

'Legal highs' may be more dangerous than traditional drugs of abuse

September 19 2018, by Colin Davidson



Credit: AI-generated image ([disclaimer](#))

Novel psychoactive substances (NPS), or "legal highs," have had various definitions but can simply be thought of as new drugs of abuse. Some may be entirely new, some may be designed to mimic existing drugs, some are based on psychoactive plants and some are medicines.

In the UK, most were legal up until the 2016 Psychoactive Drugs Act, which has effectively banned all drugs which have a psychoactive effect, except alcohol, nicotine, caffeine and drugs used for medicinal purposes. Despite this, they remain widely, albeit illegally, available.

Drug users are a heterogeneous group: many have continued to use [traditional drugs](#) of abuse, such as cocaine and heroin, but others have embraced legal highs. It was estimated in 2014 that [nearly half of all drug users](#) in the UK have taken an NPS.

The reasons for their popularity include the misconception that because they were once legal they are safe, the ease of obtaining them, and a subset of drug abusers who are "novelty seekers" and want to try something new and exciting.

Prior to 2016, NPS were typically banned as individual drugs or more recently, as groups of [chemically related compounds](#). This led to the synthesis and marketing of an NPS to take the place of the banned substance, while the novelty seekers also drove a market for new drugs.

Unfortunately, we now have close to [700 NPS](#) and this has exacerbated the health risk because, with a new drug, users are unsure how to take it safely and healthcare workers will also know very little about the drug, making effective treatment difficult. A legal high user in A&E might be reliant on medical staff who only have a packet of powder with an unhelpful street name such as "Ivory Wave" to go on.



Are synthetic cannabinoids like Spice worse than the real thing? Credit: [Damany S. Coleman/Wikimedia Commons](#)

We're familiar with the side effects that come from long-term abuse of traditional drugs. Ketamine can lead to [bladder problems and incontinence](#), amphetamines can [kill nerve cells](#) in a process called neurotoxicity, cannabis can increase the risk of developing [schizophrenia-like symptoms](#), MDMA may lead to [heart valve problems](#) and numerous drugs lead to addiction.

The mechanisms underlying these problems are largely known and so we can predict the long-term problems of NPS use.

How legal highs affect the body

Synthetic cannabinoids were developed as a legal alternative to cannabis. The main psychoactive compound in cannabis is THC, which activates a cannabinoid receptor protein called CB1.

Spice or K2 has been found to be made up of a variety of synthetic cannabinoids, which are often [more than ten times as potent](#) at the CB1 receptor.

The same dose of Spice will have a much bigger effect than the same dose of THC and long-term users of spice may therefore have a greater chance of developing schizophrenia than cannabis users.



Credit: CC0 Public Domain

Animal studies have long shown that amphetamine compounds can cause neurotoxicity, and may mean long-term amphetamine abusers have [persistent dysfunction](#) in their brain dopamine systems.

Dopamine is not only the "reward" chemical in the brain, but is also critical to movement. Parkinson's patients have part of their brain dopamine system destroyed, leading to [problems](#) initiating movement. More recently, studies have found long-term amphetamine users have a [greater chance of developing Parkinson's disease](#), confirming what we'd already seen with animals.

[One of the most popular](#) NPS since 2008 has been mephedrone, also known as MCAT or meow meow. Mephedrone is a synthetic drug, similar to the plant-based chemical cathinone. It is a stimulant, like amphetamine, and has a very [similar effect in rats and mice](#) and could also leave users with a greater chance of developing Parkinson's.

Examples abound of NPS which might be more dangerous than the drugs they were developed to replace. Desoxypipradrol (Ivory Wave) may be [more likely to lead to psychosis than cocaine](#). Benzofury, an MDMA-like drug, may also [cause heart valve problems](#), Mexxy (methoxetamine) a ketamine-like [drug](#) may also [cause bladder problems](#).

Adding the relative ignorance among users and healthcare professionals about how to take these [new drugs](#) safely and how to treat overdoses, it's clear that "[legal highs](#)" are anything but a safe substitute for traditional drugs of abuse.

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