NEW PSYCHOACTIVE SUBSTANCES:

Challenges for Law Enforcement Agencies and the Law

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Cover Photo Credit: A table full of fentanyl and other designer drugs seized by U.S. Customs and Border Patrol sit on display at the International Mail Facility in Chicago, Illinois, November 28, 2017, as Illinois Gov. Bruce Rauner is given a tour of CBP operations.
U.S. Customs and Border Protection photo by Kris Grogan.

"New Psychoactive Substances: Challenges for Law Enforcement Agencies and the Law"

By Kalliroi Ziavrou

Introduction

New psychoactive substances (NPS) present a new global phenomenon in the drug market. This phenomenon is characterized by the emergence of a significant number of new substances every year that are not controlled under international drug control conventions, which means that their trafficking is legal. These substances mimic traditional illicit drugs and may cause severe adverse health effects.[1]

Over the last few years, the unprecedented rate of NPS proliferation has resulted in significant risk to public health; the numbers of people who become sick or addicted, as well as the number of fatalities, are consistently growing at an alarming pace. With the aid of the internet, new psychoactive substances are spreading at such a rapid rate that law enforcement agencies cannot respond quickly enough when it comes to identifying and regulating these substances.

Law enforcement and healthcare professionals are becoming more and more concerned as they struggle with how to react to these new risks. Furthermore, legislation is proving inadequate to monitor and control the situation, allowing NPS proliferation to outpace healthcare and justice systems worldwide. This lack of legal controls has provided organized crime networks the opportunity and the leeway to increase their presence in this market and generate millions of dollars in profit for their organizations. The negative societal and economic impacts of NPS on the global community are significant and the challenge to law enforcement, the judiciary, and policymakers is unprecedented.

To date, there have been few legislative efforts nationally, regionally, or internationally to control the widespread problem of NPS. Why has it proved so difficult to control the NPS market? What should be done to contain and regulate NPS proliferation? Locating a solution to the global NPS dilemma will require all those involved, from local communities to nations, to join together and generate innovative responses, including updating currently ineffective drug policies, rewriting out-of-date legislation, and collaborating in the field for a common objective. Failure to engage in a worldwide effort will only exacerbate an already dangerous situation, as criminal groups continue to take advantage of economic globalization, cutting-edge technology, and innovation to firmly entrench themselves within the NPS market.

This paper will address the NPS phenomenon, presenting why the issue is generating increased interest worldwide and how it has provoked new challenges for law enforcement agencies (LEA) and policymakers. Beginning with a presentation of the current NPS crisis, this paper will demonstrate how illicit networks have managed to flood the drug market with NPS and examine the emerging issues for the involved communities and countries, legislative and

[1] UNODC, "Market Analysis of Synthetic Drugs: Amphetamine-type Stimulants, New Psychoactive Substances," *World Drug Report 2017, Booklet 4*, 27.

judicial communities, and populations worldwide. Finally, it will discuss current governmental responses and containment measures and offer suggestions on how to counter the challenge using a holistic approach.

The NPS Phenomenon

New Psychoactive Substances fall outside the global drug control system and are defined as "Narcotic or psychotropic drugs that are not scheduled under the United Nations 1961 or 1971 Conventions, but which may pose a threat similar to illicit drugs that are listed in these Conventions." [2] In the literature and on the market, NPS are also referred to as research chemicals, analogues, legal highs, herbal highs, bath salts, synthetic drugs, or novel psychoactive substances. The preferred term, as adopted by the European Community in 2005, is new psychoactive substances. [3] Here, "the term 'new' does not necessarily refer to new inventions but to substances that have recently become available."[4] The labels "synthetic drugs" and "legal highs" are often used to deliberately mislead consumers into believing that these are traditional illicit synthetic drugs (e.g. LSD or MDMA) or legal substances.[5]

The United Nations Office on Drugs and Crime (UNODC) classifies NPS in eight categories, plus one as "Other Substances," according to "[s]imilarity in chemical structure (for example phenethylamines, tryptamines) and/or by their major pharmacological effects (for example cannabinoid receptor agonists)."[6] The UNODC classification accounts for the facts that "similarity in chemical structure does not always reflect identical pharmacological effects and a known pharmacological effect can be produced by NPS of dissimilar chemical structure."[7] The Other Substance category "covers substances of poorly understood pharmacological effects and/or miscellaneous chemical structures."[8]

According to the UNODC Early Warning Advisory on NPS, "Up to December 2017, more than 800 substances have been reported to the UNODC."[9] The 2017 World Drug Report stated, "From 2009 and 2016, 106 countries and territories reported the emergence of . . . 739 different NPS . . ." and "in 2015, 100 NPS were reported globally for the first time, a two-thirds increase on the 66 NPS reported for the first time in 2014."[10] Within this increase "there is a core group of over 80 NPS that show resilience in the global market, having been reported every year from 2009-2015," while "60 NPS left the market after 2013."[11] The enduring substances that have shown resilience in the global market include: "synthetic cannabinoids of the JWH series,

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[2] Ibid.
[3] Council Decision 2005/387/JHA (10 May 2005 on the Information Exchange, Risk-Assessment and Control of New Psychoactive Substances), *Official Journal of the European Union,* (2005), L127/32: Article 3 (b) & (c).
[4] UNODC, "The Challenge of New Psychoactive Substances," Global SMART Programme Report (2013), iv.
[5] Rachael Sutherland and Monica Barrat, eds., "New (and Emerging) Psychoactive Substances," *NDARC Fact Sheet* (University of New South Wales, National Drug and Alcohol Research Centre, 2016) 1. https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/NDA073%20New%20Psychoactive%20Substances%20%28NPS%29.pdf.
[6] UNODC, "Market Analysis of Synthetic Drugs," 28. See also Appendix.
[7] Ibid.
[8] Ibid.
[9] "What are NPS?" UNODC Early Warning Advisory on New Psychoactive Substances. https://www.unodc.org/LSS/Page/NPS.
[10] UNODC, "Market Analysis of Synthetic Drugs."
[11] Ibid, 28, 29.

mephedrone and derivatives, several amphetamine analogues and piperazines, as well as a number of tryptamines and 2C-B analogues."[12] According to the 2017 World Drug Report, "[s]ynthetic cannabinoids constitute the largest category in terms of the number of different substances reported, followed by synthetic cathinones and phenethylamines."[13]

To fully appreciate the current situation, it is crucial to understand that "[d]espite the large number of NPS present in drug markets, the overall size of the market for such substances is relatively small when compared to illicit drug markets."[14] While over twenty tons of NPS were seized in 2015, amphetamine-type stimulants (ATS) seizures doubled between 1999 and 2014, with 191 tons of ATS seized in 2015.[15] However, the unprecedented rate of NPS proliferation has resulted in a significant risk to society and has created a new phenomenon in the drug market. Social factors are increasingly seen as driving forces in the rapid expansion of NPS usage throughout the world. Data collection indicates recreation, consumerism, and the "growing medicalization of society" impact NPS use considerably.[16] Very often NPS users are reported to be motivated by simple curiosity and boredom.[17]

Not only is the rising use of NPS outpacing current drug control measures around the globe, but continual development of NPS leaves drug enforcement and legislation struggling to keep up. The NPS phenomenon is characterized mainly by the continued emergence of new substances that are not legally controlled by international drug control conventions. There have been numerous

[12] Ibid, 28-29.
[13] Ibid, 29.
[14] Ibid, 10.
[15] Ibid, 9.
[16] S.D. Brandt, L.A. King, and M. Evans-Brown, "The new drug phenomenon," *Drug Testing and Analysis 6,* no. 7- 8 (July-August 2014): 594, doi: 10.1002/dta.1686.
[17] UNODC, "Market Analysis of Synthetic Drugs," 32.

attempts in the past to outwit drug laws via the production of derivatives or analogues that are not controlled under international conventions. Presently, what is new is the complexity, scale, and accessibility of the NPS market compared to past decades, and this market responds very quickly to legislative changes. The UNODC Commission on Narcotic Drugs points out, "NPS under national control [are] being replaced rapidly by new uncontrolled substances [and] [s]ubstances under national control in one country [resurface] in countries with weaker legal frameworks . . . or on the Internet . . ."[18]

New psychoactive substances are designed to mimic the effect of traditional illicit drugs and may pose a significant public health threat.[19] They are used for reasons similar to those for traditional drugs or as a substitute of the drug of preference when the latter is not available on the market. Unfortunately, most of the time, "users are unaware of the content and the dosage of the substances contained in some NPS."[20] Neither do they know the pharmacological effects of the substances they are buying. The number of people searching for hospital treatment is expected to grow and a public health crisis generated by NPS cannot be ruled out.

The use of NPS could result in adverse health effects, serious injuries (sometimes through road traffic accidents, or violent behavior), as well as suicide and other fatalities. [21] There have been reports citing correlations between NPS use and an increase in the spread of disease, including HIV, and hepatitis C, and outbreaks of mass poisonings.[22] Unfortunately, health care personnel are often unaware of new trends and new substances on the market. Almost nothing is known about their harmful properties or their long-term effects or how to counteract them.[23] Most of the new substances have few published complications and interactions.[24] "What little we do know comes from occasional work in animal toxicology, fatal poisonings in humans, and clinical observations of intoxicated patients."[25] The situation is further complicated as users are often unaware of the content or the dosage of the substance they have used and typically exhibit a preference to polyabuse.[26] This constitutes a major public health risk due to synergistic effects which are unpredictable and often fatal.

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[18] LSS/RAB/DPA/UNODC, "New Psychoactive Substances: Overview of Trends, Challenges and Legal Approaches," Commission on Narcotic Drugs, E/CN.7/2016/CRP.2, 6-7.

[19] UNODC, "Market Analysis of Synthetic Drugs," 27.

[20] Ibid, 10.

[21] C.D. Smith, M. Williams, and M. Shaikh, "Novel Psychoactive Substances: a Novel Clinical Challenge," *BMJ Case Rep*. (August 2013): 1, doi: 10.1136/bcr-2013-200663. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3762549/pdf/bcr-2013-200663.pdf.

[22] M. Evans-Brown, and R. Sedefov, "New Psychoactive Substances: Driving Greater Complexity into the Drug Problem," *Addiction* 112, no. 1 (January 2017): 37, doi: 10.1111/add.13528.

[23] UNODC, "Market Analysis of Synthetic Drugs," 10.

[24] C.D. Smith, and S. Robert, "'Designer Drugs': Update on the Management of Novel Psychoactive Substance Misuse in the Acute Care Setting," *Clinical Medicine* 14, no. 4 (2014): 410, http://www.clinmed.rcpjournal.org/content/14/4/409.full.pdf+html. .

[25] L.A. King, and A.T. Kickman, "A Brief History of 'New Psychoactive Substances,'" *Drug Testing and Analysis* 3, no. 7-8 (July-August 2011): 403, https://doi.org/10.1002/dta.319.

[26] Giovanni Martinotti, Matteo Lupi, Leonardo Carlucci, Eduardo Cinosi, Rita Santacroce, Tiziano Acciavatti, Eleonora Chillemi, Ludovica Bonifaci, Luigi Janiri, and Massimo Di Giannantonio "Novel Psychoactive Substances: Use and Knowledge among Adolescents and Young Adults in Urban and Rural Areas," *Human Psychopharmacology Clinical and Experimental* 30, no. 4 (July 2015): 299, https://doi.org/10.1002/hup.2486.

Dissemination Techniques and Organized Crime Groups

The NPS phenomenon is spreading rapidly due to globalization and technology, with the internet playing a vital role in increasing the number of NPS available and extending NPS distribution. The easy access and enhanced profitability of this growing drug market makes it increasingly attractive both to consumers and organized crime. Dissemination of drugs in the internet age differs from the drug chain model of the past which connected laboratories and end-consumers. Globalization and technology contribute hand-in-hand to NPS proliferation, linking vital substance-production knowledge and easy avenues for market distribution. In a 2016 analysis, The European Monitoring Centre for Drugs and Drug Addiction warned, "The combination of globalization and innovation in communications technologies means that substances have been developed, produced and marketed internationally at great speed, and sold openly in specialized shops in towns and cities, as well as via the internet."[27]

The primary countries from which NPS originate are considered to be China and India.[28] Production takes place either in illegal laboratories or in legal facilities owned by companies that openly produce substances which are not regulated. These companies manufacture "new" chemical substances or modify existing drug compounds and then easily deliver the products to various destinations either for further processing or for immediate sale. These substances are frequently advertised as harmless or even legal, creating a false appearance of legitimacy for the product. For this reason, suppliers call them "food supplements," "research chemicals," or "legal highs." Moreover, most of the time fancy logos and colors are used as an aggressive method of marketing to attract young people. A 2015 study analyzing NPS use among teens and young adults found, "Potential consumers, including vulnerable individuals as children/adolescents and psychiatric patients, are targeted online by aggressive marketing strategies (attractive names, colorful packaging, free samples to test)."[29]

New psychoactive substances are available under their own name, under false names (e.g. as ecstasy, heroin, or cocaine), or even could be sold as mixtures with controlled drugs or other NPS. These products are being sold inexpensively and openly on the street, in shops, on the illicit drug market, or through the internet. Web-based distribution also provides a nimbleness to the illicit drug trade. When a substance becomes controlled in one country, suppliers are able to switch immediately to a new uncontrolled NPS or simply relocate business to another country.

In 2013, UNODC recognized the foothold the internet has secured for distributors, noting "[t]he significant informational, promotional and distributional capacity of the Internet plays an important role in the NPS market and global web-based marketing and distribution distinct from illegal street markets has developed . . ." [30] Online sales have become a low-risk, easily manipulated distribution tool that offers both the user and the supplier a high degree of flexibility and anonymity. UNODC also notes, "Drug users can obtain information through online forums, chat rooms and blogs and find out about new products."[31]

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[27] European Monitoring Centre for Drugs and Drug Addiction and Eurojust, *New Psychoactive Substances in Europe: Legislation and Prosecution – Current Challenges and Solutions* (Luxenberg: Publications Office of the European Union, 2016): 9, http://www.emcdda.europa.eu/publications/joint-publications/eurojust/nps-legislation-and-prosecution_en.

[28] LSS/RAB/DPA/UNODC, "New Psychoactive Substances,"12.

[29] Martinotti, *et al*., "Novel Psychoactive Substances," 296.

[30] UNODC, "The Challenge of New Psychoactive Substances," 53.

[31] Ibid.

Organized crime groups (OCG) find the NPS market highly attractive from both a manufacturer and sales perspective. It is expected the involvement of these groups will increase in scale and number as the NPS market offers increasingly high rewards. Identification of such groups hiding behind the NPS market is difficult for law enforcement agencies, as manufacturing and trafficking of NPS is a complex system that stretches across countries worldwide. As early as 2014, the United Nations Commission on Narcotic Drugs ascertained, "Internet websites participating in the trade/traffic of NPS may be based in countries different from those where NPS are manufactured and/or supplied to, and the disparity of laws . . . makes it very challenging to find a common approach . . . A further complication is the sale of . . . NPS on the 'darknet' which can be accessed only with anonymizing software."[32] Profit is the main reason OCG are involved in the NPS market, and unfortunately, relegation of an NPS to the controlled substance list frequently makes that drug even more attractive to the organized criminal groups.[33] It is simple supply and demand; when supply decreases and demand remains stable or rises, profits increase substantially. Ultimately, profit is the primary objective for organized crime and the current NPS market is easy money.

All the above have formed an evolving phenomenon which presents new challenges to society and the architects of international health and security. Some of these challenges are shown in the following sections.

Challenges for Law Enforcement Agencies (LEA)

Today, NPS are spread swiftly via the internet at a pace which is difficult for law enforcement agencies (LEA) to quickly identify and regulate substances. This fluidity interrupts the very first investigative step: determining a suspicion of drug abuse. The overarching challenge facing LEA is a limited knowledge of NPS. New psychoactive substances could be characterized as a complicated subject, which changes rapidly, with a lot of scientific details that could easily confuse all professionals involved.

Moreover, public awareness efforts that could provide basic knowledge about NPS are limited or non-existent. A 2016 UNODC study on NPS trends admits, "While some Member States have undertaken efforts to raise awareness…, awareness-raising campaigns have not been conducted on a systematic basis; this means awareness-raising does not exist in many countries or is lacking in entire regions."[34] As a result, law enforcement authorities often turn to the internet as a primary source of information on every aspect of NPS, from chemical composition and manufacturer locale to distribution methodology and end-user demographics. [35]

A major challenge in the disruption of NPS smuggling lies in the identification of manufacturing sites, processing sites and the websites used for trafficking. All of these sites for just one specific NPS may be based in different countries around the world, making tracking suppliers and the criminal groups that profit from NPS a very difficult and complex task. This task is

[32] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 7.
[33] A. Winstock, and C. Wilkins, "'Legal Highs': The Challenge of New Psychoactive Substances," TNI/IDPC Transnational Institute Series on Legislative Reform of Drug Policies, no. 16 (October 2011): 12, https://www.tni.org/files/download/dlr16.pdf.
[34] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 13.
[35] UNODC, "The Challenge of New Psychoactive Substances," 53.

further complicated as laws and prosecutorial standards vary across countries, with little or no international consensus or cooperative approach.[36] Additionally, suppliers often bypass national laws either by offering newer uncontrolled NPS to users or by merely switching their operations to countries with less onerous legislative policies and fewer legal standards. [37]

Identification and seizure of NPS in police operations is another major challenge in combating the spread of NPS. LEA could encounter chemicals in many forms, i.e., liquids, pills, powders, or plants that could not be recognized as NPS or NPS precursors due to lack of knowledge. Identification and seizure of NPS at the borders is another crucial step in winning the war on smuggling. According to a UNODC Questionnaire on NPS, "The mode of trafficking named by most respondents was trafficking by air . . . followed by trafficking by mail . . . without any regional variations."[38] For this reason the Customs Enforcement Network (CEN) of the World Customs Organization has been introduced in an attempt to facilitate NPS-related cross-border operations by gathering and exchanging enforcement-related information.[39]

Finally, when LEA come across a manufacturing or processing site or bulk quantities of chemicals, they should never forget to be cautious about potential hazards. Per *The World Drug Report*, "Canada and the United States have recorded incidents of hospitalization of law-enforcement officers who carried out seizures of [fentanyl and analogues]."[40] The U.S. Drug Enforcement Administration has published safety alerts and procedural protocols are in place in an effort to reduce the risk of harm to LEA worldwide.

[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] LSS/RAB/DPA/UNODC, "New Psychoactive Substances,"12.
[40] UNODC, "Market Analysis of Synthetic Drugs," 48.

Frequently, it is not only the on-location law enforcement who do not identify NPS, but often the law enforcement laboratories cannot detect every new substance that is out there. Identification of NPS is difficult in the field and in the laboratory for both solid samples and biological specimens. The biggest challenge, however, is the identification and quantitation of new psychoactive substances in biological matrices within the forensic laboratory, as it is hard to keep up analytically with the fast pace that these substances are altered, mainly due to the constant absence of reference material required for building methods of analysis.[41] Moreover, impediments to detection and analysis are caused when mixtures of substances are present or the substances are in trace amounts (like synthetic opioids due to their extreme potencies) in the new psychoactive substance consumed by the person whose biological sample is being examined. Laboratories not able to detect these substances in biological specimens of people involved in legal cases or in the general population could lead to complications in legislative efforts and trend reporting, as well as within research and data gathering.[42] Experts warn, "This makes detection of [NPS] extremely challenging in the forensic laboratory and could lead to underreporting of the extent to which they appear on the market."[43] Underreporting impedes international control which relies on detection for the development of measures to combat drug trafficking and abuse.[44]

Another challenge is the evaluation of the role of LEA in regard to police operations and seizures in combating NPS smuggling. According to UNODC's 2017 *World Drug Report*, "The analysis of NPS seizures is limited by the fact that most substances are not under international control and thus may not be seized and reported to UNODC as part of the regular data collection mechanisms."[45] Data from the European Drug Report 2016 states, "In 2014, almost 50,000 seizures of [NPS] . . . were made across Europe . . . [and] [s]ynthetic cannabinoids account for the majority of these, with almost 30,000 seizures . . ."[46] These numbers lead researchers to ask whether "law enforcement is prioritizing synthetic cannabinoids or [do] these substances take a larger share of the NPS market or [is it] a combination of both."[47] Furthermore, recently a large number of NPS have been put under regulatory control, resulting in much concern regarding whether increased legislative responses may inadvertently undermine the effectiveness of LEA.[48] Some argue adding to the number of controlled substances places a heavier burden upon law enforcement professionals and reduces their efficacy.[49] It is certain that in order to ensure the effective implementation of more laws, more funding and human resources are required.[50] This economic impact is an unintended consequence of increased regulation.

At this point, it is necessary to note that some subgroups among NPS users present a particular test to LEA policies and procedure. One such group is military personnel. Synthetic cannabinoids have been reported as a preferred drug among United States service members due to the fact that NPS are not detected in drug screens, are falsely believed to be safe, and are

[41] Ibid.
[42] Ibid, 49.
[43] Ibid.
[44] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 10.
[45] UNODC, "Market Analysis of Synthetic Drugs," 30.
[46] European Monitoring Centre for Drugs and Drug Addiction, *European Drug Report 2016*, 32.
[47] UNODC, "Market Analysis of Synthetic Drugs," 30.
[48] A. Winstock, and C. Wilkins, "'Legal Highs,'" 12.
[49] Ibid.
[50] Ibid.

cheap and easy to buy.[51] A 2012 *Military Medicine* report notes, "Designer drugs are especially popular among those in the military who also abuse other substances."[52] The second subgroup is the incarcerated population. In prisons, NPS use seems to be increasing as these substances are not detected in in-house drug screens or by trained narcotics sniffer dogs. There have been reports associating prison violence with the use of NPS. "In 2015, synthetic cannabinoids were reported to be particularly linked to destabilizing effects in prisons, exacerbating issues of bullying, debt, riots, self-harm, self-inflicted death, serious illnesses and violence amongst prisoners and against staff." per the *World Drug Report*.[53] There is also a measurable increase in adverse health effects and hospitalizations with the use of synthetic cannabinoids by inmates.[54]

Challenges Regarding Legislation

The NPS phenomenon has severely impeded judicial resolution of drug cases, hindering both the assembly of strong prosecutorial cases and the determination of appropriate sentence recommendations. These legal complications impact crime prevention and undermine public trust in rule-of-law. The development and establishment of legislation flexible enough to monitor and determine which substances fall under the NPS control in a timely manner is the primary challenge to a resolution of this juridical problem. At present, "[t]he unprecedented number of NPS and their rate of emergence present a challenge to drug control systems" worldwide.[55]

[51] George Loeffler, Donald Hurst, Ashley Penn, and Kathryn Yung,"Spice, Bath Salts, and the U.S. Military: The Emergence of Synthetic Cannabinoid Receptor Agonist and Cathinones in the U.S. Armed Forces," *Military Medicine* 177, no. 9 (September 2012): 1041.

[52] M. F. Weaver, J. A. Hopper, and E. W. Gunderson, "Designer Drug 2015: Assessment and Management," *Addiction Science & Clinical Practice* 10, no. 8 (March 2015): 2, https://doi.org/10.1186/s13722-015-0024-7.

[53] UNODC, "Market Analysis of Synthetic Drugs," 44.

[54] Ibid.

[55] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 8.

Suppliers often provide disclaimers on product packages, such as "not for human consumption," to skirt legal controls.[56] Regulatory efforts are hampered due to the fact that the chemical structures of the individual substances may not fall under international control or may have been deliberately altered in a way that no longer renders them illicit.[57] In these cases, suppliers are simply selling substances on the open market.

In order for a substance to be placed under control (nationally and/or internationally), a specific time frame to put in place legal measures is required and this "may be a lengthy process that requires evidence-gathering, and scientific review of harms."[58] The lag time is a window of opportunity for manufacturers, allowing them to develop and bring to market alternative substances and further thwart drug control legislation and agencies. Moreover, not all countries have similar laws for NPS control. This means that judicial cooperation is extremely difficult on a transnational level, when the supply of the substance is not a criminal offense in one of the involved countries.[59] According to the European Monitoring Centre for Drugs and Drug Addiction, there are four primary policy challenges:[60]

- Some substances are so new to the field that, at least initially, there is very limited evidence of public health risks—the risks being one of the primary justifications for punitive control measures.
- The process of updating the law can take time; some countries require criminal laws to be agreed by parliament, which may take more than a year. However, the speed with which new drugs appear means that as soon as one new psychoactive substance is identified by the authorities and controlled a replacement is often already on the shelves.
- Entrepreneurs have used the lists in the drug laws simply as exclusions from their potentially vast product range, yet very broad definitions that might control many substances can be so vague that a prosecutor has difficulty proving that distribution was a crime.
- Adding substances to the list obliges law enforcement to test for those substances, but technical and financial resources for the new tests are not always increased accordingly.

Case Studies

This section will introduce facts and responses from some regions and countries regarding NPS proliferation, demonstrating general regional and international responses and identifying specific problems and actions from around the world. Different categories of NPS are distributed in various countries and regions globally. According to the UNODC Commission on Narcotic Drugs, "[T]he largest number of [NPS] are spread across three regions: Asia (Japan), Europe

[56] UNODC, "The Challenge of New Psychoactive Substances," 1.
[57] .Ibid.
[58] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 8.
[59] European Monitoring Centre for Drugs and Drug Addiction and Eurojust, *New Psychoactive Substances in Europe:* 7.
[60] Ibid, 9.

(Finland, Germany, Hungary, Russian Federation, Sweden, Turkey, United Kingdom of Great Britain and Northern Ireland), and North America (Canada and the United States of America)."[61] Currently, not all countries and regions are facing the same problems regarding NPS, and heterogeneity characterizes this phenomenon worldwide. There is also heterogeneity in legislation and responses.

Globally, a wide range of legislative responses have been explored, including generic controls, analogue controls, temporary legislation, specific legislation, import controls and trade restrictions.[62] Generic legislation is based on determining a "set of substances which can be defined in terms of a specific substitution pattern in a core molecule."[63] Some success has been achieved via generic legislation. The advantage of it is the "simultaneous control of large groups of substances without the need to list them individually."[64] However, there are disadvantages, as well, to creation and reliance on generic legislation, as "the definitions of generic legislation have had to be amended or extended to include new classes of synthetic cannabinoids, whose design was not envisaged under the original law."[65] Essentially, whenever the substitution pattern cannot be recognized the generic approach is of limited value.[66] According to the UNODC Early Warning Advisory, nineteen out of fifty-nine countries in Asia, Europe and North America employ generic legislation.[67]

Approaching from a different direction, the USA and several European countries have used analogue legislation and similar approaches.[68] According to analogue control, the substance under inspection must have a "broad chemical and pharmacological similarity to existing controlled substances."[69] Even though generic and analogue approaches have succeeded up to a point, they are insufficient to build a legal framework. Essentially, they prohibit large numbers of compounds "some of which have little or no psychoactive effect and which may potentially have legitimate industrial and research application."[70]

Some countries have introduced the total prohibition or blanket ban of NPS, generating a great deal of debate over the impact of unintended consequences.[71] In a 2011 study for the Transnational Institute, Adam Winstock and Chris Wilkins break down unintended consequences associated with total prohibition of NPS into three categories, as outlined in Table 1.[72]

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[61] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 5-6.

[62] S. D. Brandt, et al., "The new drug phenomenon," 594.

[63] L.A King, and A. T. Kickman, "A Brief History of 'New Psychoactive Substances," 402.

[64] UNODC, "Market Analysis of Synthetic Drugs," 45.

[65] Ibid.

[66] L.A King, and A. T. Kickman, "A Brief History of 'New Psychoactive Substances," 403.

[67] UNODC, "Market Analysis of Synthetic Drugs," 45.

[68] A. King, and A. T. Kickman, "A Brief History of 'New Psychoactive Substances," 403.

[69] Ibid.

[70] C. Wilkins, "The Interim Regulated Legal Market for NPS ('Legal High') Products in New Zealand: The Impact of New Retail restrictions and Product Licensing," *Drug Testing and Analysis* 6, no. 7-8 (July-August 2014): 868, https://doi.org/10.1002/dta.1643.

[71] A. Winstock, and C. Wilkins, "'Legal Highs," 12.

[72] Ibid.

Table 1: Unintended Consequences of the Prohibition of Emergent Psychoactive Substances

Wider drug market	Individual	Nation and its resources
Replacement by other new untested compounds	Criminalization	Increased resources for enforcement
Transition of newly banned substances to the illicit street marker [sic]with possible involvement of serious organized crime rings	Higher cost of substance	Loss of possible taxable revenue
Displacement to the substances within the pre-existing illicit market	Lower purity of outlaw substances with potential increase in health related harm	Uncertain credibility of new legislation passed with limited information
Loss of analogues being investigated for therapeutic potential	Necessary contact with dealers of other substances	Increased burden upon over stretched law enforcement which runs the risk of new laws never being effectively implemented
	Unregulated drug market	
	No possibility of consumer protection or quality control	

Source: "'Legal Highs': The Challenge of New Psychoactive Substances," Transnational Institute

Monitoring is another tool that has been implemented nationally, regionally and globally, providing an increased understanding of the NPS market and its characteristics.[73] Some countries have incorporated monitoring systems for NPS into existing drug enforcement systems (e.g., Australia, Belgium, Canada, Chile, Colombia, Italy), while others have created altogether new systems (e.g., the United Kingdom Forensic Early Warning System).[74] The European Monitoring Centre for Drugs and Drug Addiction's Early Warning System is a unique "example of best practice in terms of regional cooperation."[75] For the same purpose, the UNODC Early Warning Advisory (EWA) collects information on the global appearance of new substances from 101 countries and territories, compiling data on trends, legislation, drug-testing procedures and manuals and technical information. The World Health Organization (WHO) may initiate procedures to place the new substances under international control. Upon receipt of information regarding an uncontrolled substance, the WHO issues a notification to all WHO parties, as well as the Commission on Narcotic Drugs. The WHO makes an assessment of the particular substance as well as recommendations for control measures.[76] The Commission then decides the ultimate fate of the substance.[77]

[73] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 7.
[74] Ibid, 7-8.
[75] Ibid, 8.
[76] UNODC, "The Challenge of New Psychoactive Substances," 27.
[77] Ibid.

New Zealand

In New Zealand the Psychoactive Substances Act 2013 (PSA) was introduced and is the world's first attempt to regulate a legal market for NPS.[78] Not surprisingly, this approach has attracted a great deal of global interest as to whether it could serve as a model for drug control and drug enforcement policy reforms. In 2013, retailers were given the opportunity to legally sell forty-six existing NPS on the condition the retailers could provide scientific evidence of the product's low risk of harm. Due to limited initial time to generate such evidence, an interim regulatory regime was established and, with some retail restrictions (mainly in labelling), licenses were granted provided no reports of adverse effects had been reported three months prior to the PSA.[79] "The rationale for allowing existing NPS products to continue to be sold during the interim period was to avoid the emergence of a large black market if all existing legal products were immediately banned."[80] As a result of interim licensing, the number of NPS retail outlets fell and the number of legally available NPS products was reduced immediately and significantly from two hundred to forty-six.[81] Eventually, the interim licenses of twelve more products were revoked due to reports of adverse effects.[82] However, for the first time, there was an attempt to monitor the NPS market and the operators involved. Ultimately, due to the absence of valid scientific data, and because of the reporting of adverse effects of legally sold NPS and pressure from the media, the interim period ended in October 2013 and, by the following May, the sale and possession of all NPS in New Zealand was banned.[83] Although retailers may still apply for licenses provided they can develop and submit acceptable safety-assessment standards and risk-mitigating framework, at this time no retailer has received such a license. Some argue that PSA reform is an illusion, claiming that the total ban on NPS was crafted to look like reform, but "psychoactive substance" and "low risk" were never clearly defined and PSA criminalized "personal possession of any new psychoactive drugs [as] a punishable offence." [84] Moreover, it is questionable whether there was ever a true will to legalize any NPS.[85]

European Union (EU)

Europe is the region reporting the highest number of NPS with the highest rate of usage among young people approximately twenty years of age.[86] "New Psychoactive Substances, including synthetic cannabinoids, synthetic cathinones, and new synthetic opioids, are causing a range of serious harms in Europe."[87] New synthetic opioids, although occupying a small role in Europe's

[78] C. Wilkins, "The Interim Regulated Legal Market for NPS," 868.

[79] C. Wilkins, "Recent Developments with the Establishment of a Regulated Legal Market for New Psychoactive Substances ('Legal Highs') in New Zealand," *Drug and Alcohol Review* 33, no. 6 (November 2014): 678, https://doi.org/10.1111/add.13495.

[80] Ibid.

[81] Ibid.

[82] Ibid.

[83] Ibid.

[84] Julian Buchanan, "Unmasking New Zealand's 'World Leading Drug Reform,'" *Drug Policy, Human Rights & Harm Reduction (blog)*, accessed September 17, 2017, https://julianbuchanan.wordpress.com/2015/01/08/lessons- from-the-world-leading-kiwi-drug-reform-magic-trick.

[85] Ibid.

[86] UNODC, "Market Analysis of Synthetic Drugs," 34.

[87] European Monitoring Centre for Drugs and Drug Addiction, *European Drug Report 2017: Trends and Developments* (Luxenberg: Publications Office of the European Union, 2017): 71, http://www.emcdda.europa.eu/publications/edr/trends-developments/2017.

overall drug market, pose a very serious threat due to their extremely high potency. Per UNODC, "So far the only regional response system to the emergence of NPS is the European Early Warning System (EWS) of the European Union."[88] The EWS is framework for reporting new substances, providing mechanisms for risk-assessment and control. EWS procedures are delineated by Council Decision 2005/387/JHA of 10 May 2005.[89] To ensure full compliance, each EU Member State must provide all available information on emerging NPS to Europol National Unit and the Reitox Network. It is the responsibility of Europol, in cooperation with the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), to collect the data and prepare a Joint Report for submission to the Council of the European Union and the European Commission. If sufficient cause for further investigation is determined, the EMCDDA prepares and submits a Risk Assessment Report and the European Commission presents an initiative to the Council of the European Union with a recommendation to place the new substance under control.[90]

"On 15 November 2017, the Parliament and the Council of the European Union passed new legislation to speed up the procedure for responding to NPS, and included NPS into the official definition of a "drug" at the European level. The new legislation retains a three-step approach to responding to NPS, i.e., early warning, risk assessment and control measures, while significantly strengthening existing processes by streamlining and accelerating data-collection and assessment procedures."[91] Within the EU, judicial responses available to LEA in targeting the NPS threat generally fall under one of three broad legal categories:[92]

- Existing Consumer-Safety/Health-Protection or Medicines Laws: Strict labelling requirements within consumer safety laws have allowed some countries to use these laws successfully in combatting the distribution of NPS. In Italy, under consumer safety provisions, national-language labelling standards permitted the seizure of synthetic cannabinoid products.[93] Laws regulating medicine were initially used, as well, to control the spread of NPS via the legal standard for licensing requirements for both importation and distribution. However, following a 2014 ruling by the Court of Justice of the European Union (CJEU), prosecution of NPS based on medicine laws became more difficult; per this legal instruction, substances are not medicinal products if they do not have beneficial effects on human health.[94] Consequently, disclaimers such as "not for human consumption" and an "absence of scientifically valid published information on their pharmacology" render the European definition of medical product, and therefore medicine laws, ineffective in the control of NPS.[95]

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[88] UNODC, "The Challenge of New Psychoactive Substances," 27.
[89] Ibid.
[90] UNODC, "The Challenge of New Psychoactive Substances," 27-28.
[91] "Legal Responses," UNODC Early Warning Advisory on New Psychoactive Substances. https://www.unodc.org/LSS/Page/NPS/LegalResponses.
[92] European Monitoring Centre for Drugs and Drug Addiction and Eurojust, *New Psychoactive Substances in Europe*, 9.
[93] Ibid.
[94] Ibid.
[95] L.A King, and A. T. Kickman, "A Brief History of New Psychoactive Substances," 403.

- Modified Existing Drug Laws: By introducing group definitions of substances under control and modifying or extending existing law, countries have successfully introduced temporary control regimes to allow time for investigation necessary to the imposition of permanent controls.[96] "In 2011, the United Kingdom enacted a procedure allowing temporary class drug orders, under which named substances could be quickly controlled under drug laws for up to 1 year."[97] Several countries have chosen to enlist tightly defined generic groups of substances, rather than individual drugs in the extended coverage of existing drug laws.[98]

- Innovative New Laws: Stepping into unchartered territory, states are crafting new laws specifically geared to block the flow of NPS across borders.[99] "Three main aspects of the innovative legal responses can be identified: the criteria to define the substance or the motivation for use; the listing mechanisms that reduce the time needed to control new substances; and the levels of punishment established."[100]

In the United Kingdom, the Psychoactive Substances Act took effect in 2016. Under this law, it is illegal "to produce, supply or offer supply [of] any psychoactive substance if it is likely to be used for psychoactive effects."[101] Personal possession is not deemed criminal, unless "the person is in a custodial institution."[102] The main criticism leveled at the Act is its complete ban on the sale of all psychoactive substances with some exceptions like tobacco and alcohol. The law's overly broad definition of the term psychoactive and its failure to distinguish dangerous and low- harm NPS in punishing offenders are just two legislative weaknesses noted by critics.[103] Even so, other EU countries have adopted similar legislation with some variations, including Ireland, Poland, and Romania.[104]

[96] European Monitoring Centre for Drugs and Drug Addiction and Eurojust, *New Psychoactive Substances in Europe*, 10.
[97] Ibid.
[98] Ibid.
[99] Ibid.
[100] Ibid.
[101] "Psychoactive Substances Act 2016-United Kingdom," Randox Toxicology, last modified May 20, 2016, https://www.randoxtoxicology.com/newsroom/47.
[102] Ibid.
[103] P. Reuter and B. Pardo, "Can New Psychoactive Substances be regulated effectively? An assessment of the British Psychoactive Substances Bill," *Addiction* 112, no. 1 (January 2017): 29, doi: 10.1111/add.13439.
[104] Reuter and Pardo, "Can New Psychoactive Substances be regulated effectively?" 25.

United States of America (USA)

Opioids dominate the illicit drug market in the United States. This opioid market includes internationally controlled substances—most notably heroin—and prescription medicines, as well as synthetic opioids.[105] Effects of synthetic opioids mimic those of natural opioids and the increasing supply and use, particularly of fentanyl and fentanyl analogues, is a serious concern for LEA and healthcare personnel. In 2016, deaths related to synthetic opioids doubled the 2015 rate and rose "to more than 20,000 from 3,000 in just three years."[106] Fentanyl is a legal medicine used for its pain-relieving properties, but is prone to abuse and dependence.[107] The appearance of fentanyl in the illicit drug market is not a new phenomenon, but goes back to the 1970s and 1980s when heroin containing or substituted with fentanyl or fentanyl analogues appeared, along with a spate of accidental overdoses.[108]

Since 2014, a newer but similar situation has evolved with fentanyl, novel fentanyl analogues, and other synthetic opioids rising in popularity in the drug market.[109] These synthetic opioids are produced illegally, are not approved for medical use, and are causing increasingly severe adverse effects, as well as death.[110] To fully understand the problem, the potency of these substances must be considered. Fentanyl is the strongest opioid available for use in humans, with "100 times the potency of morphine," while carfentanil (intended for veterinary use only), may be 10,000 times more potent than morphine.[111] The variable context, quantity, and potency of these substances is what makes them particularly dangerous, especially "when sold as street heroin or as counterfeit prescription drugs without the user's knowledge."[112]

[105] UNODC, "Market Analysis of Synthetic Drugs," 10.
[106] Josh Katz, "The First Count of Fentanyl Deaths in 2016: Up 540% in Three Years," *The New York Times*, September 2, 2017, https://www.nytimes.com/interactive/2017/09/02/upshot/fentanyl-drug-overdose-deaths.html.
[107] UNODC, "Market Analysis of Synthetic Drugs," 46.
[108] Ibid, 47.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Ibid.

The Controlled Substances Act (CSA) is the arbiter of U.S. federal drug policy. Under the CSA, which regulates the manufacture, importation, possession, use, and distribution of certain substances, all substances are categorized by "medicinal value, harmfulness, and potential for abuse or dependence."[113] In 1986, the spread of fentanyl derivatives and other compounds led to the creation of the Controlled Substances Analogue Enforcement Act, also known as the Federal Analogue Act, which was designed to regulate substances not specifically listed in the CSA. Unfortunately, not only did this legislation fail to control the NPS market, but an escalation in overdose deaths has been reported.[114] These deaths and associated addictions have reached overwhelming proportions and drained both resources and budgets. Increased needs for police, medical care, judicial interference and stronger safety nets for the neglected and orphaned who are the collateral damage of the illicit drug market are the unintended result.[115]

Recommendations

With the myriad challenges to combating NPS proliferation worldwide, the interests of regional, national, and international communities are best served by a holistic approach. This approach embraces societal and state actors, globally, in order to make real progress toward a solution. Current NPS drug policy and legislation need to be revised as the implementation of existing laws and policies has been unable to effectively contain the expanding market. The overriding challenge remains the creation of legislation effective in limiting the manufacture and proliferation of new substances.[116] Unfortunately, this has proved a very difficult task "as manufacturers have replacement substances ready for sale even before a substance is controlled."[117]

Confronting the NPS phenomenon requires meaningful drug policy reform. "While new psychoactive substances pose a challenge to existing drug control regimes, their appearance provides an opportunity to consider the trial of alternative policies and legislative approaches to drug control."[118] One innovative response could be to legalize the sale of low-risk NPS in order to control the market and the quality of the substances available. "Evidence shows that alternatives to criminalization exist that may attain many desirable outcomes for governments, whilst minimizing the unnecessary consequences of criminalizing the individual user."[119] Advantages include the reduction of public health risks and subsequent economical costs, a reduction in need for enforcement, and an increase in tax revenues. However, to objectively ascertain the utility of various control options, scientific data are needed and that data is presently limited.[120]

Prior to the implementation of new drug policy legislation, gathering and analysis of information must take place globally and cooperatively. All regions and countries involved share increasing concern over how to best respond to the NPS risk. So far, law enforcement agencies, health-care providers, and scientists obtain and investigate data primarily on their own, via surveys and individual research. Timely information collection is further complicated by the

[113] UNODC, "The Challenge of New Psychoactive Substances," 29.
[114] Ibid, 30.
[115] Josh Katz, "The First Count of Fentanyl Deaths in 2016."
[116] M. Evans-Brown and R. Sedefov, "New Psychoactive Substances," 37.
[117] Ibid.
[118] A. Winstock, and C. Wilkins, "'Legal Highs,'"1.
[119] Ibid.
[120] Ibid, 9.

dynamic nature of the market and the fact that often users are unaware of the true substances they are using and cannot accurately self-report.[121] Therefore, present epidemiological indicators have limited capacity to monitor the NPS phenomenon.[122] Experts agree, "These limitations make quantifying the size of the public health threat difficult . . . [while] signals from the EU Early Warning System and other sources suggest serious cause for concern."[123]

All the advantages globalization and technology can provide must be fully and exhaustively exploited in order to form reliable information exchanges on the international level. Unimpeded exchange of information and insights should take place on platforms similar to those already provided by WHO and the UNODC. The value of these platforms emphasizes the importance of continued support for strengthening and expanding these organizations in the effort to combat the spread of NPS.[124] It is only through timely and accurate information exchange that vital tools for building national, regional, or global early warning systems can be utilized. The European Monitoring Centre for Drugs and Drug Addiction's Early Warning System, as well as the global UNODC Early Warning Advisory are the two effective regional and international early warning systems available today that have seen success in detecting and gauging signals of harms and communicating risk.[125] Prioritizing these systems is paramount to the success of legislative reform.

In the identification and reporting of NPS, regional and international cooperation of LEA is fundamental to disrupting supply. More international participation is needed among multiple law enforcement agencies as collaboration has proven a useful and effective tool against the production and supply of NPS. Improved education and sensitization of LEA, as well as first responders and health-care personnel, regarding the NPS market and its changing trends is also inviolable.[126] Without mutual cooperation and consideration within the various LEA and health care communities, the NPS dilemma will never be resolved. To augment efforts, aggressive campaigns to inspire public vigilance regarding NPS should be implemented, as well. Every effort to raise public awareness of the risks of NPS regarding both health and legal consequences must be made.[127] Awareness campaigns, in order to be fully functional, must "be adequately resourced, expanded, and promoted," with continuous cooperation on the national, regional, and international levels.[128]

Finally, for the collection of precise data, the detection and quantitation of NPS by forensic laboratories is vital. Toxicological findings provide essential information on the quantity and quality of new substances and their properties. Per the UNODC's Commission on Narcotic Drugs, "Detection and identification of NPS are critical to health intervention strategies and to the collection of accurate data for effective policymaking."[129] Thus, enhancement of laboratory capacity is urgently necessary. Moreover, additional resources must be allocated to development

[121] M. Evans-Brown and R. Sedefov, "New Psychoactive Substances," 37.
[122] Ibid.
[123] Ibid.
[124] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 13.
[125] M. Evans-Brown and R. Sedefov, "New Psychoactive Substances," 36.
[126] LSS/RAB/DPA/UNODC, "New Psychoactive Substances," 8.
[127] Ibid.
[128] Ibid, 13.
[129] Ibid.

of new analytical techniques for NPS detection, especially in regard to screening biological specimens. Attention has focused lately upon promising screening techniques for detecting multiple NPS substances in hair.[130]

It has become clear that globalization, technology, and innovation play key roles in the rapidly expanding NPS phenomenon. Hence, policymakers must bring to bear the all the innovative advantages globalization and technology offer to effectively combat this growing trend. Moreover, it is imperative that reporting of detection, toxicological findings, adverse health effects, incidents, illicit manufacture, trafficking, and consumption of NPS take place upon the global platform. Policymakers, law enforcement agencies, health-care providers and scientists must join forces, working closely and cooperatively to foster mutually beneficial information exchanges and to form common global alliances and approaches.

Conclusion

Any effective resolution of the NPS phenomenon mandates a holistic approach. Common political will is key to drug policy reform and innovative legislation is the most likely solution to NPS proliferation. With aggressive information campaigns and increased coordination and cooperation between all parties, the risk to the public's well-being can be substantially diminished. While existing NPS-detection platforms, including those of the European Monitoring Centre for Drugs and Drug Addiction and UNODC, must be utilized and expanded upon for worthwhile sharing of information and expertise, new warning systems should be collaboratively constructed in order to maintain an effective lead on the NPS problem. Without exception, LEA and health-care personnel training must be considered paramount factors in the fight against the spread of NPS and its dire consequences. Subsequently, the relevant ministries that deal with the NPS fallout require the funding necessary to sustain their efforts in the battle. If deterring NPS consumption worldwide fails, the secondary costs will be staggering.

Expenditures required to address addiction, adverse health effects and fight consumption-related crimes will far outweigh the investment needed to implement a revised holistic approach based on collaboration. Only collaboration will help policy makers to diminish NPS proliferation worldwide.

[130] Vassiliki A. Boumba, Matthew Di Rago, Melissa Perka, Olaf H. Drummer, Dimitri Gerostamoulos, "The Analysis of 132 Novel Psychoactive Substances in Human Hair Using a Single Step Extraction by Tandem LC/MS," *Forensic Science International* 279, (October 2017): 192.

Appendix: Compiled UNODC Classification [131,132]

NPS category	Example	General information	Adverse effects
Aminoindanes	2-AI (*Pink Champagnes)*, 5-IAI, MDAI (*MDAI gold)*, NM-2AI, ETAI	Stimulants (mimic the effects of cocaine, amphetamine, methamphetamine, ecstasy).	
Ketamine & Phencyclidine-type substances	**Ketamine** (*K, special K, kit kat, tac, tic, cat valium, cat tranquilizer, vitamin K, ket, super K*). **Phencyclidine-type substances**: 3-MeOPC, 4-MeOPCP, MXE	**Ketamine:** similar to phencyclidine. Widely used in medicine. **Phencyclidine-type substances**: Stimulants (mimic the effects of cocaine, amphetamine, methamphetamine, ecstasy) or dissociatives (hallucinogens).	**Ketamine:** tachycardia, hypertension, pulmonary edema, psychological dependence, impairment of attention and recall, visual anomaly, anxiety, changes of perception, impairment of motor function, rhabdomyolysis, lasting memory, cognitive dysfunction, death.
Other substances	**Classic hallucinogens** **Opioids:** AH-7921, MT-45, fentanyl analogues: BF, PFBP, 4F-BF **Sedatives/hypnotics** **Stimulants**	**Classic hallucinogens (**mimic the effects of 2C-B, LSD, DMT) **Sedatives/hypnotics:** depressants (mimic the effects of diazepam, alprazolam) **Opioids:** depressants (morphine-like effects). **Stimulants (**mimic the effects of cocaine amphetamine, methamphetamine, and ecstasy).	
Phenethylamines	2C series (2C-E (*Europa*), 2C-I, 2C-T-7, 2C-T-4), 4-FMA, 4-FA (*4-FMP*, *RDJ*), PMMA (*4-MMA*, *Methyl-MA*), 5-APB, 6-APB, D series (DOI, DOC), 2C-C-NBOMe, benzodifurans (Bromo-Dragonfly, Fly, 2C-B-Fly).	Stimulants (mimic the effects of cocaine, amphetamine, methamphetamine, ecstasy) or hallucinogens (mimic the effects of 2C-B, LSD, DMT).	Agitation, seizures, hyperthermia, metabolic acidosis, tachycardia, organ failure, mydriasis, hallucinations, severe limb ischemia, death.
Piperazines	BZP *(party pills)*, mCPP (3CPP, 3CI-PP, CPP), TFMPP, MBZP, *p*FPP, MT-45	Stimulants (mimic the effect of cocaine, amphetamine, methamphetamine, ecstasy). Rarely act (e.g. MT-45) as opioids.	Toxic effects, respiratory acidosis, hyperthermia, rhabdomyolysis, renal failure, seizures, headaches, tremor, poor concentration, death.

[131] Sutherland and Barrat, "New (and Emerging) Psychoactive Substances," 1-2.
[132] "NPS Substance Groups," UNODC Early Warning Advisory on New Psychoactive Substances, accessed September 1, 2017, https://www.unodc.org/LSS/SubstanceGroup/GroupsDashboard?testType=NPS.

Plant-based NPS	**Khat** *(qat, gat, chat, miraa, murungu, Arabian or Abyssinian tea*), K**ratom** (*thang, kakuam, thom, ketum, biak*), **Salvia divinorum** (*Maria Pastora, Sage of the Seers, Diviner's Sage, Salvia, Sally-D, Magic Mint, Purple Sticky, Shepherdess's Herb*)	Plants with psychoactive properties.	**Khat**: psychiatric disturbances (psychosis, depression), damage of major organs, similar neurological disorders with amphetamine and cocaine use. **Kratom**: at high doses sedative-narcotic effects. **Salvia divinorum**: lasting psychosis.
Synthetic cannabinoids	(*Spice, Spice Gold, Spice Silver, Spice Diamond, K2, Bliss, Black Mamba, Bombay Blue, Blaze, Genie, Zohai, Kaos, Kronic, Yucatan Fire, Skunk, Moon Rocks, Mr. Smiley, Northern Lights*) HU-210, CP-compounds, JWH-018, JWH-073, JWH-250, AM-2233, APINACA (AKB-48), AB-PINACA	Synthetic cannabinoid receptor agonists (mimic the effects of cannabis).	cardiovascular events, acute kidney injury, seizures, psychiatric problems, hyperemesis, tachycardia, agitation and nausea, suicides, addiction and withdrawal symptoms, carcinogenic potential.
Synthetic cathinones	Mephedrone (*4-MMC, meph, drone, miaow, Meow Meow, m-cat*), Methylone (*explosion, top cat, bk-MDMA*), MDPV (*ivory wave*), a-PVP (*flakka*), βk-MBDB, 4-MEC, 4-FMC, O-2482, 3-FMC, 3,4-DMMC, MABP, pentedrone, a-PPP	Stimulants (mimic the effect of cocaine, amphetamine, methamphetamine, ecstasy).	Anxiety, agitation, chest pain, paraesthesia, hearth palpitations, seizures, hypertension and dependence, death.
Tryptamines	5-Meo-DMT (*5-MEO*), 5-Meo-DPT, AMT, 4-AcO-DMT, 4-AcODiPT, 5-Meo-DiPT (*Foxy-Methoxy*), 5-Meo-AMT (*alpha-O, alpha, O-DMS*)	Hallucinogens (mimic the effects of 2C-B, LSD, DMT).	Restlessness, agitation, gastrointestinal distress, muscle tension, rhabdomyolysis, death.

About the Author

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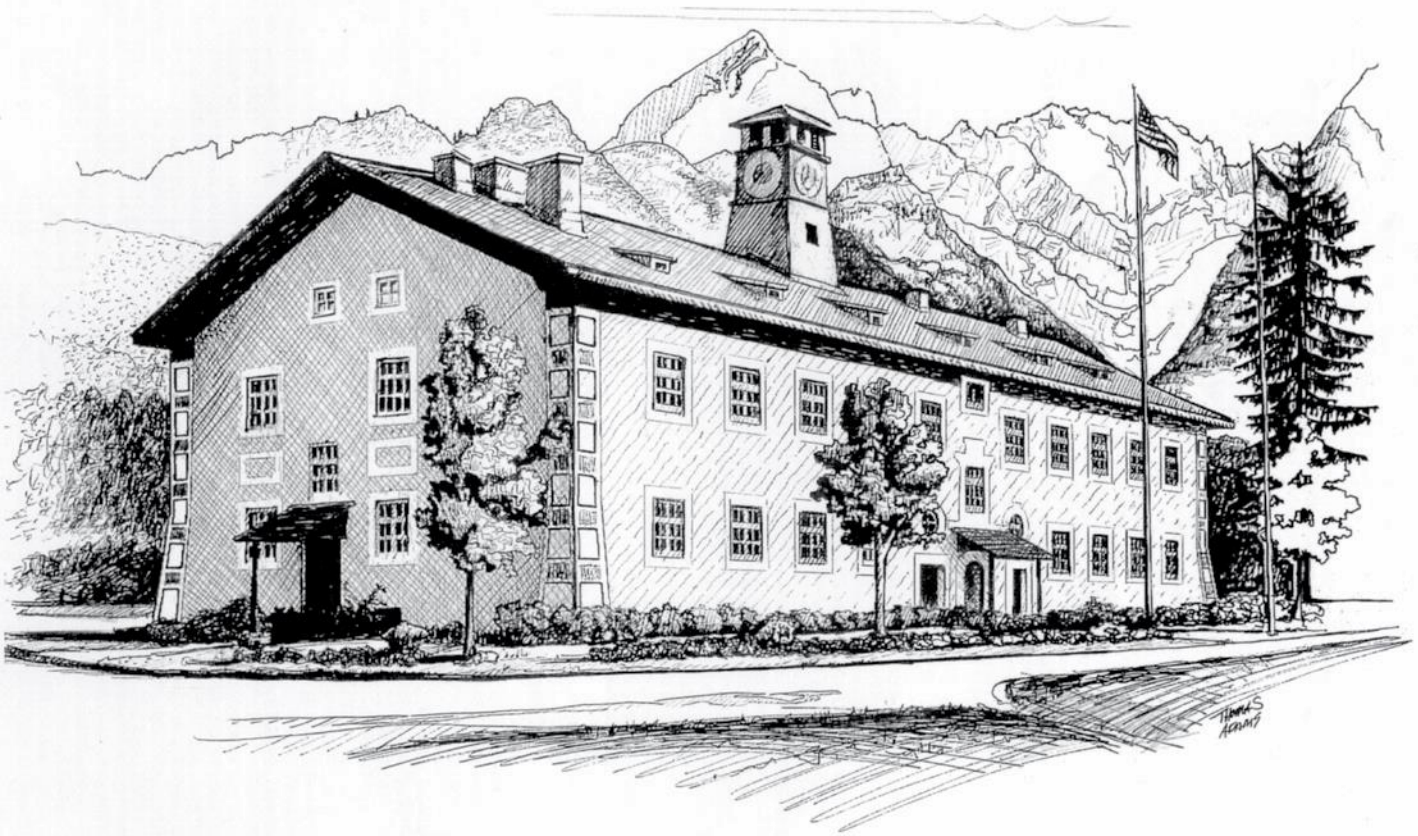

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