.203	1.329
Psychedelics (12M)	0.033	0.233	0.02	0.888	1.033	0.137	0.268	0.262	0.609	1.147	-0.03	0.23	0.014	0.906	0.973
Dissociants (12M)	-0.270	0.295	0.811	0.368	0.767	0.312	0.320	0.954	0.329	1.366	-0.23	0.292	0.645	0.422	0.791
Other NPS (12M)	0.074	0.236	0.097	0.755	1.076	0.009	0.265	0.001	0.973	1.009	0.003	0.234	0.000	0.990	1.003
Constant	-0.29	0.459	0.393	0.531	0.75	-2.12	0.544	15.09	0	0.121	-0.62	0.46	1.81	0.179	0.538

B – Beta coefficient; Stat. error – statistical error; Wald – Wald coefficient; *p* – level of statistical significance;
OR – odds ratio; Ref. – reference category for other variables included in the regression model

Discussion

In the 2016 EMCDDA study [8], two-thirds of the countries reported that using NPS caused health concerns for users. The aim of this article was to describe the negative consequences of using novel psychoactive substances for physical and mental health as well as social functioning experienced by the recreational and marginalised users, as well as users active online, residing in Poland.

Using synthetic cannabinoids is considered to be a problem in many of the European countries, especially in the marginalised populations, including the homeless people and prisoners [8]. Our research shows that substances from the stimulant/empathogen/nootropics group were the most desired of NPS among the nightlife users as well as the marginalised people, and also for those who are active on the internet. Herbal blends were less popular, and synthetic cannabinoids reached the third position. Data from the Chief Sanitary Inspectorate [26] show that the most popular group of NPS identified in 2018 were cathinones (a group of stimulants) and cannabinoids.

The results of the logistic regression analyses showed that the use of substances from the group of stimulants/empathogens and nootropics has an impact on the occurrence of the negative consequences of NPS use. The acute side effects were the most common consequences in all of the research groups. Out of these symptoms, among the recreational users and users active online, the most common were: accelerated heart rate, dizziness, nausea, vomiting, and anxiety. Correspondingly, among the marginalised users: anxiety, increased heart rate, dizziness and headache. The prevalence of the medium – and long-term mental and physical health problems, as well as the social problems was at a similar level. In the case of the former, the most common were: weight loss, depression, addiction, withdrawal symptoms and drug craving. Among the social problems, conflicts with a partner or with a family member and conflicts with the law were the most common.

All types of the negative consequences were mostly common among the marginalised users. It is related to their lifestyle.. These are the individuals who use substances regularly, who often have been in treatment before, some use drugs intravenously. Hence, the high percentage of those who experience housing problems, have conflicts with the law and in relations with a partner or with a family member was found. But on the other hand, the use of psychoactive substances can be a reaction to the difficult situation they find in. Deepened studies in this field should be undertaken to answer the question whether the substance use is the cause or result of social problems.

Prevalence of the negative consequences among the nightlife users and the users active on the internet was at a similar level. However, these two groups experienced different type of consequences caused by the use of NPS. Individuals active on the internet experienced accelerated heart rate, muscle spasms, anxiety, shallow breathing, and increased body temperature more often than the nightlife users. They also experienced all medium – and long-term consequences for mental and physical health

except for weight loss more often. In the case of the social problems, conflicts at school or university, conflicts with a partner or with a family member, and conflicts with the law were more prevalent among the users active on the internet compared to the nightlife users.

Unfortunately, there is a lack of Polish studies on the issue that we could compare our results to. The Chief Sanitary Inspectorate provides only the data on poisoning without monitoring the symptoms of NPS use [26].

The studies from other countries show that the acute side effects resulting from NPS use are similar to those identified in the present study. Spiller et al. [27] presented the most frequently observed side effects of poisoning by NPS from the group of synthetic cannabinoids. Some of the side-effects were the same as in the present study, e.g., increased heart rate, headache, nausea and vomiting, abdominal pain, anxiety, increased body temperature, and aggression. The last one was the only symptom that appeared less often among the respondents in our research, the other side-effects were more prevalent. The results of the research show that it is necessary to monitor the occurrence of the acute side effects associated with the use of NPS from a specified group of substances. Unfortunately, the size of the research group in our study did not allow this type of analysis.

The study has its limitations, which must be taken into account when interpreting the results. First of all, the way the data were collected could have influenced the results. Among the nightlife users and in a group of the marginalised users questionnaires were completed on paper, whereas among the users active on the internet – online. However, due to choosing such method of collecting data, we were able to reach a group of respondents that we would not have reached when restricting ourselves to use 'face to face' questionnaires only. In addition, survey among nightlife and marginalized user were conducted only in large cities, which affected a high percentage of respondents from these samples living in cities with more than 100,000 inhabitants. Among the users active on the internet it was different; around a third lived in small towns. Another limitation that could have had an impact on the results of the study was the presence of the interviewer when completing the questionnaire. The presence of a stranger could have threatened the sense of anonymity of the respondents. During our research, we did not check the sobriety of the respondents. According to the recommendations of Morán-Sánchez et al. [28], it was assumed that when there are no acute withdrawal symptoms, intoxication or advanced cognitive limitations, users are able to give informed consent and provide rational answers to the asked questions. Assuming in advance that the substance users are unable to participate in the study is erroneous and stigmatizing.

Conclusions

The study shows that the users of novel psychoactive substances experience several negative consequences. The most common were acute, unpleasant side effects that were direct symptoms of substance use. The users experience medium – and long-term mental and physical health problems a little less often. The negative consequences of NPS use present huge challenges for the healthcare services. They must be answered by an adequate form of help, albeit it is often not easy due to diagnostic difficulties and a similar profile of symptoms as in the case of traditional drugs. Rapid salivary tests or laboratory analyses may help doctors detect substances, which would allow to implement appropriate treatment. In addition, screening tests of occurrence of substance use disorders conducted by physicians at the level of primary healthcare, specialist doctors, social workers or nurses working in the community could contribute to the identification of users at an earlier stage of the development of the disease.

Occurrence of social problems that resulted from NPS use makes it necessary for the social assistance institutions to be more engaged. Training courses for social workers and other professionals providing assistance to users are recommended to raise awareness of the problems, their diagnosis and prevention.

To monitor the phenomenon and to develop the knowledge and our understanding of the problem there is a necessity to conduct further research in the area of novel psychoactive substances. That would allow to control the scale of the phenomenon, monitor patterns of use and ways of procurement as well as negative consequences triggered by "legal highs".

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