

# CHARACTERISTICS OF PSYCHIATRIC INPATIENTS DIAGNOSED WITH MENTAL AND BEHAVIORAL DISORDERS DUE TO PSYCHOACTIVE SUBSTANCE USE (THE F11–19 BLOCK), PARTICULARLY FOCUSING ON NEW PSYCHOACTIVE SUBSTANCES AND PSYCHIATRIC COMORBIDITIES

PIOTR ENGELGARDT<sup>1</sup>, MACIEJ KRZYŻANOWSKI<sup>1</sup>, PRZEMYSŁAW PIOTROWSKI<sup>1</sup>,  
MAŁGORZATA BORKOWSKA-SZTACHAŃSKA<sup>2</sup>, AGNIESZKA WASILEWSKA<sup>2</sup>, and TOMASZ KOWALKOWSKI<sup>3</sup>

<sup>1</sup> University of Warmia and Mazury, Olsztyn, Poland  
Faculty of Medicine, Department of Forensic Medicine

<sup>2</sup> University of Warmia and Mazury, Olsztyn, Poland  
Faculty of Medicine, Department of Psychiatry

<sup>3</sup> Nicolaus Copernicus University, Toruń, Poland  
Faculty of Chemistry, Chair of Environmental Chemistry and Bioanalytics

## Abstract

**Objectives:** This study analyzed the prevalence of new psychoactive substance (NPS) use in the analyzed group and compared demographic features and psychoactive substance profiles between the 2 subgroups (NPS users, non-NPS users). The secondary measure was used to determine the prevalence of psychiatric comorbidities in study group and to compare demographic features and psychoactive substance profiles between 2 subgroups (the F11–19 only diagnosed group and the F11–19 group with psychiatric comorbidities according to ICD-10). **Material and Methods:** A 12-month retrospective cross-sectional analysis of medical records compiled for adult psychiatric patients who had been admitted to the Regional Psychiatric Hospital in Olsztyn, Poland, in October 1, 2016 – September 30, 2017 was conducted. After analyzing the available medical records, 157 cases were included and analyzed. Data for the study were collected in a specially designed monitoring card from discharge reports, including data from psychiatric examinations, especially anamnesis. **Results:** The most commonly declared psychoactive substances were amphetamine (AMF) – 54% and cannabinoids – 46%. The prevalence of NPS use in the study group was 34%. Inpatients taking NPS, as compared with non-NPS users, were younger and more often admitted to hospital through the Emergency Department. It was also found that NPS users more often took AMF or cannabinoids, and less frequently benzodiazepines (BDZ) or opioids. However, the taking of AMF, cannabinoids and BDZ was also age-dependent. **Conclusions:** The prevalence of psychiatric comorbidities in the study group was 9%. Inpatients with psychiatric comorbidities were older and took BDZ significantly more often than AMF. In addition, NPS use affects different groups, including a specific group as the analyzed sample, which shows a similar NPS use profile as different groups described in the literature. *Int J Occup Med Environ Health. 2020;33(2):125–36*

## Key words:

addiction, epidemiology, psychoactive substances, drug users, new psychoactive substances, psychiatric comorbidity

Funding: this work was supported by Faculty of Medicine, University of Warmia and Mazury, Olsztyn, Poland (grant No. 25.610.001-300 entitled “Monitorowanie rozprzestrzenienia substancji psychoaktywnych w populacji mieszkańców województwa warmińsko-mazurskiego,” grant manager: Piotr Engelgardt, Ph.D.)

Received: May 22, 2019. Accepted: October 24, 2019.

Corresponding author: Piotr Engelgardt, University of Warmia and Mazury, Faculty of Medicine, Department of Forensic Medicine, Warszawska 30, 10-082 Olsztyn, Poland (e-mail: piotr.eng@gmail.com).

## INTRODUCTION

The recreational use of psychoactive substances is common. It is estimated that over 80 million adults, or – in other words – almost a quarter of the adult population in the European Union, have tried illicit drugs at some point in their lives. The most commonly used drugs are cannabis, cocaine, amphetamine (AMF) and 3,4-methylenedioxy-methamphetamine (MDMA); however, the levels of lifetime use differ considerably between countries [1,2].

New psychoactive substances (NPS) are a specific problem in terms of psychoactive substances in general. These substances (previously known as “designer drugs,” “research chemicals,” “bath salts,” “plant food” or “legal highs”) are usually analogs or derivatives of legally controlled substances, produced in order to circumvent legal regulations, mimicking the biological effects of a controlled drug of choice [1]. In Poland, such substances are widely known as “boosters.” The number of different NPS on the European drug market has rapidly increased over the last decade. In 2014, as many as 101 NPS were detected for the first time. Despite the lower number of new detections, the overall number of various psychoactive substances available on the market continues to grow. There is increasing evidence nowadays that some classes of NPS, notably synthetic cathinones and synthetic cannabinoids, are attempting to gain a foothold in the drug market [1].

Several factors have contributed to the increasing popularity of NPS, including aggressive marketing strategies to attract consumer attention, such as attractive names, colorful packaging, low prices, occasional sales and loyalty programs (e.g., buy one get one free), the perception of being “safe” and free from the risks typical of classical drugs, easy accessibility through online stores and a low chance of detection in routine urine screening tests [3].

Until about a decade ago, only a few new psychoactive substances were reported each year in Europe. They were mainly sold on the illicit drug market and usually passed off as amphetamines or ecstasy. Some of them were sold

as a new type of ecstasy. These substances were produced in illegal, clandestine laboratories which were often run by organized criminal groups. These new psychoactive substances were called “designer drugs” [4].

The NPS market is not regulated and there is a considerable variability in composition among substances distributed under the same designation [5]. The diversity, combined with differing chemical structure and pharmacology of such compounds, makes it difficult to objectively characterize their properties [3,4]. As such, it is not surprising that they have unpredictable toxicological and psychiatric effects [3], while there is a growing number of documented drug-related deaths [6]. Therefore, potential NPS users can never be sure what substance they are actually buying and what kind of adverse effects can be expected.

The interconnections between psychiatric diseases and the consumption of traditional substances (alcohol, cannabis, opioids, and cocaine) are common [7]. Recent studies have shown that a similar relationship is true for NPS [8,9]. Several studies suggest that NPS use may lead to serious and potentially lethal consequences in at least some people with psychiatric co-occurring disorders [10], since such patients present poorer clinical outcomes, and they cost the health care system more money [11] by complicating treatment with a higher number of psychiatric admissions [12].

The prevalence of NPS, as well as NPS availability, is influenced by country-specific legal regulations. In the United Kingdom, for example, the introduction of the Psychoactive Substances Act in 2016 [13] changed the market of illegal substances [9]. A similar situation took place in Poland, where legislative changes and a prohibition on the use of NPS led to the emergence of new substances from this group [14].

Presently, there is limited literature on the socio-demographic profile of NPS consumers. Studies examining NPS use have found that young males abusing other (non-NPS) drugs (particularly in combination) are more likely to use NPS [8,9,15–19].

There are also reports proving that NPS users are more likely to display risky behavior [20–22]. New psychoactive substances are commonly added to drug repertoires, which can be particularly observed among experienced users [21,22]. The consumption of traditional substances (alcohol, cannabis, opioids and cocaine) often co-occurs with other psychiatric disorders [7,23,24]. Potential NPS consumers are also found among psychiatric patients [25]. The percentage of psychiatric comorbidity among patients abusing psychoactive substances in Poland was reported to be 30.5% [26].

## MATERIAL AND METHODS

### Objectives

The current study was aimed at assessing the prevalence of NPS among drug users – F11–19 according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10).

The primary outcome measure was to determine the prevalence of NPS use in the analyzed group and to compare demographic features and psychoactive substance profiles between the 2 subgroups (NPS users, non-NPS users). The secondary measure was to determine the prevalence of psychiatric comorbidities in the study group as well as to compare demographic features and psychoactive substance profiles between the 2 subgroups (the F11–19 only diagnosed group and the F11–19 group with psychiatric comorbidities according to ICD-10).

### Study design and data collection

The study was designed as a retrospective cross-sectional review of discharge reports written for psychiatric patients admitted to the Regional Psychiatric Hospital in Olsztyn, Poland. Adult patients (18–79 years old) diagnosed with mental and behavioral disorders due to the use of psychoactive substances (F11–19 according to ICD-10), admitted to the Regional Psychiatric Hospital in Olsztyn, Poland, in October 1, 2016 – September 30, 2017, were identified from the hospital medical database.

Elective admissions concerned patients admitted to the Withdrawal Syndrome Treatment Unit – a department specializing in:

- alcohol withdrawal syndrome, including complications in the form of delirium or epileptic seizures,
- treatment of other alcohol psychoses,
- consciousness disorders and non-psychotic psychiatric disorders,
- detoxification and initiation of therapy for patients lawfully ordered to rehab treatment,
- conducting hospital observation oriented to a forensic and psychiatric opinion release.

Admissions through emergency included patients presenting symptoms of mental disorders. Patients with acute life-threatening symptoms of intoxication are initially treated in the Emergency Ward and then transferred to appropriate departments depending on their specific health problem and overall condition (the Intensive Care Unit, the Toxicology Department or others).

Data for the study were recorded on a specially designed monitoring card from discharge reports, including data from psychiatric examinations, especially anamnesis (self-reported data). Data were sought for the following substances: AMF, cannabinoids, opioids, benzodiazepines, alcohol, and other substances like “boosters” (i.e., a colloquial name for NPS in Poland). Whenever possible, the NPS commercial or chemical names were asked to be given. In the case of NPS, substance qualification was based on the definition by the European Monitoring Center for Drugs and Drug Addiction.

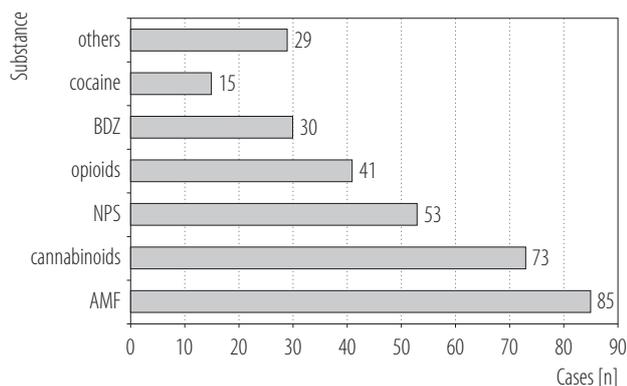
### Statistics

All analyses were done in Statistica Dataminer 7.0 (Statsoft, Poland). Chi-square tests and t-tests were used to assess the differences between NPS users and non-NPS users. The same tests were used to assess the differences between patients with F11–19 diagnosis and patients with additional psychiatric comorbidities. To check

**Table 1.** Demographic characteristics of patients and types of admission in a 12-month study on assessing the prevalence of new psychoactive substances (NPS) among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Variable	Participants (N = 157)	
	n	%
Gender		
male	125	79.5
female	32	20.5
Age		
≤20 years	8	5
21–30 years	64	41
31–40 years	55	35
>40 years	30	19
Hospital admission		
through emergency	69	43
elective	88	57

the significance of differences between other data, different tests (t-test, Mann-Whitney U test and  $\chi^2$  test) were used.



AMF – amphetamine; BDZ – benzodiazepines;  
NPS – new psychoactive substances.

**Figure 1.** Self-reported cases of substance use in the period of October 1, 2016 – September 30, 2017 in a 12-month study on assessing the prevalence of new psychoactive substances (NPS) among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland

## Ethics

This study was approved by the local Bioethics Committee of the University of Warmia and Mazury in Olsztyn – Decision No. 24/2016 – on June 30, 2016.

Data were entered into an Excel spreadsheet using a coded ID number which could not be used to retrospectively identify individual patients. The spreadsheet was password protected and stored on the University servers only. The password was available only to the authors of the study.

## RESULTS

### Demographic characteristics of patients and the prevalence of psychoactive substances

There were 4094 admissions to the hospital during the study period, of which 196 concerned patients diagnosed with mental and behavioral disorders due to psychoactive substance use (Section F11–19 of ICD-10). Eventually, 39 patients were excluded from the study group due to incomplete medical records and the remaining 157 cases were involved in the study.

Table 1 presents the demographic data and types of hospital admissions of the study sample. The average age was 35 years.

The prevalence of multiple drug use (polytoxicomania, polydrug use) was observed in 125 cases (80%), while 32 patients reported, in their anamneses, that they had been taking drugs from only 1 group – mostly benzodiazepines (BDZ), then opiates or others, including 2 patients who declared having taken NPS alone. Among NPS users, 42 patients (79%) declared having taken > 2 psychoactive substances.

The frequency of reported drug use is shown in Figure 1. The most commonly used substances were AMF (85 cases, 54%) and cannabinoids (73 cases, 46%), while NPS were used by 53 respondents (34%).

In Poland, NPS are commonly referred to as “boosters.” In practice, only a few subjects were able to give the name of a particular substance they had used (15 users

quoted mephedrone, one of them mentioned “Stiff Misha,” yet another one reported the name “Strongman,” and once it was reported to be GBL). Because of the above, the NPS group was treated homogeneously, with no detailed discrimination between particular substances. In the group of people declaring the use of opioids, there were both heroin and “compote” (a homemade extract of opioid alkaloids obtained from poppy straw decoction aka “Polish heroin”) users, as well as tramadol users.

There were also some specific cases of various chemicals used, among others, volatile solvents and glues (6 cases), lysergic acid diethylamide (LSD; 5 cases), Z-drugs (3 cases), hallucinogenic mushrooms (2 cases), the use of silicone oils and penetro TM for external treatment of pediculosis (Hedrin; 1 case), as well as benzydamine (from the preparation Tantum Rosa recommended for vaginal irrigation; 1 case).

The study group comprised people addicted to psychoactive substances other than ethanol; however, because of the fact that some of the patients also reported ethanol consumption in the anamnesis, the authors decided to include the data.

### Comparison of the group of people declaring NPS use with the group denying NPS use

First, demographic data in the group of NPS users was compared with those denying NPS use (non-NPS users) in the anamnesis. The results are presented in Table 2.

The average age of NPS users was 28.3 years, while in the case of non-NPS users, it was 38.3 years. Interestingly, in the group of patients >40 years of age, there was no declaration regarding the use of NPS. The difference was statistically significant ( $M \pm SD$  28.3  $\pm$  6.3 years vs.  $M \pm SD$  38.3  $\pm$  15.8 years, t-test  $p < 0.001$ ). The majority of NPS users were admitted to hospital through emergency (62%) whereas most of the declared non-NPS users were

**Table 2.** Demographic characteristics and types of admission of new psychoactive substances (NPS) users and non-NPS users in a 12-month study on assessing the prevalence of NPS among drug users ( $N = 157$ ) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Variable	Participants ( $N = 157$ )			
	NPS users ( $N = 53$ )		non-NPS users ( $N = 104$ )	
	n	%	n	%
Gender				
male	43	81	82	79
female	10	19	22	21
Age				
$\leq 20$ years	5	9	3	3
21–30 years	26	50	38	36
31–40 years	22	41	33	32
>40 years	0	0	19	18
Hospital admission				
through emergency	33	62	36	35
elective	20	38	68	65
Additional psychiatric diagnosis	3	6	11	11

**Table 3.** Comparison of differences in the profile of substances used by new psychoactive substances (NPS) users and non-NPS users in a 12-month study on assessing the prevalence of NPS among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Substance	Participants (N = 157)				total [n]
	NPS users (N = 53)		non-NPS users (N = 104)		
	n	%	n	%	
Amphetamine**	38	73	47	45	85
Cannabinoids**	34	65	39	37	73
Ethanol	12	23	22	21	34
Benzodiazepines***	2	4	28	27	30
Cocaine	7	13	8	8	15
Opioids***	5	10	36	57	41
Others	7	13	22	21	29

Statistically significant differences between the groups ( $\chi^2$  test): \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

admitted to hospital electively (65%). The difference was statistically significant (t-test  $p < 0.001$  and Mann-Whitney U test  $p < 0.0001$ ).

In the next step, the profiles of drugs other than NPS substances were compared in both study subgroups (NPS users vs. non-NPS users). Table 3 presents differences in the profiles of substances abused by the patients belonging to either NPS users or non-NPS users.

The  $\chi^2$  test showed that NPS users significantly more often took AMF ( $p < 0.01$ ) and cannabinoids ( $p < 0.01$ ), whereas non-NPS users significantly more often took BDZ ( $p < 0.001$ ) and opioids ( $p < 0.001$ ).

Since NPS users were, on average, 10 years younger than non-NPS users, it was decided to check whether the differences in the profile of substances found in the analyzed groups were also not age-dependent. This analysis is presented in Table 4.

The differences in the use profile of AMF, cannabinoids and BDZ may be considered age-based. On the one hand, AMF and cannabinoid users were, on average, 10 and 12 years younger, respectively, than people who did not

take these substances. Benzodiazepines users, on the other hand, were, on average, 18 years older than people who did not take BDZ. In contrast, differences in the profile of opiate users were not age-dependent.

#### **Comparison of patients diagnosed with F11–19 only and those diagnosed with F11–19 and other conditions (psychiatric comorbidities)**

In 14 cases, some accompanying psychiatric conditions were found in addition to those classified as F11–19. These were diseases that belonged to the following groups:

- mood disorders (F30–39) – 5 cases;
- anxiety, dissociative, stress-related, somatoform and other non-psychotic mental disorders (F40–48) – 3 cases;
- mental disorders due to known physiological conditions (F01–09) – 3 cases;
- schizophrenia (F20) – 2 cases;
- disorders of adult personality and behavior (F60–69) – 1 case.

Initially, the authors compared demographic data in the group of people diagnosed with F11–19 only with

**Table 4.** Age of users of particular psychoactive substances in a 12-month study on assessing the prevalence of new psychoactive substances (NPS) among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Substance	Participants' age [years] (M)		p	
	users	non-users	t-test	Mann-Whitney
New psychoactive substances	28.3	38.3	<0.0001	<0.0001
Amphetamine	30.1	40.6	<0.0001	<0.0001
Cannabinoids	28.1	40.8	<0.0001	<0.0001
Ethanol	37.6	34.1	0.211	0.213
Benzodiazepines	49.9	31.3	<0.0001	<0.0001
Cocaine	28.2	35.6	0.054	0.0403
Opioids	34.6	35.0	0.872	0.607
Others	38.3	34.1	0.151	0.0192

**Table 5.** Demographic characteristics and types of admission of the F11–19 only diagnosed group and the group of F11–19 patients with additional psychiatric diagnosis (psychiatric comorbidities) in a 12-month study on assessing the prevalence of new psychoactive substances (NPS) among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Variable	Participants (N = 157)			
	F11–19 only (N = 143)		F11–19 + psychiatric comorbidities (N = 14)	
	n	%	n	%
Gender				
male	115	80	10	71
female	28	20	4	29
Age				
≤20 years	8	6	0	0
21–30 years	61	42	3	21
31–40 years	50	35	5	35
>40 years	24	17	6	42
Type of hospital admission				
through emergency	68	48	6	43
elective	81	52	8	57

the group of people diagnosed with F11–19 and other conditions (psychiatric comorbidities). The data are presented in Table 5.

The average age of patients without additional psychiatric impairments was 33.6 years, while for people with additional psychiatric disorders, it was 48.3 years. The differ-

**Table 6.** Comparison of differences in the profile of used substances between the analyzed groups in a 12-month study on assessing the prevalence of new psychoactive substances (NPS) among drug users (N = 157) admitted to the Regional Psychiatric Hospital in Olsztyn, Poland (October 1, 2016 – September 30, 2017)

Substance	Participants (N = 157)			
	F11–F19 only (N = 143)		F11–19 + psychiatric comorbidities (N = 14)	
	n	%	n	%
New psychoactive substances	50	35	3	21
Amphetamine*	83	58	2	14
Cannabinoids	68	46	5	36
Ethanol	29	20	5	36
Benzodiazepines***	21	17	9	64
Cocaine	14	10	1	7
Opioids	37	26	4	29
Other	27	19	2	14

Statistically significant differences between the groups ( $\chi^2$  test): \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

ence was statistically significant ( $M \pm SD$   $33.6 \pm 12.9$  years vs.  $M \pm SD$   $48.3 \pm 19.6$  years, t-test and Mann-Whitney U test,  $p < 0.0001$ ). For patients with no additional psychiatric conditions, emergency hospital admissions accounted for 48% of cases, while such admissions averaged 43% in the group of people with additional disorders. However, the difference was statistically irrelevant.

Profiles of used substances were then compared in each of the diagnostic subgroups (i.e., F11–19 only vs. F11–19 and psychiatric comorbidities). Table 6 presents detailed results. The  $\chi^2$  test showed that patients without additional psychiatric disorders significantly more often took AMF ( $p < 0.05$ ), whereas people with psychiatric co-occurring disorders significantly more often took BDZ ( $p < 0.001$ ). These statistical differences, however, may have resulted from age differences between such assigned groups.

## DISCUSSION

In the study, the authors focused on examining the prevalence of NPS in the specific group of inpatients with mental

and behavioral disorders due to psychoactive substance use, and the relationship between using NPS or other psychoactive substances. In addition to that, the prevalence of psychiatric comorbidities was evaluated in the study group.

Literature reports published to date have described groups of patients who regularly or frequently use psychoactive agents such as NPS. There were different names used to describe such users: experienced users [27], regular psychostimulant users [22], patients who use drugs heavily, patients who inject drugs [20], and patients dependent on psychoactive substances [26], without giving precise definitions of these terms. The group studied included patients who met the ICD-10 criteria – a diagnosis of mental and behavioral disorders due to psychoactive substance use (the F11–19 block). A detailed analysis of publications with the above-mentioned key words indicates that the study group was comparable to those differently-named groups reported in the available literature.

The prevalence of NPS use in the current study group was 33%. These results are lower than in an Australian

study by Sutherland et al. [22], in which a similar group was described (regular psychostimulant users), with 41.9% of respondents reporting NPS use. In Europe, NPS have been reported mostly among heavy drug users, specifically in Hungary and Poland [20,28,29]. A Polish survey reported that 15% of the clients of needle and syringe programs marked NPS as their “most problematic substance,” while 12% had used mephedrone in the month preceding the survey, and 14% had used other NPS [30].

Patients using NPS alone are very rare. As noted by Sutherland et al. [21], among 23 855 patients only 5.7% of NPS users and 0.07% of the entire cohort did not use other (non-NPS) drugs. In the study, NPS users were divided into SCRA (synthetic cannabinoid receptor agonists) and other NPS users. Generally, NPS users were polysubstance consumers, while SCRA users were most typically addicted to AMF or cannabinoids [21].

According to the study conducted in Australia, the use of NPS in the regular psychostimulant users (RPU) population in 2010–2015 was 41.9%, on average [22].

Despite numerous research initiatives, literature sources report that the use of NPS in the population of addicts, often taking psychoactive substances, is poorly recognized [20].

In the group analyzed in this study, the majority of people reported the use of AMF and cannabinoids (54% and 46%, respectively), which is confluent with literature data referring to the general population [1,2]. In contrast to the epidemiological data reported in the literature, the use of cocaine (10%) and methylenedioxyamphetamine (0%) [1,2] was relatively low in the study group. The difference may have resulted from cultural specificity and lower income in the region where the research was carried out.

Patients taking NPS alone accounted for 4% of the NPS users included in the study group. These values are similar to those reported by Sutherland et al. (5.7%) [22]. In turn, in the studies by Stanley et al. [8], and also by Bennet et al. [9], which concerned general psychiatric pa-

tients in the same hospital, the percentage of patients taking NPS alone was >20% and 16%, respectively.

Even though attempts were made to identify the NPS-taking history from the patients included in the study group, it did not seem very effective, as only in 18 cases (34% of NPS users) was it possible to obtain the substance name, of which in 15 cases (28% of NPS users) mephedrone was administered as NPS. None of the participants in the study reported using popular cannabinoids or synthetic cathinones which are mentioned in numerous publications [1,3,14,21,22]. This may have been due to the fact that in Poland NPS are treated as a collective group, referred to as legal highs or “boosters.”

The study subgroup of NPS users did not differ significantly from the NPS users described by other researchers. The average age of NPS users was 28.3 years and they were 10 years younger than non-NPS users. Interestingly, all NPS users were <41 years old. These observations are compatible with data provided by other authors [8,9,15–19]. Unlike other researchers reporting a subgroup of NPS users >40 years of age who treat NPS as replacements or supplements taken instead of, or along with, the main addictive substance, none of the declared NPS users in the study group exceeded 40 years of age [9,31].

Most of the NPS users in the study subgroup, or in the entire study group, were males, which is confluent with the results reported by other researchers [8,9,15–19].

New psychoactive substance users were mainly polysubstance users with a significant prevalence of AMF and cannabinoids in their drug profile, which correlates with previous reports [1,9,21]. Nevertheless, it cannot be ruled out in this case that the prevalence of AMF and cannabinoids in the current study group could have also resulted from age differences between the NPS users and non-NPS users.

It was found that NPS users, more often than non-NPS users, were admitted to hospital through emergency, which indirectly confirms the observations of other re-

searchers of the inclination for risky behavior among NPS users [20,21].

The significantly higher percentage of BDZ and opioid users in the group of non-NPS users can be explained by the fact that among patients taking these substances, the highest percentage of people declared having taken only one substance. It was also observed that BDZ users were definitely older than patients who did not use these substances.

Research conducted by Stanley et al. [8] and Bennet et al. [9] revealed a higher percentage of NPS use among patients addicted to opioid substitutes; however, this was not observed in the current study group.

Potential NPS consumers are found also among psychiatric patients, especially in the Italian population of depressed (15.6%) and bipolar (14.8%) patients. Although reports on the mental effects of NPS in subjects previously not identified as psychiatric patients are numerous, little is known about their effect on psychiatric patients and, specifically, those generally defined as severe mental illness (SMI) patients. However, it should be taken into account that the actual level of NPS use among people with SMI seems to be significantly underestimated, as most of the SMI patients who use NPS do not come to see health professionals for that reason [26].

Co-occurring psychiatric disorders were found in 10% of the subjects in the studied sample. The percentage was lower than in other studies, where 14.8–30.5% of addicts were found to have other psychiatric conditions [23–26].

Considering that the group of patients with additional mental disorders accounted for <10% of the total study group, the results presented below should be interpreted with caution.

Having said that, the average age in the subgroup of patients with co-occurring psychiatric disorders was higher (48.5 years) than in the subgroup with no psychiatric disorders (33.5 years), as well as higher than the average age of the entire study group (35.5 years). Since the percent-

age of NPS users in the subpopulation of patients with co-occurring psychiatric illnesses was 21%, it was lower than the percentage of NPS users in the entire examined group.

The authors believe that the strength of the report is the well-defined study group (inpatients diagnosed according to ICD-10). Data were collected during psychiatric examinations and completed during hospitalization, which allowed the information to be verified.

The limitation of the study was the relatively small group of patients enrolled, which might be naturally limited by the size of the medical center where the research was conducted.

Another possible limitation is that data collection was based only on anamnesis. On the other hand, there is no possibility of any objective confirmation of what psychoactive substances the person may have taken, often during a long-term history of addiction.

Unfortunately, because of the Polish specificity (using the collective term of “boosters” for all NPS, with interviewees paying no attention to particular drug names), it was not really possible to investigate which NPS, other than mephedrone, were used by the patients included in the study group.

The relatively small size of the study group encourages expanding the research and, importantly, introducing laboratory analysis to precisely detect NPS in biological samples collected from the subjects. Since the subgroup of patients with psychiatric comorbidities was too small and needs re-assessment, it is planned to investigate patients diagnosed with specific psychiatric conditions for NPS use.

## CONCLUSIONS

The fundamental outcome of the study is demonstrating that NPS use affects different groups, including such a specific group as the analyzed sample, which shows a similar profile of NPS use as in different groups described in the literature.

## REFERENCES

1. European Monitoring Centre for Drugs and Drug Addiction [Internet]. Lisbon: The Organization; 2017 [cited 2018 January 1]. European Drug Report: Trends and Developments. Available from: [http://www.emcdda.europa.eu/publications/edr/trends-developments/2017\\_en](http://www.emcdda.europa.eu/publications/edr/trends-developments/2017_en).
2. Dines AL, Wood DM, Yates Ch, Heyerdahl F, Hovda KE, Giraudon I, et al. Acute recreational drug and new psychoactive substance toxicity in Europe: 12 months data collection from the European Drug Emergencies Network (Euro-DEN). *Clin Toxicol (Phila)*. 2015;53(9):893–900, <https://doi.org/10.3109/15563650.2015.1088157>.
3. Zawilska JB, Andrzejczak D. Next generation of novel psychoactive substances on the horizon – A complex problem to face. *Drug Alcohol Depend*. 2015;157:1–17, <https://doi.org/10.1016/j.drugalcdep.2015.09.030>.
4. European Monitoring Centre for Drugs and Drug Addiction [Internet]. Lisbon: The Organization; 2015 [cited 2018 January 1]. New psychoactive substances in Europe. An update from the EU Early Warning System (March 2015). Available from: <http://www.emcdda.europa.eu/system/files/publications/65/TD0415135ENN.pdf>.
5. Brandt SD, Sumnall HR, Measham F, Cole J. Analyses of second generation ‘legal highs’ in the UK: Initial findings. *Drug Test Anal*. 2010;2:377–82, <https://doi.org/10.1002/dta.155>.
6. McAuley A, Hecht G, Barnsdale L, Thomson CS, Graham L, Priyadarshi S, et al. Mortality related to novel psychoactive substances in Scotland, 2012: an exploratory study. *Int J Drug Policy*. 2015;26:461–7, <https://doi.org/10.1016/j.drugpo.2014.10.010>.
7. Martinotti G, Lupi M, Acciavatti T, Cinosi E, Santacroce R, Signorelli MS, et al. Novel psychoactive substances in young adults with and without psychiatric comorbidities. *BioMed Res Int*. 2014;2014:815424, <https://doi.org/10.1155/2014/815424>.
8. Stanley JL, Mogford DV, Lawrence RJ, Lawrie SM. Use of novel psychoactive substances by inpatients on general adult psychiatric wards. *BMJ Open*. 2016;6(5):e009430, <https://doi.org/10.1136/bmjopen-2015-009430>.
9. Bennett KH, Hare HM, Waller RM, Alderson HL, Lawrie S. Characteristics of NPS use in patients admitted to acute psychiatric services in Southeast Scotland: a retrospective cross-sectional analysis following public health interventions. *BMJ Open*. 2017;7(12):e015716, <https://doi.org/10.1136/bmjopen-2016-015716>.
10. Gray R, Bressington D, Hughes E, Ivanecka A. A systematic review of the effects of novel psychoactive substances ‘legal highs’ on people with severe mental illness. *J Psychiatr Ment Health Nurs*. 2016;23(5):267–81, <https://doi.org/10.1111/jpm.12297>.
11. Dickey B, Azeni H. Persons with dual diagnoses of substance use and major mental illness: their excess costs of psychiatric care. *Am J Public Health*. 1996;86:973–7, <https://doi.org/10.2105/ajph.86.7.973>.
12. Bartels SJ, Drake RE, Wallach MA. Long-term course of substance use disorders among patients with severe mental illness. *Psychiatr Serv*. 1995;46:248–5. <https://doi.org/10.1176/ps.46.3.248>.
13. UK Government. Psychoactive Substances Act 2016 c.2 (January 28, 2016).
14. Maciów-Głąb M, Kula K, Kłys M, Rojek SD. New psychoactive substances in substantive evidence in expert practice of the Department of Forensic Medicine, UJCM in the years 2010–2015. *Arch Med Sądowej Kryminol*. 2017;67(3):178–200, <https://doi.org/10.5114/amsik.2017.71449>.
15. Bruno R, Matthews AJ, Dunn M, Alati R, McIlwraith F, Hickey S, et al. Emerging psychoactive substance use among regular ecstasy users in Australia. *Drug Alcohol Depend*. 2012;124:19–25, <https://doi.org/10.1016/j.drugalcdep.2011.11.020>.
16. Bonar EE, Ashrafioun L, Ilgen MA. Synthetic cannabinoid use among patients in residential substance use disorder treatment: prevalence, motives, and correlates. *Drug Alcohol Depend*. 2014;143:268–71, <https://doi.org/10.1016/j.drugalcdep.2014.07.009>.
17. Burns L, Roxburgh A, Matthews A, Bruno R, Lenton S, Van Buskirk J. The rise of new psychoactive use in Australia.

- Drug Test Anal. 2014;6:846–9, <https://doi.org/10.1002/dta.1626>.
18. Palamar JJ. Bath salt use among a nationally representative sample of high school seniors in the United States. *Am J Addict*. 2015;24(6):488–91, <https://doi.org/10.1111/ajad.12254>.
19. Palamar JJ, Acosta P. Synthetic cannabinoid use in a nationally representative sample of US high school seniors. *Drug Alcohol Depend*. 2015;149:194–202, <https://doi.org/10.1016/j.drugalcdep.2015.01.044>.
20. Janíková B, Fidesová H, Miovský M, Vavrinčíková L, Grund J-PC. New Psychoactive Substances among People Who Use Drugs Heavily in Europe. An inventory of changing drug consumption patterns, shifting drug markets and lagging policy responses. *Adiktologie*. 2016;16(2):92–105.
21. Sutherland R, Peacock A, Roxburgh A, Barratt MJ, Burns L, Bruno R. Typology of new psychoactive substance use among the general Australian population. *Drug Alcohol Depend*. 2018;188:126–34, <https://doi.org/10.1016/j.drugalcdep.2018.03.034>.
22. Sutherland R, Peacock A, Whittaker E, Roxburgh A, Lenton S, Matthews A, et al. New psychoactive substance use among regular psychostimulant users in Australia, 2010–2015. *Drug Alcohol Depend*. 2016;161:110–8, <https://doi.org/10.1016/j.drugalcdep.2016.01.024>.
23. Merikangas KR, Herrell R, Swendsen J, Rössler W, Ajdacic Gross V, Angst J. Specificity of bipolar spectrum conditions in the comorbidity of mood and substance use disorders: Results from the Zurich cohort study. *Arch Gen Psychiatry*. 2008;65(1):47–52, <https://doi.org/10.1001/archgenpsychiatry.2007.18>.
24. Toftdahl NG, Nordentoft M, Hjorthøj C. Prevalence of substance use disorders in psychiatric patients: A nationwide Danish population based study. *Soc Psychiatry Psychiatr Epidemiol*. 2016;51(1):129–40, <https://doi.org/10.1007/s00127-015-1104-4>.
25. Bersani G, Prevete E. Novel psychoactive substances (NPS) use in severe mental illness (SMI) patients: Potential changes in the phenomenology of psychiatric diseases. *Hum Psychopharmacol Clin Exp*. 2017;e2591, <https://doi.org/10.1002/hup.2591>.
26. Błachut M, Badura-Brzoza K, Jarzab M, Gorczyca P, Hese RT. [Dual diagnosis in psychoactive substance abusing or dependent persons]. *Psychiatr Pol*. 2013;47(2):335–52. Polish.
27. Moore K, Dargan PI, Wood DM, Measham F. Do Novel Psychoactive Substances Displace Established Club Drugs, Supplement Them or Act as Drugs of Initiation? The relationship between Mephedrone, Ecstasy and Cocaine. *Eur Addict Res*. 2013;19:276–82, <https://doi.org/10.1159/000346678>.
28. Malczewski A, Misiurek A, Bukowska B, Chojecki D, Jabłoński P, Kidawa M, et al. National Report 2013, Poland: new developments, trends and in-depth information on selected issues. Warszawa: Krajowe Biuro ds. Przeciwdziałania Narkomanii; 2013.
29. Gorun G, Curca GC, Hostiuc S, Buda O. “Legal highs” in Romania: historical and present facts. *Rom J Leg Med*. 2011;19:73–6, <https://doi.org/10.4323/rjlm.2011.73>.
30. European Monitoring Centre for Drugs and Drug Addiction [Internet]. Lisbon: The Centre; 2015 [cited 2018 January 1]. Injection of synthetic cathinones. Available from: [http://www.emcdda.europa.eu/system/files/publications/2754/Synthetic%20cathinones\\_updated2015.pdf](http://www.emcdda.europa.eu/system/files/publications/2754/Synthetic%20cathinones_updated2015.pdf).
31. Shapiro HD. NPS come of age: A UK overview [Internet]. DrugWise; 2016 [cited 2018 January 1]. Available from: <http://www.drugwise.org.uk/wp-content/uploads/NPSComeofAge.pdf>.