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# How and Where to Find NPS Users: a Comparison of Methods in a Cross-National Survey Among Three Groups of Current Users of New Psychoactive Substances in Europe

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Published online: 17 January 2019  
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## Abstract

Use of new psychoactive substances (NPS) across Europe remains a public health challenge. The study describes potentials and limitations of methods in a transnational survey of recent marginalised, nightlife and online community NPS users in Germany, Hungary, Ireland, the Netherlands, Poland and Portugal ( $n = 3023$ ). In terms of demographic profile, drug use history and type of NPS, different methods reached different segments of the NPS-using population. Last year use of different NPS varied across countries and groups. Respondents used NPS in a variety of settings, with public spaces most common in the marginalised group. The study suggests that prevalence rates can reveal a picture of the NPS market that significantly deviates from what law enforcement seizures indicate. Outreach in nightlife settings and peer education are recommended to inform users about health risks and to improve access to drug services and care.

**Keywords** New psychoactive substance · NPS · Prevalence · Marginalised drug user · Nightlife drug user · Online community user · Prevention · Health education

New psychoactive substances (NPS) are a rapidly expanding group of psychoactive drugs. Their emergence goes hand in hand with the growing importance of the internet and social media as a source of information for users and the internet as a growing marketplace (EMCDDA 2017a). In the European Union (EU), NPS are defined as “synthetic or naturally occurring substances that are not controlled under international law, and often produced with the intention of mimicking the effects of controlled drugs” (EMCDDA 2014). Between 2008

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and 2013, the number of NPS notified through the EU Early Warning System for the first time gradually increased from 13 in 2005 to 24 in 2009 and, then, steeply went up. By the end of 2016, a total of more than 620 NPS were being monitored (EMCDDA 2017b). NPS notified and monitored in the EU encompass a great variety of psychoactive substances. Observations of NPS reported by the member states predominantly refer to customs and police seizures or biological data from fatal and non-fatal intoxications (Van Amsterdam et al. 2015). In 2015, almost 80,000 seizures of NPS were reported, nearly twice as much as in the previous year (EMCDDA 2017b). However, little is known about the extent to which NPS are actually used and the users.

Three studies provide European-wide prevalence data on the use of NPS (as a general category) from surveys among normative samples. In the 2011 and 2014 Eurobarometer telephone surveys on drugs among young people aged 15–24 years, respondents were asked whether they had ever used “new substances that imitate the effects of illicit drugs”. Between 2011 and 2014, lifetime prevalence of NPS use increased from 5 to 8%. In 2014, last year prevalence was 3% (Eurobarometer 2011, 2014). A similar question was asked in the 2015 ESPAD school survey among students aged 15–16 years; 4% reported life time and 3% last year use of NPS (The ESPAD Group 2016). In addition, a growing number of EU countries have included questions about NPS use in their national general population surveys; for “young adults” (15–34 years), last year prevalence ranged 0.3–1.6% (EMCDDA 2017b).

Other surveys have been conducted among more specific populations in one or more European countries, e.g. through targeted sampling in nightlife settings (Measham et al. 2011; Wood et al. 2012; Hannemann et al. 2017), online communities (Carhart-Harris et al. 2011; Werse and Morgenstern 2012, 2015) or street drug users who inject (Racz et al. 2016; Van Hout and Bingham 2012). Not surprisingly, such more selective samples generally report higher prevalence of NPS use. Also, these studies are often more specific regarding the substances, by reporting the prevalence of use of individual NPS or groups of NPS, rather than of NPS as a general category. For example, in a Spanish survey carried out at music festivals and an online forum, lifetime NPS use was highest for phenethylamines (e.g. 2C-B 80.0%) and synthetic cathinones (e.g. methylone 40.1%) (Gonzalez et al. 2013). In two German online surveys directed to NPS-experienced users, synthetic cannabinoids were the post prevalent NPS category (Werse and Morgenstern 2015).

While surveys about NPS commonly have focused on one group of users, the NPS-transnational (NPS-t) project carried out a survey in six European countries (Germany, Hungary, Ireland, the Netherlands, Poland and Portugal), targeting at the following three groups of NPS users: (a) socially marginalised users; (b) users in nightlife settings; and (c) users in online communities.

The aim of the survey was to assess characteristics of NPS users, patterns and motives of use, procuring NPS, and perceptions of prevention. Here, our purpose is to describe and discuss methodological challenges in conducting surveys among NPS users, as well as to gain more insight into where prevention and care workers could reach out to NPS users. More specifically, our objectives are as follows: (1) to describe and discuss practical and ethical issues in transnational surveys among NPS users; (2) to better understand the potentials and limitations of different sampling methods for reaching NPS users; (3) to determine the extent to which different methods reach similar or dissimilar segments of the NPS-using population in different EU countries; and (4) to assess the most common settings where NPS users can be found for prevention and care.

We start with a brief overview of practical and ethical issues that were addressed before the survey could be carried out. We, then, turn to the methodology. Firstly, we present the questionnaire, followed by a description of how the fieldwork and the interviews were conducted and which problems were encountered, in the three groups, and in the six countries. Secondly, we outline the response, the data cleaning and the data analysis. Subsequently, we present the findings and describe similarities and differences between the three groups in terms of their general profile, last year NPS use and procurement of NPS and setting of use. Finally, we discuss our findings and draw some conclusions.

## Preparation to the Survey: Practical and Ethical Issues

For all three groups to be surveyed, the eligibility criteria were the following: recent NPS use (at least once in the past 12 months), resident of the participating country, and adult (18 years or older). The three target groups were specified as follows. (a) *Socially marginalised users*: “high risk drug users”, often also frequently using opioids, (crack) cocaine and/or (meth)amphetamine intravenously or through smoking. (b) *Users in nightlife*: recreational drug users who frequent clubs, raves and/or festivals. (c) *Users in online communities*: users who are very active on the internet and/or actively participate in drug forums.

Cross-national studies are accompanied by the challenge to find a good balance between uniformity and cultural specificity. A major challenge was to find an unambiguous but simple description of NPS that can be understood by a variety of drug users, in different countries. As stated before, NPS are officially defined as psychoactive substances that are not controlled under international law. In this context, the international law refers to the 1961 Single Convention on Narcotic Drugs and the 1971 Convention on Psychotropic Substances (UNODC 2013). However, drugs that are not controlled under the international law can be illegal at the national level. In recent years, a growing number of substances in the EU that are monitored as NPS have become controlled drugs in one or more of the countries in this study, for instance by managing individual NPS or groups of NPS under existing national drug legislation (EMCDDA 2016). Mephedrone is a typical example of an NPS that is controlled under the national criminal law in all six countries. However, in the case of other NPS, the legal status varies across the EU. Synthetic cannabinoids, for example, are not controlled under the national drug law in the Netherlands, while in Poland, synthetic cannabinoids had already become controlled substances in the amended drug act of 2010. In Germany, at the end of 2016, a generic law with a specific focus on NPS (“new psychoactive substances law” (NpSG 2016) was implemented to control groups of chemical molecules, including the group of synthetic cannabinoids. Before (at the time of the survey described here), a large number of individual cannabinoids had already been made subject to the German narcotics law.

This variation in legal status of NPS within and between countries does not make it easy to find a simple, unambiguous description of NPS in a cross-national survey. What makes it even more complicated is that it is not uncommon that online as well as offline vendors suggest a legal status, by marketing NPS that are illegal in one or more EU countries as “legal highs”, “bath salts” or “research chemicals” (Dabrowaska and Bujalski 2013; Seddon 2014; Wadsworth et al. 2017). Fortunately, we were not the first to be confronted with this problem. In the two Eurobarometer surveys as well as the ESPAD survey, the official definition of NPS was translated into “new substances that imitate the effects of illicit drugs”, and reference was made to the different forms in which NPS can appear.

Different from the 2011 Eurobarometer survey, the 2014 Eurobarometer survey mentioned some examples of existing illegal drugs. Both the 2014 Eurobarometer survey and the 2015 ESPAD survey made reference to marketing terms that vendors use in selling NPS (see Table 1).

Extending the Eurobarometer and ESPAD definitions, we decided to describe NPS in our survey as follows: “By NPS, we mean all kinds of New Psychoactive Substances, both pure and branded. Alternative names for NPS are ‘research chemicals’, ‘legal highs’, ‘herbal blends’, and ‘bath salts’. A common brand name is ‘Spice’. NPS cover a whole range of pharmaceutical groups like stimulants, empathogens, sedatives, and dissociatives. Therefore, NPS can be synthetic cannabinoids, cathinones, amphetamines, opioids, and other chemical drugs, and can be used for a whole range of purposes, from sleeping to partying.”

Admittedly, this description is not very simple, as it comprises terminologies that are not expected to be clear to every NPS user. In the next section, it will be elaborated how this problem was addressed in the survey.

The survey was conducted in accordance with relevant national and EU data protection laws. The questionnaire did not refer to any medical or other intervention that requires ethical approval. However, ethical approval for the survey was required in two participating countries. In Poland, the survey was approved by the bioethical committee at the researchers’ institute, provided signed statements that the respondent had given oral consent. In the case of the Irish team, the ethics committee at their university did not grant permission to approach nightlife users both inside nightclubs and on the street outside nightclubs. As an alternative, the Irish team received ethical approval to advertise the survey inside nightclubs. In all participating countries, subjects were free to choose to participate, and anonymity was explicitly guaranteed before participation. The online survey was run on a secure URL (https), and no IP addresses were collected. For any further questions or, if necessary, contact to professional help, respondents were given an e-mail link to the national research team. In case of medical or psychological problems of respondents or needs for help (at least those related to the use of psychoactive substances) that came to notice of the researchers during face-to-face interviews, interviewers were able to direct respondents to a qualified institute or service.

**Table 1** Definitions of NPS in European surveys

Survey	NPS defined as
Eurobarometer (2011)	In certain countries, some new substances that imitate the effects of illicit drugs are being sold as legal substances in the form of—for example—powders, tablets/pills or herbs.
Eurobarometer (2014)	New substances that imitate the effects of illicit drugs, such as cannabis, ecstasy, and cocaine, may now sometimes be available. They are sometimes called [INSERT “local name” such as, “legal highs”, “research chemicals”] and can come in different forms, for example herbal mixtures, powders, crystals or tablets.
The ESPAD Group (2016)	New substances that imitate the effects of illicit drugs [such as cannabis or ecstasy] may now be sometimes available. They are sometimes called [“legal highs”, “ethno botanicals”, “research chemicals”] and can come in different forms, for example herbal mixtures, powders, crystals or tablets.

## Data Collection: Questionnaire, Fieldwork and Interviews

The questionnaire was developed in English and translated into the other languages in this project (Dutch, German, Hungarian, Polish and Portuguese). To guarantee comparability, translation was done back and forth (from/into English). The questionnaire covered all themes of the NPS-t study and included items about the following: sociodemographic characteristics; prevalence and patterns of use of some controlled drugs; prevalence and patterns of NPS use; motives of NPS use; procuring NPS; and perceptions of NPS prevention. The questionnaire was divided into seven sections. Here, we just explain the sections that are relevant to the current paper.

The questionnaire was introduced by a description of NPS (as stated previously), the aim of the research, the number of questions (60), estimated time to complete the questionnaire (30 min) and the statement that participation was completely anonymous. In the first section, the following two inclusion/exclusion questions were asked: “Are you 18 years of age or older?”, and “Have you used any legal high products or other new psychoactive substances (e.g. herbal blends, bath salts, or research chemicals) in the prior 12 months?” A negative answer to either one or both led to exclusion from the survey. The second section included items about gender, age and residence. In the third section (prevalence), respondents were asked whether they had used NPS, divided into seven categories. For each category, names were accompanied by examples, except for the “other” category. The categories were as follows: herbal blends (e.g. “Spice”); synthetic cannabinoids (obtained pure); branded stimulants (e.g. “bath salts”); stimulants/empathogens/nootropics (obtained pure, e.g. mephedrone, MDPV, a-PVP); psychedelics (e.g. NBOMe-x; 2C-x); dissociatives (e.g. methoxetamine); and other. For each category, the respondents had to choose one out of four options (no, never; yes, more than 12 months ago; yes, within the last 12 months, but not within the last 30 days; yes, within the 30 last days). Subsequently, for each category that respondents had reported to have used in the last 12 months, they were asked to name up to three substances or brands they had used. Two other sections included items about where respondents use NPS and how and where they obtain NPS.

The survey was conducted between April and November 2016. A targeted methodology was applied to reach NPS users in each of the three groups. Questionnaires were available in two versions, printed (pen and paper) and online. Socially marginalised users and users in nightlife could choose either one, while users in online communities were offered online access to the survey only. A general issue encountered during fieldwork was that many (potential) respondents were not familiar with the concept of NPS. In the initial conversation, as well as in the course of the interview, the most appropriate strategy was to refer to names or street names (e.g. “meow” for mephedrone or “spice” for synthetic cannabinoid products) as examples of the most common NPS in the applicable country. In the case of the online community users, we did the same by posting messages and participating in discussions in internet forums.

### Socially Marginalised Users

Socially marginalised users were predominantly recruited by the researchers, trained field assistants and outreach workers, at or through care and treatment facilities (e.g. drug services, shelters) and in the street or through snowball sampling, and interviewed face-to-face. In most cases, pen-and-paper questionnaires were used and interviewer-administered. A concise overview of successful recruitment strategies and type of interview/questionnaire per country is presented in Table 2. Overall, services played an important role in finding marginalised NPS users. This was particularly the case in Germany, Hungary, Ireland and Poland.

**Table 2** Overview of successful recruitment strategies and type of interview/questionnaire

Country	Recruitment	Type of interview/questionnaire
Socially marginalised users		
Germany	Clients from harm-reduction centre in Munich recruited through peer-prevention project. Flyers with access codes in low-threshold services in Frankfurt/M and Munich.	F-t-f, p&p, interviewer-administered. Self-completed online.
Hungary	Low-threshold and harm-reduction drug and other services in Budapest. Recruitment by service providers. Snowball technique with clients recruiting users not in services.	F-t-f, p&p, mostly interviewer-administered. F-t-f, p&p, mostly interviewer-administered.
Ireland	Drug services across Ireland. Recruitment by service providers.	F-t-f, p&p, interviewer-administered.
Nether-lands	Outdoor fieldwork in Amsterdam by researcher.	F-t-f, p&p, interviewer-administered.
Poland	In and around drug treatment services, social welfare facilities, and shelters, and in the streets in Warsaw and 5 other cities. Recruitment by outreach workers.	F-t-f, p&p, self-administered with assistance of outreach workers.
Portugal	Drug services in Lisbon, Azores and Madeira Islands. Recruitment by service providers	F-t-f, p&p, interviewer-administrated
Users in nightlife		
Germany	One club in Frankfurt; recruitment by field assistant. Various clubs and festivals in Munich and Leipzig; recruitment by field assistants, in collaboration with peer-prevention projects. Flyers with access codes in clubs and at festivals in Frankfurt, Munich and Leipzig.	F-t-f, p&p, interviewer-administered. Self-completed online.
Hungary	Three clubs in Budapest. Recruitment by field assistants. Flyers with individual codes distributed by field assistants at festivals and in clubs in Budapest.	F-t-f, p&p, interviewer-administered. Self-completed online.
Ireland	Facebook groups and web pages specific to Irish clubs and dance venues.	Self-completed online.
Nether-lands	Eleven clubs/festivals in and around Amsterdam. Recruitment by researchers and field assistants.	P&p, interviewer-administered/self-administered/self-completed online.
Poland	Clubs in Warsaw and 5 other cities. Recruitment by outreach workers with experience as “party worker”.	F-t-f, p&p, self-administered with assistance of party worker.
Portugal	In and around clubs and at festivals in and near Lisbon.	F-t-f, self-completed online.

F-t-f, face-to-face interview; P&p, pen and paper questionnaire

In Germany, attempts by the Frankfurt-based research team to recruit marginalised NPS users in the local “open drug scene” were unsuccessful, as was to be expected from the latest local monitoring system survey (Werse et al. 2017). Therefore, recruitment was diverted to Munich, the only German city that is known for substantial NPS use among marginalised drug users. In collaboration with a harm reduction centre in Munich, marginalised NPS users were recruited and interviewed by trained field assistants. In addition, flyers containing a link to the online questionnaire were distributed among clients in organisations that work with marginalised users in Munich and Frankfurt. In Hungary, a large share of the interviewed marginalised users were recruited with the support of staff in low-threshold and harm-reduction services in Budapest. These include services that specifically aim at drug users



(e.g. syringe exchange, day-care and psychosocial consultation) as well as other services (e.g. residential care for homeless people, a special service for pregnant women). In addition, a snowball technique was applied, and clients were asked to refer the interviewers (trained students majoring in psychology or social work and young researchers) to NPS users outside of these services, leading to the inclusion of non-clients in the survey as well. Clients of the given services were asked to refer the interviewers to persons who were supposed to use NPS but did not participate in any services. Respondents who were not in the clientele, as well as the respondents that had recruited them, received a small financial incentive (cash 1000 HUF = 3 EUR). In Ireland, all respondents were recruited and interviewed in drug services. Recruitment for marginalised users began with contacting all potentially relevant drug services (harm reduction and counselling services, addiction clinics, opiate substitution in primary care, local and regional drug task forces) across the country. Part of these services did not respond, another part reported that none of their clients had been using NPS in the past 12 months and one service declined to participate in the study as they do not allow research with their clients. In the end, the Irish team of two researchers visited the remaining six centres to interview clients. In Poland, the fieldwork was conducted in four urban areas—Warsaw, Cracow, Poznań and Tri-City (Gdańsk, Gdynia and Sopot)—mainly by a team of “streetworkers” and “partyworkers” (i.e. harm reduction-oriented outreach workers), and marginalised NPS users were recruited and interviewed in and around treatment and social welfare facilities, in the shelters and in the streets.

In contrast, the strategy to find respondents with the assistance of drug services fully failed in the Netherlands, and it was not very helpful in Portugal. In the Netherlands, a vast majority of marginalised users is in contact with one or more types of care (e.g. substitution programmes, user rooms, housing, shelters for homeless) and/or (user) organisations that aim to improve the rights and health of users. All applicable services in Amsterdam, including the local user organisation, were contacted, but none knew of any NPS user. Outreach workers stated that clients they had asked could not imagine that anyone would use synthetic opioids or other NPS, given the availability of methadone (and for a smaller group, heroin on medical prescription), as well as good-quality crack cocaine and heroin on the illegal drugs market. As an alternative, extensive fieldwork was conducted in the streets, parks and remote areas where homeless people sleep rough, but in the end, only one marginalised user of NPS was found. In Portugal, searching for marginalised NPS users with the assistance of care services was not a very successful strategy. According to treatment and low-threshold facilities, substance use among socially marginalised users in Portugal is essentially dominated by cocaine and heroin, and NPS use is very rare. However, various services pointed to a different situation in Madeira and the Azores, both autonomous Portuguese regions in the Atlantic, where prices for conventional drugs are much higher than in continental Portugal. As a result, only a limited number of socially marginalised NPS users were interviewed, and only in Madeira and the Azores.

## Users in Nightlife

Users in nightlife were mainly recruited face-to-face on-site at clubs, raves and festivals. Participants mostly self-completed either a pen-and-paper questionnaire or the online questionnaire to which they were referred by a flyer containing a link to the online survey. A concise overview of successful recruitment strategies and type of interview/questionnaire per country is presented in Table 2. The success in finding NPS users in nightlife settings varied

across the participating countries. Firstly, it was dependent on the role of club owners, festival organisers, party hosts or staff as gate keepers, i.e. whether or not researchers were granted permission to approach visitors and ask them to participate in the survey. A major reason to decline was that venues, clubs in particular, did not wish to be associated with drug use. Conversely, permission was often facilitated in the case of previous or ongoing collaboration with the researchers and/or peer education and prevention or harm-reduction projects. A second factor was temporality. On the one hand, this refers to season, with festivals mostly being organised during the summer, thereby leaving local clubs with less visitors than in other parts of the year. On the other hand, opening hours of clubs can be very late, particularly in a country like Portugal, and, generally, this has a negative impact on visitor willingness to participate in an interview. Thirdly, rates of NPS use among partygoers differ considerably between countries and sometimes between urban nightlife settings within one country.

In Germany, the efforts to recruit respondents in clubs in Frankfurt were of limited success, as most clubs and festival hosts that had been requested, declined to participate, and only one club gave permission to conduct fieldwork, i.e. to interview NPS users in the club and to distribute flyers for the online questionnaire. However, very few current NPS users could be found here. Fieldwork was more successful in Munich and Leipzig, due to collaboration with peer projects that provide information about drugs, drug use and risk reduction in users in clubs, and at festivals and parties. In both cities, trained field assistants managed to find and interview current NPS users at various nightlife locations and distributed flyers to invite NPS users to fill in the online questionnaire.

Finding NPS users in nightlife setting was much more difficult in Hungary and Ireland. In Hungary, during July and August, the Budapest “party scene” largely moves to festivals out of town. Therefore, trained field assistants distributed flyers among local NPS users who were at the festivals and asked them to fill in the online questionnaire. After the summer, club owners in Budapest were kindly asked for permission to approach visitors for participation in the survey. However, most of them refused, as they wanted to avoid to make the impression that there was any drug use in their premises. In the end, three clubs were found where field assistants could interview NPS users and distribute flyers that gave them access to the online questionnaire. In Ireland, recruiting NPS users in nightlife was most difficult. As stated before, the Irish researchers only received ethical approval to advertise the survey inside nightclubs. Unfortunately, all local nightclubs in two major Irish cities (Dublin and Waterford) declined with the reason that they did not wish to associate drug use/drug research with their clubs. Subsequently, the team attempted to recruit Irish nightlife users through Facebook groups and pages that are specific to Irish clubs, house/dance music, DJs, etc.

Conversely, finding NPS users in clubs and at festivals was far less problematic in the Netherlands, Poland and Portugal. In the Netherlands, fieldwork was conducted in and near Amsterdam. Although some clubs or festival organisers did not want to be associated with NPS, gaining access was not a serious obstacle. Researchers and field assistants (trained students, familiar with nightlife scenes where NPS were used) conducted fieldwork in a variety of settings, both clubs and festivals. Sometimes, the fieldwork team was allowed to move around freely at the venue; in other instances, a booth was created where potential respondents could meet the interviewers. In two occasions (a festival and a club), no permission was granted for fieldwork on the premises, and as an alternative, respondents were recruited in the shuttle buses to the festival or in front of the entrance to the club, respectively. Respondents received a small incentive (e.g. water pistols, bubble blowers, or lighters) upon completion of the survey. In all settings, respondents were given the option to fill out the

survey immediately on the spot—on paper with or without assistance of the interviewer—or to fill it out later online. In the latter case, respondents were given a flyer with a unique number. In Poland, fieldwork among nightlife users was conducted in the same cities as where socially marginalised users were recruited. Fieldworkers were “partyworkers”, who had experience in harm-reduction activities during events. Overall, access to the fieldwork settings went quite smooth, as this took place mostly in venues that they regularly visit as harm-reduction professionals. Knowing the staff helped them to enter the venues, contacting NPS users and carrying out face-to-face interviews on-site. In Portugal, the fact that entrance to clubs in a city like Lisbon usually begins around 2:00 AM or 3:00 AM made it more difficult to recruit NPS users for an interview, not in the least because many club visitors have been drinking alcohol in the hours prior to entry. On the other hand, professionals and volunteers working in harm reduction were very helpful to the researchers and field assistants in gaining access to a variety of parties and festivals, in and near Lisbon.

### Online Community Users

NPS users in online communities were recruited by posting messages on drug-related social media and internet forums. They were only given access to the online questionnaire. As for the whole project, messages were posted on two leading international drug forums ([www.bluelight.org](http://www.bluelight.org) and [www.reddit.com](http://www.reddit.com)), with a link to the online survey for all participating countries. At the national level, major factors in gaining access to NPS users in online communities were as follows: availability of internet forums relevant to NPS users and moderator or administrator willingness to accept posts. Similar to the role of club owners and festival organisers in gaining physical access to nightlife communities, moderators and administrators played a crucial role in gaining virtual access to online communities. Overall—and again like with nightlife settings—familiarity or personal contacts with people working at websites and forums appeared to lower the threshold to collaboration. Similarly, positive messages on Facebook or in vlogs/blogs from persons with a high status in their online community could motivate NPS users to participate in the survey.

In Germany, invitations to participate in the online survey were placed on German language drug forums, Facebook, Twitter and a drug policy activist website. Activists from the latter website also used their social media accounts for further invitations. So did the administrator of the most popular German NPS prevention website, who spread the invitations on his website, on Facebook and on a popular drug forum. In addition, the German researchers successfully approached two persons who regularly submit drug-related videos on YouTube: a young “self-experimenter”, whose videos sometimes reach several hundreds of thousand views, mentioned the survey on his Facebook account and his blog; and a psychonaut (YouTube views around 10,000) cited the survey in one of his videos. In Hungary, links to the online questionnaire were placed on two Hungarian language platforms; firstly, a platform of well-educated, experienced substance users who rigorously share information about drugs and drug use and, some weeks later, also a platform of people sharing an interest in drug policy-related issues. Parallel to the inclusion of the second platform, the message was repeated on the first platform. Both platform moderators eagerly assisted in motivating NPS users to participate in the survey. In Ireland, apart from the two international drug forums mentioned previously, attempts to get permission to post the online survey on Irish drug user forums or to join Irish NPS groups on Facebook returned no results. Subsequently, a member of the Irish research team posted information and a link to the survey on her personal Facebook page daily, and this

was regularly shared by friends also. In the Netherlands, the online survey was distributed through five Dutch language drug user forums. Only forums where users actively participated in discussions about the use of drugs were selected. Forums where only cannabis cultivation was discussed and forums with no more than a few hundred users or no recent discussion were not selected. All selected forums approved access, and, sometimes, the moderator would participate in discussions about the surveys. After posting messages, the forums were visited regularly by the Dutch research team to follow and engage in discussions and to answer any questions that discussants would have. Especially the post on the very active forum of the internet community related to a national TV programme about young people, lifestyle and drug use, combined with messages regarding the survey on their Facebook page, generated much response. In Poland, two out of the four national web forums that were contacted approved to post information about the study and a link to the online survey in Polish language. These were the biggest Polish drug users' forum covering the vast spectrum of psychoactive substances, including NPS, and the biggest Polish forum dedicated to cannabis use and advocacy, covering issues of both natural and synthetic cannabinoids. However, the other two forums, that were smaller and more specifically NPS-oriented, did not respond to the request. On the other hand, all three social media "fan sites" on Facebook that were contacted responded positively and posted the information about the study and a link to the online questionnaire. These "fan sites" were related to groups either advocating decriminalization of drug use or supporting and delivering harm-reduction services. Finally, in Portugal, the researchers approached two Portuguese language Facebook platforms where users frequently discuss NPS and other drug-related issues, one from a harm-reduction project and the other run by users and critical scholars. The latter also has a website. Both platforms posted information about the study and a link to the online survey in Portuguese language. Likewise, a Portuguese online lifestyle and entertainment magazine was supportive in communicating the survey. However, a Portuguese website from a leading online smartshop declined to collaborate.

## Response and Data Analysis

A total of 3503 respondents were recruited in the data collection phase. Among those, 260 (7.4%) were excluded for not meeting the eligibility criteria; 253 were not a resident of either of the six participating countries (mainly respondents that had entered the survey through the international internet forums used in the online community fieldwork) and seven were minors (15–17 years). Of the remaining 3243 respondents, 212 (6.5%) were excluded because they had not used any NPS in the past 12 months. They either reported names of non-NPS substances when asked which NPS they had used in the past year, or—which was more often the case (189 out of 212)—reported that their last NPS use was more than 12 months ago. The eligibility criterion of last 12-month NPS use was clearly communicated during recruitment and also checked at the very beginning of the questionnaire. This general question of last 12-month NPS use was answered in the affirmative by these respondents, but when asked about specific categories of NPS later in the questionnaire, their answers were negative. This reflects the general issue encountered during fieldwork that the concept of NPS is not always clear at the consumer level. Lastly, eight respondents were excluded because of questionable validity, based on their irrelevant, incoherent or angry comments on open-ended questions.

The final sample consisted of 3023 recent NPS users, among which the online community sample was the largest (2110) and the marginalised sample the smallest (266). For reasons

described in the “[Data Collection: Questionnaire, Fieldwork and Interviews](#)” section, the subsamples of marginalised users from the Netherlands and Portugal, and nightlife users from Ireland were very small (Table 3).

All data were imported in and analysed with SPSS (version 22). Continuous variables (age) were analysed using ANOVA, and categorical or nominal variables were analysed with Chi<sup>2</sup> tests. A significance level of 0.05 was used for all analysis, and only significant results have been reported.

## Findings

In this section, in order to determine the extent to which different methods reach similar or dissimilar segments of the population of NPS users, we first present a general profile of respondents of the three samples and, then, give an overview of their NPS use. Next, to assess the most common settings where NPS users can be found, we describe where respondents procure and use NPS.

### General Profile of NPS Users

As shown in Table 4, there were no gender differences between the samples. In all three samples, more than three thirds of the respondents were male. However, the samples differed in age, employment status, level of education, residence and living arrangements. Socially marginalised were oldest ( $M = 33.5$  yrs.), over half had not completed any education after primary school, about three quarters were unemployed and/or on social benefits, a vast majority lived in a large town (85.8%) and over one third was homeless or in residential care. On average, the nightlife sample was eight years younger ( $M = 25.7$  yrs.), a vast majority had completed secondary school or college/university, was employed or student, and more than two thirds lived in a large town, mostly in their own home or a rented apartment/room. The online community sample was the youngest ( $M = 23.6$  yrs.), a vast majority had completed secondary school or college/university, a sizeable part was student (43.7%), and lived in small towns (41.2%), and with their parents/family (44.1%).

In terms of drug use history, among the marginalised sample, almost three quarters had ever used drugs intravenously, compared to very low percentages of the nightlife sample and the online community sample. Also, lifetime prevalence of heroin and/or other unprescribed opioids, crack cocaine and methamphetamine (43.9–61.2%) was much higher than among the nightlife sample (10.8–24.1%) and the online community sample (6.4–13.7%).

**Table 3** Final sample, by type of sample and country

Sample	Marginalised	Night life	Online	Total
Germany	23	98	542	663
Hungary	101	15	156	272
Ireland	48	3	11	62
The Netherlands	1	189	1000	1190
Poland	86	172	338	596
Portugal	7	170	63	240
Total	266	647	2110	3023

**Table 4** Socio-demographic characteristics and drug use history

	Marginalised (%) <i>n</i> = 266	Nightlife (%) <i>n</i> = 647	Online (%) <i>n</i> = 2.110	<i>p</i>
Gender				
Male	71.7	67.9	68.0	0.457
Female	28.3	21.1	32.0	
Age				
18–24 years	17.4	50.1	70.3	0.000
25–34 years	36.7	41.7	23.7	
35–44 years	35.9	7.6	5.1	
45 years and older	10.0	0.6	1.0	
Average (sd)	33.5 (8.7)	25.7 (5.9)	23.6 (5.8)	
Residence				
Small town (pop. < 50,000)	6.1	17.3	41.2	0.000
Medium town (pop. = 50,000–100,000)	8.1	14.0	17.0	
Large town (pop. > 100,000)	85.8	68.6	41.8	
Living arrangements				
Own home	6.9	20.8	14.5	0.000
Rented apartment or room	14.6	47.1	39.6	
Parents/family	16.5	27.6	44.1	
Friend's home	9.6	3.4	1.1	
Residential care	7.7	0.6	0.2	
Homeless accommodation/hostel	32.3	0.3	0.2	
Other	12.3	0.2	0.4	
Level of education				
None	7.7	0.3	0.6	0.000
Primary school	47.5	16.9	12.8	
Secondary school	37.9	45.2	56.2	
College/university	5.7	37.3	28.5	
Doctor's degree, PhD, etc.	1.1	0.3	1.9	
Employment				
Student	3.1	28.6	43.7	0.000
Full-time worker	3.5	39.0	30.6	
Part-time or casual worker	9.4	12.0	11.7	
Self-employed	5.9	9.3	5.4	
Unemployed/benefits	75.7	10.8	8.1	
Other	2.4	0.3	0.5	
Drug use history (lifetime)				
Intravenous drug use	74.4	3.6	4.9	0.000
Heroin/unprescribed opioids	61.2	10.8	13.7	
Crack cocaine	43.9	13.9	6.4	
Methamphetamines	56.7	24.1	14.3	

### Last Year Use of NPS

For each category of NPS that respondents reported to have used in the last 12 months, they were asked to name up to three NPS within that category. However, as the analysis revealed, names of NPS were not always entered under their proper categories. Wherever applicable, data were corrected. Because synthetic cannabinoids are sold pure under their chemical name, but under the same name, also sold as a brand of herbal blends, they were merged into “herbal blends and/or pure synthetic cannabinoids”. Likewise, pure stimulants are sold as bath salts under their chemical name. Therefore, they were merged as “branded and/or pure stimulants”. As shown in Fig. 1, within all samples in this study, branded and/or pure stimulants were used last year by most, albeit that prevalence was higher in the marginalised and online community

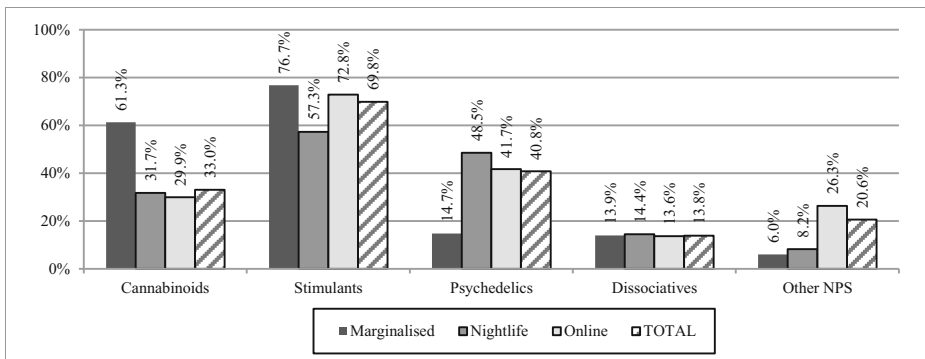


Fig. 1 Last 12-month use of NPS among marginalised, by group

sample than in the nightlife sample. Psychedelic NPS ranked second, and herbal blends and/or synthetic cannabinoids third. Prevalence of psychedelic NPS use was higher among nightlife and online community users than among marginalised users. Conversely, marginalised users differed from nightlife and online community users by a higher last year prevalence of herbal blend and/or synthetic cannabinoid use. However, the three samples did not differ in last year use of dissociative NPS.

Of note is that results showed similarities and differences between countries regardless of sample composition. The German and Dutch samples, for instance, both largely consisted of online community NPS users (81.7 and 84.0%, respectively); yet, last year prevalence of herbal blends and/or synthetic cannabinoids was four times higher in Germany (42.2%) compared to the Netherlands (9.9%). Likewise, while the Portuguese sample mainly consisted of nightlife users (70.8%) and the Irish sample of marginalised users (77.4%), both countries showed very similar last year prevalence of herbal blends and/or synthetic cannabinoids (27.4 and 27.1%, respectively). In comparison, as shown in Fig. 2, last year prevalence was highest for herbal blends and/or synthetic cannabinoids in Hungary, for stimulants in the Netherlands, for psychedelics in Portugal and for dissociatives and other NPS in Germany. Within the countries, in Germany and Portugal, last year prevalence was highest for psychedelics, in Hungary for herbal blends and/or synthetic cannabinoids and stimulants and in Ireland, the Netherlands and Poland for stimulants. In five of the six countries, last year prevalence was lowest for dissociatives.

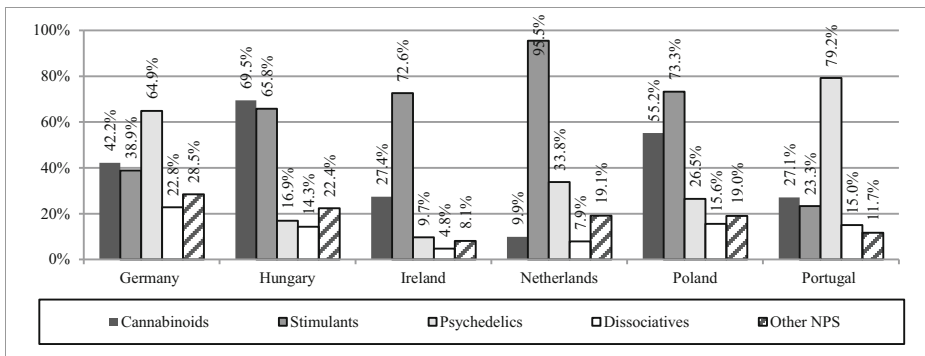


Fig. 2 Last 12-month use of NPS, by country



## Setting of Use

Respondents use NPS in a variety of settings (Table 5). Close to two thirds of the marginalised users reported a public space versus approximately one quarter of the nightlife and online community sample. In the case of marginalised users, this commonly referred to use in the street, in a car, on the stairways of an apartment building, etc., and in the nightlife and online community sample, to a recreational area (e.g. park, forest, and beach). Both the nightlife and the online community sample most frequently reported a nightlife setting. All three samples relatively often (also) reported their own home or a friend's home as setting of NPS use.

## Discussion

A targeted sample of 3023 last year NPS users participated in a survey that was conducted in three groups (socially marginalised users, nightlife users, and online community users) and six European countries. Key findings centre on the particular trends visible in NPS use across countries and the three identified NPS user groups.

A first limitation was the ambiguity of the concept of NPS. Consequently, a major practical challenge was to find an adequate definition of NPS. A common difficulty was that users are not familiar with the concept of NPS. Instead, they use terms like “legal highs”. However, this term is misleading, as substances that are marketed as such can be illegal in one or more European countries, if not all across the EU. Therefore, in approaching and interviewing NPS users, various names of NPS were mentioned, accompanied by examples of different types of NPS and street argot. Nonetheless, a careful data cleaning process resulted in the exclusion of 6.5% of the initially eligible respondents from the final sample. They had answered in the affirmative to the general question of last 12-month NPS use, but when asked in more detail, their last NPS use appeared to be longer ago or they reported names of non-NPS substances they had used in the past year. Given these findings, it is not unlikely that in general NPS use is over-reported in prevalence studies, for example school surveys or the Eurobarometer survey.

Other limitations of the data centre on the varied composition of country samples, cross-country differences in efforts to find users in certain groups and different levels of availability of resources promoting the survey in different countries. The number of respondents in the survey varied between countries as well as between the three groups. Of the total sample, marginalised users constituted the smallest group ( $n = 266$ ; 8.8%). This is probably not very

**Table 5** Setting of NPS use

	Marginalised (%) <i>n</i> = 266	Nightlife (%) <i>n</i> = 647	Online (%) <i>n</i> = 2.110	<i>p</i>
Setting of use (multiple answers)				
Own home	39.8	44.0	49.2	0.003
Friend's home	30.5	52.2	46.1	0.000
Nightlife	16.9	83.3	71.2	0.000
Work or school	7.1	8.3	7.5	0.734
Street, park, etc.	64.3	28.6	22.4	0.000
User rooms/low-threshold services	6.4	0.6	0.6	0.000
Residential care/hostel	10.5	1.5	1.0	0.000
Other (e.g. in a car or public toilet)	5.6	1.1	1.8	0.000



surprising, as they represent a small proportion of the total drug-using population. Harm-reduction, outreach and treatment services played an important role in gaining access to this group. However, only very few marginalised NPS users were found in the Netherlands and Portugal. According to drug services in the latter countries, NPS use in this group is very rare, which is also the case for most German urban scenes of marginalised drug users, with Munich as an exception. The nightlife sample was larger ( $n = 647$ ; 21.4%). The success in finding NPS users in nightlife settings (clubs, raves, festivals) varied across the participating countries and—in addition to varying NPS prevalence rates in such settings—was largely dependent on the role of gate keepers, i.e. whether or not interviewers were allowed to contact visitors. Permission was often facilitated in the case of previous or ongoing collaboration, while a major reason to decline was that venues did not wish to be associated with drug use. Recruiting nightlife users was extremely difficult in Ireland, as the researchers were not granted ethical approval to approach visitors, neither inside nor on the street outside nightclubs. Online community users constituted the largest sample ( $n = 2110$ ; 69.8%). These NPS users were recruited by posting messages on drug-related social media and internet forums referring to the online version of the questionnaire. Major factors in gaining access to this group of NPS users were availability of internet forums relevant to NPS users and moderator or administrator willingness to accept posts. Researcher familiarity and personal contacts with people working at websites and forums appeared to lower the threshold to collaboration, and positive messages on Facebook or in vlogs/blogs from persons with a high status in their online community stimulated users to participate.

Estimating general population prevalence rates of NPS was beyond the scope of our study. Relative to controlled drugs, the use of NPS is less widespread, also within drug-using groups. Unachievable numbers of respondents, even in subpopulations such as young adults, would have had to be recruited for reliable measurement and to obtain a large enough sample of users to be able to study use and user characteristics. The survey was therefore restricted to *recent* (last 12 months) users of NPS. As a consequence, the prevalence of different categories of NPS found in this study cannot be extrapolated to the broader populations of marginalised people, nightlife visitors or members of drug-related internet forums. Results do indicate, however, the relative proportion of users of specific categories of NPS, and similarities and differences therein between marginalised, nightlife and online community users and between countries.

In the total sample, last year prevalence was by far highest for stimulant NPS, followed by psychedelic NPS and herbal blends and/or synthetic cannabinoids, while it was lowest for dissociative NPS. These findings are partly in line with the number of seizures in the EU, with synthetic cathinones and synthetic cannabinoids accounting for over 60% of all NPS seizures in 2015 (EMCDDA 2017a). However, last year use of psychedelic NPS was much higher than seizures suggest (only 6% of seizures referred to phenethylamines, which in our study were classified as stimulant or psychedelic NPS, and 1% to tryptamines). Last year prevalence of stimulant NPS was highest in all three groups. In comparison, use of psychedelic NPS use was higher among nightlife and online community users than among marginalised users. Conversely, last year prevalence use of herbal blends and/or synthetic cannabinoids was higher in the marginalised sample. The three samples did not differ in last year use of dissociative NPS.

Prevalence rates also varied across countries. It could be argued that this is due to the fact that country comparisons are heavily biased by varying group composition. However, in our study, similarities and differences between countries were regardless of sample composition per country. For example, last year prevalence of herbal blends and/or synthetic cannabinoids was much lower in the Netherlands than in all other countries, irrespective of whether the

national sample consisted of relatively many marginalised, nightlife or online community users. This suggests cross-national differences in preference for certain types of NPS and/or in availability. These differences may be related to national drug policies, for example, relatively easy access to cannabis through coffeeshops in the Netherlands (Van Ooyen-Houben and Kleemans 2016; Wouters et al. 2010). To which extent and how differences in drug policies could explain cross-national variation in NPS prevalence rates is a challenging question for future research.

In the survey, questionnaires were available in two versions, printed (pen-and-paper) and online. Marginalised users and users in nightlife could choose either one; users in online communities were offered online access to the survey only. Marginalised users most commonly preferred interviewer-administered pen-and-paper questionnaires. In terms of their demographic profile, marginalised NPS users differed most from the online community sample, while in various aspects, the nightlife sample took an intermediate position. The marginalised users were oldest, lowest educated, and many of them were unemployed and/or on social benefits, and did not have stable living arrangements. In contrast, a vast majority of the nightlife and online community samples had completed secondary school or college/university, was student or employed, and homelessness was very rare. The online community sample was the youngest and close to half lived with their parents/family (versus around one quarter in the nightlife sample). In terms of drug use history, a majority of the marginalised sample had ever used drugs intravenously, compared to only a few percent of the other samples. Also, lifetime prevalence of heroin, crack cocaine and methamphetamine was much higher in the marginalised sample. The most common characteristic was that male respondents outnumbered females. In all three samples, over two thirds were male, i.e. a gender ratio similar to last year use of cannabis and MDMA among young people in Europe (EMCDDA 2017b).

Partly related to differences in recruitment strategy, the three samples differed with regard to place of residence. Marginalised users were most likely to reside in large towns/cities. This reflects the fact that these users were commonly recruited through urban services but probably also indicates that marginalised users are concentrated in urban areas. In contrast, the online community sample was most likely to live in small towns, although an equal part of them lived in large towns. This can be explained by the fact that this sample was recruited in a virtual community and not in physical settings. Once again, the nightlife sample took an intermediate position. The majority lived in large towns, and that is where the nightlife sample was largely recruited. However, urban clubs and festivals appear to also attract visitors from medium and small towns. The three groups also differed in where they use NPS. All three samples relatively often (also) reported their own home or a friend's home as setting of NPS use. However, there were also significant differences between the groups. Marginalised users most often mentioned public spaces (e.g. in the streets), and the other two samples most frequently nightlife settings.

## Conclusion

Among the most important practical issues was the fact that for many users “NPS” is not a common term. In surveys, “NPS” needs to be clearly explained to respondents—and this may vary between groups of users and across countries. In terms of demographic profile, drug use history and type of NPS, different sampling methods reach different groups of NPS users. However, there is also some overlap between groups, for example in where they use NPS. This study suggests that prevalence rates of different NPS reported in user surveys can reveal a picture of the NPS market that significantly deviates from what law enforcement seizures

indicate. To find NPS users for research, a multi-method approach and various recruitment strategies (online and offline) are warranted. The emergence of NPS poses new challenges to prevention, care and law enforcement. Country-specific initiatives in response to user trends should include regular training of health professionals and targeted drug service responses to reduce incurred harms. Outreach in nightlife settings and peer education are recommended to inform users about health risks and to improve access to drug services and care.

## Compliance with Ethical Standards

**Disclosure of Interest** Dirk Korf, Annemieke Benschop, Bernd Wese, Gerrit Kamphausen, Katalin Felvinczi, Katarzyna Dabrowska, Susana Henriques, Ton Nabben, Lukasz Wieczorek, Michael Bujalski, Zsuzsa Kalo, Evelyn Heame and Marie Claire Van Hout declare that they have no conflict of interest.

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