

# New Psychoactive Substances: “Chemical Chameleons” That Evade Detection and Legislations

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**ABSTRACT:** *Background:* New Psychoactive Substances (NPS) and New Emergent Substances (NES), are subversive and withering substances that invaded all communities around the globe without exceptions or immunity. They are being sold as recreational drugs containing synthetically designed substances, despite the tag label states “Not for Humans Use (e.g. bath salts, synthetic cannabinoids)<sup>1,2</sup>. *Objective:* The main theme and aim of this paper is to enhance and add to the huge efforts of different international and national organizations, government and law enforcement authorities to combat the spread and highlight the risks and serious implications of these substances on the health of humans and their wellbeing. *Method:* literature review was undertaken, with especially focus on the published data related to the objective of the paper. Some reference textbooks were also consulted, especially for the information regarding the laboratory techniques. Literature search was conducted using PubMed, EMBASE, PsycInfo, Internet underground and governmental websites using the following keywords alone or in combination: designer drugs, club drugs, party drugs, GHB, synthetic cathinones, mephedrone, methylone, flephedrone, MDAI, and MDVP. *Conclusion:* These substances pose a global threat that will affect young generations due to the health risks associated with the consumption of these drugs. This phenomenon requires the collaboration between the international organizations, the national reference laboratories, legislation authorities, law enforcement officers and political systems in the different countries to make the necessary plans and measures capable of stopping the production and distribution of these substances.

**Glossary:** *UNODC:* United Nations Office on Drug and Crime; *NIDA:* National Institute on Drug Abuse; *EMCDDA:* European Monitoring Center for Drugs and Drug Addiction; *WHO:* World Health Organization; *NDARC:* National Drug & Alcohol Research Center Australia

## INTRODUCTION

Novel psychoactive substances (NPS) workably resembles, mimic and echo the effect of controlled drugs (like amphetamines, cocaine, opiates and cannabis, (Vardakou et al., 2010)). The users of NPS drugs, often eschew and avert legal proceedings due to their unique chemical formulation that differs from controlled drugs.

Despite being very minor for some designer drugs, the difference in the chemical formulas is the real challenge for law makers. Each class of these drugs follows the same principles and norms of the resemblant controlled drugs as they bind to the same receptors in the brain and peripheral organs. NPS were available in Europe in the head shops and are sold on websites. They are marketed under disguised brand name like “ Legal, Highs, Herbal Highs, Research Chemicals, Bath salts, Designer Drugs, Synthetic drugs, Spice, Novel psychoactive substances”(NDARC Fact Sheet, 2016) A more generalized word for the NPS is the Emerging

Psychoactive Substances (EPS). This generalization encompasses all the psychotropic drugs that newly invaded the recreational drug emporium (NDARC Fact Sheet, 2016).

## DISCUSSION

Despite being described as legal highs, they are never legal, due to the serious damage and harm they cause. Significant and Serious implications were reported after consumption, including Intoxication, withdrawal, psychosis, and death. These drugs are not controlled or commanded by the 1961 and 1971 conventions on Narcotic drugs and Psychotropic drugs control. They represent a pivotal menace and intimidation, to the public health as well as political, social and health challenges, due to the fact that only very few information is known about their pernicious health effects. (Yousif Ali, 2016)

## TYOLOGY

More than 600 of different New Psychoactive Substances have been identified and reported to the UNODC Early Warning

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Advisory by governments, laboratories and partner organizations till December 2015 (World Drug Report, 2017). It's worth mentioning that the Early Warning Advisory (EWA) (Annual NPS Report, 2014) of the UNODC, serves as an observatory apparatus and information axis and heart for learning, awareness and guidance on NPS, for national drug laboratories, policy makers, addiction treatment physicians and law enforcement authorities. The list expands every day with clandestine laboratories coming up with new modified formulas. The NPS or EPS combines the synthetic cannabinoids (like Spice, K2, APINAKA, JWH-018...etc), Phenethylamines which have similar stimulant effects like amphetamine and MDMA (like 2C series, NBOME series, benzofuranes, 6-APB, ...etc), Synthetic cathinones (like mephedrone "Meow Meow", MDPV, Methylo "Ivory Wave", alpha-PVP "flakka"), Tryptamines (DMT, AMT, etc) and others like Aminoidanes, (MDAI), Arylcyclohexylamines (MXE or Methoxetamine), Novel benzodiazepines (Pyrazolam, diclazepam, flubromazepam, etizolam), Novel opioids (fentanyl analogues such as BF, PFBF, 4F-BF), Plant based NPS (plants with psychoactive properties e.g. kratom, khat, salvia divinorum) and Piperazines (described as "failed pharmaceuticals"). Piperazines possess a central nervous system stimulation effect and for this are sold as ecstasy, e.g. BZP and TFMPP (NDARC Fact Sheet, 2016; World Drug Report, 2017).

The undermentioned table, does not represent an exhaustive list of all new psychoactive substances identified so far, it's just a brief paradigm. (Table 1) (DEA Congressional Narrative, 2014; Synthetic Drug Fact Sheet, 2013; Drug Enforcement Administration, 2013; Office of National Drug Control Policy)

## LEGISLATIONS

Considering the legal status of NPS, we come across a very complicated and confusing situation. These substances are not included in the 1961 and 1971 conventions' lists of controlled drugs, nor being licensed as alcohol and nicotine. The ownership and harness of these drugs have long been commissioned and authorized, and their supply was endured as long as they are sold for purposes other than human consumption. An example of the awkward legal situation of NPS is the cannabinoids situation. Spice products are currently controlled in 14 European countries (Austria, Denmark, Estonia, France, Germany, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Romania, Sweden, and UK), where cannabinoids are categorized as pharmaceuticals or narcotics. The paradox is that, the same drugs are still legal and uncontrolled in the remaining parts of Europe and many other countries. In the United States of America, some states (Alabama,

Arkansas, Georgia, Kansas, Kentucky, and Missouri) have banned and illegalized the distribution and use of Spice, and until recently, only one synthetic cannabinoid, namely HU-210, was considered a Schedule I substance (unsafe, highly abused, no medical usage). On November 24, 2010, the United States Drug Enforcement Administration temporarily combined to the some synthetic cannabinoids: JWH-018, JWH-073, JWH-200, CP-47,497, and cannabicyclohexanol (US Department of Justice Drug Enforcement Administration Drugs and Chemicals of Concern, 2010). JWH compounds (i.e., JWH-018, JWH-015, and JWH-073) are also currently unregulated in New Zealand and are easily obtainable in head shops and from many websites (Every-Palmer, 2011).

In some parts of the world where NPS are emerging very rapidly, authorities have taken tough measures adopting what is so called "generic approach", which means they created new legislations that automatically include the analogues of chemical similarities to the lists of already controlled substances.

The International Commission on Narcotic Drugs, positioned 10 NPS in March 2015 and 7 NPS in March 2016, under international hegemony, (United Nations Office on Drug and Crime (UNODC) report, 2016).

## DETECTION

The challenge of detection and identification of NPS in urine, blood and other biological matrices (body fluids), is too immense. The current immunoassay laboratory methods are to recognize, characterize and uncover a diversity of new chemical makeups that are connected with NPS. As of now, these techniques are capable of examining and screening classic drugs than controversial new substances. The existing immunoassay methods need to be updated and redesigned to render them suitable for NPS investigation. Highly specific, sensitive and selective techniques such as gas or liquid chromatography with mass-spectrometry are to be used for exact and precise identification, especially in forensic and medico-legal settings.

Using targeted analysis over non-targeted screening methods for NPS, will raise and augment the specificity to detect NPS existing at very tiny concentrations like synthetic cannabinoids and some other sturdy NPS like LSD derivatives, and minimizing the chances of false positive and false negative results. On the other hand, general screening will secure the detection of a broader spectrum of substances at the expense of the method sensitivity, which doesn't represent a trouble issue for much NPS, as many users take considerable doses.

**Table 1.**  
New psychoactive substances identified.

Synthetic Hallucinogens	Synthetic Morphine	Synthetic Pschoactives	Synthetic canabinoids	Synthetic Cathinones
2C Family	Krolodil Heroin substitute	Ecstasy(Molly)	Spice	MDPV
MXE (Methoxetamine)	Etorphine	Benzo Fury (5-APB)	Bizarro	Mephedrone
Bromo Dragonfly		5-DBFPV	K2, and Scooby	MDPV (Methylendixypyro-valerone)
		3,4-ctmp	Scooby and Snax	Methylo
		3-Fluorophenmetrazine (3-FPM)		

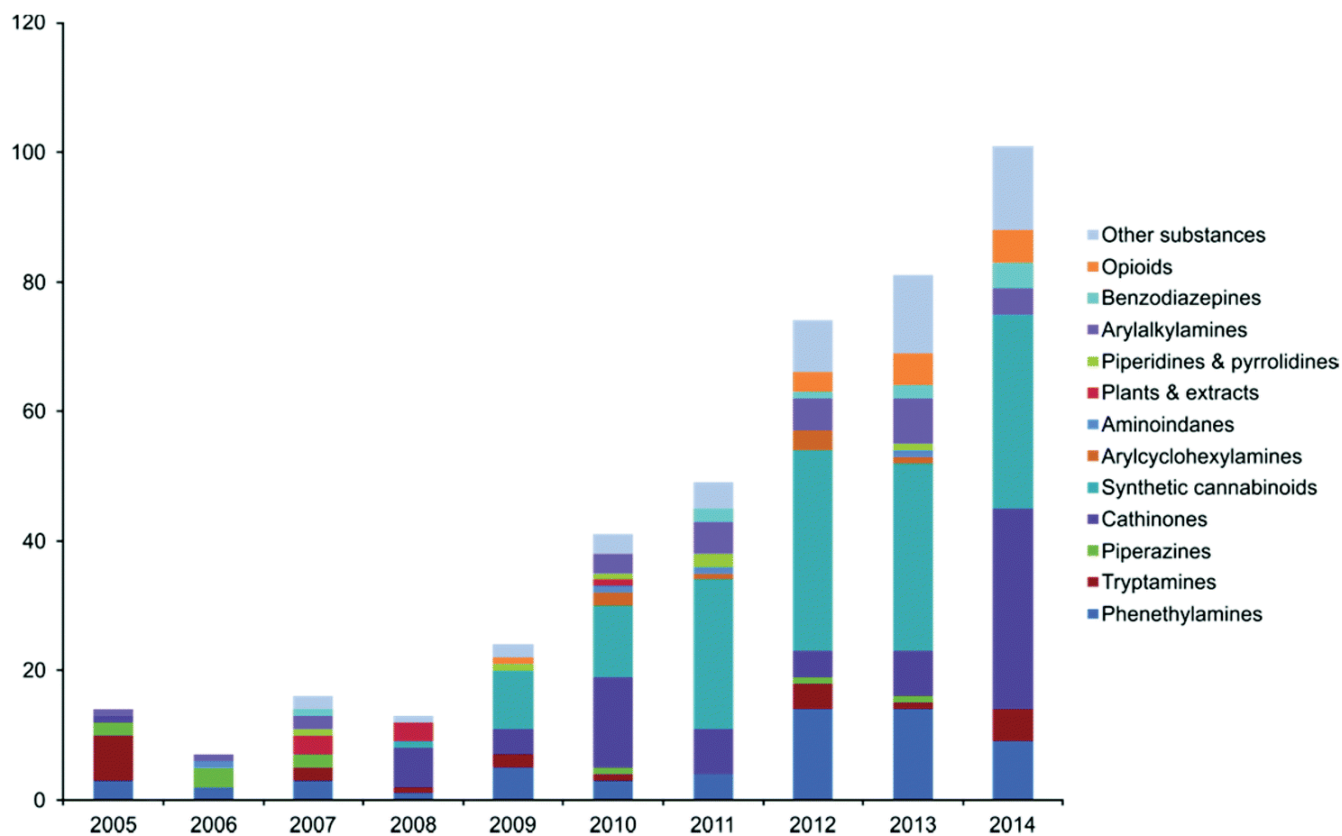


Figure 1. A graphical representation of new psychoactive substances notified to the EWS between 2005–2014 (Smith et al, 2015)

It is the choice of the laboratory to use the most appropriate analytical techniques or tend to employ a combination of them to ensure higher degrees of detectability, selectivity (specificity), and sensitivity. (Simon Elliot, 2013; European Monitoring Center for Drugs and Drug Addiction (EMCDDA)) (Figure 1).

## CONCLUSION

NPS and EPS, are psychoactives available via the Internet and head-shops, frequently legal, and often regarded as safe by the public. Unfortunately, these drugs have serious adverse effects, which range from neurotoxicity, manifestations of behavioural toxicity and death, especially when these substances are combined with other drugs like tramadol or alcohol,3,4. Agitation, tachycardia, mydriasis, hallucination, seizures, liver and renal failure and severe limb ischemia were reported with NPS use (Hill & Thomas, 2011; Kronstrand et al., 2011; Kelly, 2011). Health care providers must be familiar with these important new classes of drugs.

Improvement of laboratory methods is mandatory to overcome the challenge of these drugs defeat the existing protocols. Training of law enforcement personnel and laboratory staff, funds for research are required. Amendments to the current legislations is to be adopted to include all the analogues of chemical similarities to the traditional drugs in the control list of 1961 and 1971 conventions. A ban on the head-shops from selling any new chemically modifies substance ahead getting a clearance with regards to the impact of

the substance composition to health, and monitoring of internet websites that promote the NPS/EPS. Collaboration between the authorities around the globe in every aspect to control and monitor the illicit production of drugs. Reporting and exchanging information regarding the newly discovered NPS by the different laboratories.

However, further research works and surveys on their pharmacological and toxicological properties is a must in order to discover and learn the veritable potential harms and damage of NPS to general public health.

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