



Home Office

New Psychoactive Substances in England

A review of the evidence

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The views expressed in this report are those of the authors, not necessarily those of the Home Office (nor do they reflect Government policy).

Executive Summary

Aims and Approach

This report builds on chapter 2 of the report of the expert panel review, and provides an overview of the current available evidence on New Psychoactive Substances (NPS)¹.

Findings

Identification of NPS

- Forensic analysis of NPS samples and seizures suggests the rate at which NPS are appearing on the European market is increasing. The Early Warning System run by the European Monitoring Centre for Drug and Drug Addiction (EMCDDA) detected 81 novel² NPS in 2013, an increase from 74 in 2012, 49 in 2011 and 41 in 2010 (EMCDDA-Europol, 2014).
- The picture in the UK is slightly different, with greater year-to-year variation. The UK reported 11 substances for the first time to the EMCDDA in 2013, a fall from 13 in 2012, the same as 2011 and down from the 16 reported in 2010 (Home Office, 2014a).
- Many of the NPS detected are part of groups of similar substances with similar effects (such as cathinones), or dissimilar substances that produce similar effects (such as synthetic cannabinoids). This is unlike many traditional illicit drugs, such as cocaine, cannabis, ecstasy and heroin, which all have distinct effects.
- It is likely that most of the substances identified by early warning systems are not in widespread or even limited use.

Prevalence of NPS use

- The Crime Survey for England and Wales (CSEW) reports that mephedrone use has fallen since measurements began in 2010/11. Last year use of mephedrone among adults (16- to 59-year-olds) was 1.3 per cent in 2010/11; it then fell to 1.0 per cent in 2011/12 and to 0.5 per cent in 2012/13, before stabilising in 2013/14 (0.6%) (Home Office, 2014b).
- Mephedrone use tends to be higher than other types of NPS. In the 2011/12 CSEW, mephedrone use in the last year among adults (16- to 59-year-olds) was higher (1.0%) than any other NPS measured in the survey that year (GBL/GHB, spice and BZP were 0.1%). However, as mephedrone use has fallen, use is at a similar level to salvia (0.5%) (Home Office, 2014b).

¹ The Home Office's expert review panel defined New Psychoactive Substances as: 'Psychoactive drugs, newly available in the UK, which are not prohibited by the United Nations Drug Conventions but which may pose a public health threat comparable to that posed by substances listed in these conventions.'

² For the purposes of this report, novel NPS are NPS that have not previously been reported.

- NPS use is higher in certain subgroups, such as participants in the night-time economy (NTE) and men who have sex with men. A decline in mephedrone use between 2010 and 2013 is reported by the Global Drugs Survey³ of regular clubbers (Mixmag, 2014). However, other small-scale surveys of clubbers at gay-friendly nightclubs have shown that mephedrone use may have increased from 2010 to 2011 (Measham *et al.*, 2011a; Wood *et al.*, 2012a).
- The CSEW and Global Drug Survey both show that use of mephedrone has declined since it was controlled. However, it is not possible to isolate the impact of legislation as opposed to other factors.
- A large proportion of NPS contain mixtures of substances (Home Office, 2014b). This limits the validity of data gained from studies that rely on self-reported use of NPS, as users cannot know what they are taking.

Characteristics of NPS users

- Evidence from surveys show that NPS use is predominantly confined to existing traditional illicit drug users. For example, the 2013/14 CSEW found that of those who used mephedrone in the last year, 98 per cent had taken another illicit drug in the last year.
- As such, the profile of NPS users is broadly similar to the profile of club drug users; both are generally young, male, and active participants in the night-time economy (Home Office, 2014b).
- Some NPS users may not have a preference for specific substances and instead are seeking generic stimulant-type drugs (i.e. any white powder) (Measham *et al.*, 2011b).

The market for NPS

- Non-controlled NPS are commonly sold from headshops and 'clearnet'⁴ retailers. As well as other sources, controlled NPS are available from the 'darkweb'⁵, but research shows that users mainly purchase traditional illicit drugs this source (Barratt *et al.*, 2013a).
- While NPS are readily available online, only a minority of NPS users acquire their drugs through online sources (European Commission, 2014). Instead, NPS users reported purchasing from friends, dealers and headshops.
- Retailers will often mark their products 'not for human consumption' and therefore provide no information about the use or harms of NPS
- Producers may quickly adapt to substance by substance controls by marketing similar compounds that are not controlled (Dargan *et al.*, 2011).

³ The Global Drug Survey is a self-selecting online survey that was initially aimed at readers of the dance music/clubbing magazine *Mixmag*. Findings relate to those who are regular clubbers (i.e. those that have been clubbing in the past month).

⁴ The 'clearnet' refers to websites that are openly available on the internet.

⁵ The 'darkweb' refers to websites that are not openly available on the internet, and can only be accessed with anonymising software such as TOR.

- Since classification, there is some evidence that the remaining residual market for mephedrone has shifted to illicit suppliers, consequently, the price of mephedrone has increased, the purity has decreased, and there may have been a shift towards purchasing mephedrone from dealers (Davies and Murray, 2013; Winstock, *et al.*, 2010a).
- The extent to which NPS are purchased in bulk over the internet for further distribution is uncertain.
- NPS can contain controlled drugs. In 2013/14, of the substances found by the Home Office's Forensic Early Warning System within NPS samples, 3.0 per cent of those from the internet, and 4.3 per cent of those from headshops were controlled NPS (Home Office, 2014a).

Motivations for NPS use

- Similarly to traditional illicit drugs, the main factors that drove mephedrone use were market factors such as price and availability, and also the perceived higher quality when compared to illicit drugs (Dargan *et al.*, 2010; Carhart-Harris *et al.*, 2011).
- Findings on the importance of the legal status of NPS are mixed. For the majority of users, evidence suggests that legality is not the biggest motivator; increased convenience, availability and lower prices that arise from the legality appear more important. Legality may be more of a motivator for users who have not previously used illicit drugs, and for those subject to mandatory drug testing.
- For existing drug users, the legal status of NPS does not imply safety (for example Corazza *et al.*, 2014). However, there is limited evidence that suggests, for those who do not use other drugs, this may be the case (Sheridan and Butler, 2009).
- NPS may be both displacing (i.e. taking the place of illicit drugs) and also supplementing (i.e. being used alongside illicit drugs) existing drugs. For example, a study of customers at gay-friendly dance clubs in south London found that 78 per cent of those who had used mephedrone within the past month had also used MDMA powder in the past month (Moore *et al.*, 2013).

Health harms

- In 2013, there were 60 deaths where an NPS was mentioned on the death certificate. NPS deaths are relatively low compared to the total of 1,957 deaths from drug misuse overall. However, there have been increases in NPS related deaths over recent years with a sharp rise from 29 to 52 deaths from 2011 to 2012 (Office for National Statistics, 2014a).
- There has been an increase in the number of people entering treatment reporting mephedrone use, from 839 in 2010/11 to 1,630 in 2012/13 (Public Health England, 2013). These people comprise a small amount of the overall treatment population and generally have positive treatment outcomes.

- Between 2011/12 and 2012/13 there were increases in the number of telephone enquiries (49%) and TOXBASE accesses (128%) to the National Poison Information Service⁶ regarding NPS (National Poison Information Service, 2013).

Social harms

- Research on the social harms of NPS use is limited. However, it is plausible that the social harms of NPS use are equivalent to those of other recreational/ club drugs (ACMD, 2009). That is to say, at present, it is likely that NPS use is not significantly driving crime, anti-social behaviour and other social harms.

Conclusion

- NPS is a new and developing area of study. Many innovative methodologies are being used and conventions surrounding how best to research NPS are still being established.
- There is good evidence on the identification of new NPS, and evidence on the use of NPS is also well established, albeit with some limitations.
- However, there are gaps in the evidence on:
 - the prevalence of use of NPS, and a total measure of NPS use;
 - the use of NPS among subgroups other than NTE participants;
 - the long-term health harms of NPS use;
 - acute health harms of NPS use;
 - the extent to which NPS use drives social harms;
 - the impact and effectiveness of legislation;
 - the motivations for the use of NPS other than mephedrone;
 - the exact factors and mechanisms that affect displacement and supplementation; and
 - the extent to which individuals within social groups purchase online and then distribute within their social group.

⁶ The National Poisons Information Service provides information and advice to health professionals through telephone enquiries and also through online access to its TOXBASE service.

1. Introduction

In December 2013 the Home Office appointed an expert panel to look at the UK's current legislative response to New Psychoactive Substances (NPS) and whether it could be enhanced beyond the Misuse of Drugs Act 1971⁷. In addition, the panel considered the Government's health and education responses to NPS.

This report builds on chapter 2 of the report of the expert panel review and provides an overview of the current available evidence on NPS. It is published alongside the report of the expert panel review and the Government's response to their report.

1.1 Approach

The main sources used for this report are peer-reviewed academic research, official statistics, and reports from national and international agencies. To enhance our understanding in certain areas, additional statistics have also been produced for this report. While this is not a systematic review of the literature, the majority of the publicly available evidence in this area has been accessed. This report also covers evidence that has become newly available since the expert panel considered the evidence base on NPS.

The report has given priority to research and data relating to England, although some data covers a wider geographical area. In some areas where no UK research exists, appropriate international evidence has been drawn upon.

A large proportion of the research on NPS users has focused on mephedrone; this is not surprising, as mephedrone has been unique in achieving relatively high levels of use. However, given the increased popularity of mephedrone over other NPS, the findings from these studies may not be applicable to users of other NPS. In addition, a great deal of research into NPS was conducted before or immediately after the classification of mephedrone in April 2010 so the findings may not be applicable to the current NPS situation.

1.2 Definition

New Psychoactive Substances is a generic term for the relatively recent phenomenon of substances produced to mimic the effects of traditional illicit drugs⁸. NPS is not a perfect term, as some were first synthesised a considerable time ago and are not inherently 'new', just newly available or newly misused. Other expressions to describe NPS, such as 'legal highs', are inaccurate and unhelpful as many NPS have been controlled under the Misuse of Drugs Act 1971, and therefore NPS can refer to both controlled and non-controlled substances.

⁷ See '*NPS Review: report of the expert panel*' for further information.

⁸ Throughout this report, the phrase 'traditional illicit drugs' is used to describe established drugs of misuse, such as cocaine, ecstasy and cannabis.

Notwithstanding these issues, the Home Office's expert review panel defined New Psychoactive Substances as:

'Psychoactive drugs, newly available in the UK, which are not prohibited by the United Nations Drug Conventions but which may pose a public health threat comparable to that posed by substances listed in these conventions.'

The emergence of new drugs is not in itself a new phenomenon. However, the speed and scale at which substances are now emerging distinguishes the current NPS situation from new drugs that have previously emerged.

This review is limited to the more recently identified substances. Early warning data suggests that the NPS phenomenon started to grow around 2008, and substances that were controlled after this date are included. Therefore, for the purposes of this report, mephedrone and GBL are considered NPS, but ketamine and ecstasy are not. However, this distinction becomes blurred when considering NPS that have become established illicit drugs, as these may have more in common with other controlled drugs, rather than the currently uncontrolled NPS. Further issues with defining NPS are discussed in Box 1.

Box 1: Additional definitional issues

Throughout this report there are issues about which substances are defined as an 'NPS'. This is important because the inclusion or exclusion of substances affects estimations of the overall scale of the NPS problem. This is not an issue for research that focuses on specific substances, but research that attempts to look at NPS as a whole will be affected.

Additional definitional issues emerge when considering NPS that have achieved widespread use and are now controlled substances. For example, ketamine and mephedrone are now well-established recreational drugs that are controlled under the Misuse of Drugs Act 1971. Due to this, these would not be covered by definitions that solely focus on the legal status of a drug at a UK level. Despite this, mephedrone is still widely considered to be an NPS, and some authors and agencies also considered ketamine to be an NPS. As controlled substances can still be considered an NPS, it is unclear when a substance ceases to be an NPS, and instead becomes a traditional illicit drug.

Similarly, the exact NPS that are subject to control measures varies across different countries (EMCDDA, 2014b). The UK has taken a proactive approach to NPS, and many substances that controlled in the UK are not controlled in other countries, or at a European or international level. Therefore, definitions that focus on legal status at an international level will include a great deal of substances that are already controlled in the UK.

1.3 Scope

This report covers the following areas:

- the identification and prevalence of NPS use;
- characteristics of NPS users;
- motivations for NPS use and displacement from other drugs;
- the NPS market;
- deaths related to NPS use, poison centre contacts, and treatment data; and
- the social harms of NPS use.

This report does not review the evidence on the toxicology or pharmacology of NPS, nor the specific harms posed by individual NPS.

The Home Office's Advisory Council on the Misuse of Drugs (ACMD) produces in-depth reports primarily on the potential health harms of specific NPS. These can be found at: <https://www.gov.uk/government/organisations/advisory-council-on-the-misuse-of-drugs/series/acmd-drug-specific-reports--2>.

The European Monitoring Centre for Drug and Drug Addiction (EMCDDA) also carries out risk assessments on NPS. These can be accessed at: <http://www.emcdda.europa.eu/html.cfm/index16776EN.html>

Also, this report does not cover prevention and treatment interventions, the efficacy of different legislative approaches, nor the production and upstream supply of NPS, although these are discussed in the expert panel report.

2. Identification of NPS

Data from the forensic analysis of NPS samples and seizures suggests the rate at which NPS are appearing on the European market is increasing; however, the situation in the UK is less clear, with greater year-to-year variation.

This chapter covers the various early warning systems detecting novel⁹ NPS at a national, European and international level. These systems provide a comprehensive and responsive mechanism for the reporting of new substances, but it is possible that as forensic capability to detect NPS has improved some of the increases in incidence may be down to improved standards of detection. It is also important to note that the purpose of these systems is to identify the presence of new substances and as such they are not a measure of the scale of availability and use.

The EMCDDA detects novel NPS through reports to their Early Warning System (EWS). Figure 1 shows the increasing rate at which the EWS is detecting NPS (EMCDDA, 2014a). In 2013, 81 novel NPS were detected, an increase from 74 in 2012, 49 in 2011 and 41 in 2010.

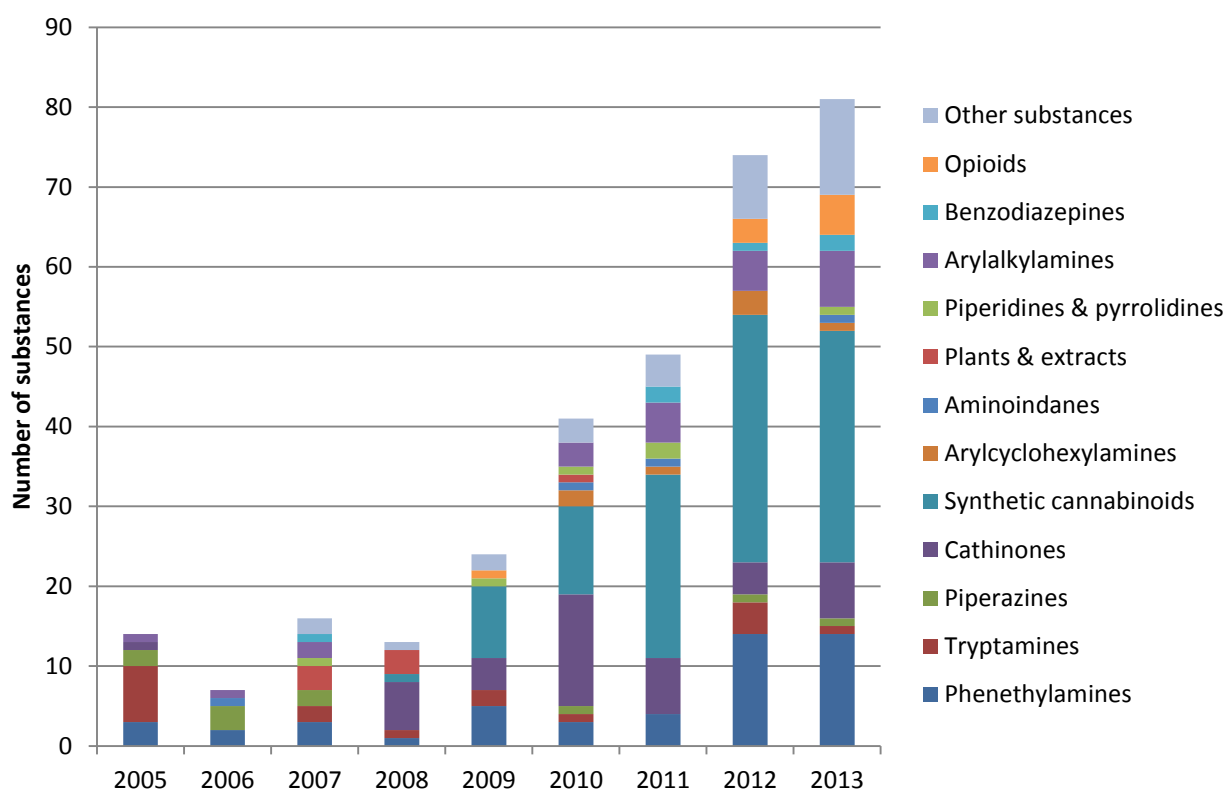
Of the 81 novel substances identified in 2013, the largest group (29) were synthetic cannabinoids. This continues the increase in the number of different synthetic cannabinoids identified over the last three years. The number of new cathinones (such as mephedrone) identified has reduced since a peak of 14 in 2010, with 7 being identified in 2013.

There is also evidence of increasing diversification, with an increase of NPS identified that fall outside the previously used common classifications¹⁰. In response the EMCDDA has expanded the number of categories for 2013.

⁹ For the purposes of this report, novel NPS are NPS that have not previously been reported.

¹⁰ The EMCDDA previously used six classifications: Other (chemicals, plants, medicines), Synthetic cannabinoids, Cathinones, Piperazines, Tryptamines, and Phenethylamines. This has been expanded to the twelve categories listed in figure 1.

Figure 1: Number and main groups of NPS notified to the EMCDDA Early Warning System, 2005 to 2013



In 2013, the UK reported 11 substances for the first time to the EMCDDA, a fall from 13 in 2012, the same as 2011 and down from the 16 reported in 2010 (Home Office, 2014a). These substances are identified in the UK by a variety of organisations, including the Home Office’s Forensic Early Warning System (FEWS), other Forensic Science Providers (FSPs), law enforcement casework and other systems. Of the 11 detected, 2 were first identified by FEWS. This is lower than previous years (10 between April 2012 and March 2013, and 17 between January 2011 and March 2012) (Home Office, 2013a)¹¹.

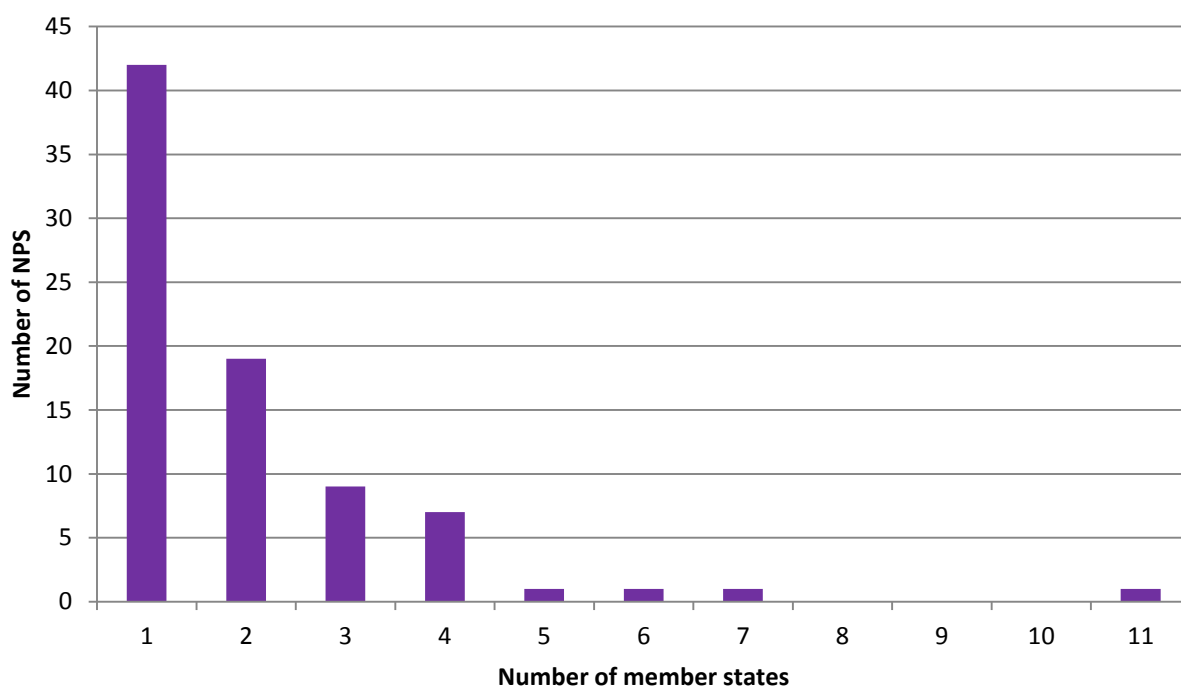
Globally there is a similar picture to the EWS trends; the United Nations Office on Drugs and Crime (2014) reported that by 2013, 348 NPS had been reported by member states, up from 166 in 2009. In 2012, the number of NPS reported overtook the total number of substances under international control (234). The UNODC concluded that: ‘the international drug control system is floundering, for the first time, under the speed and creativity of the phenomenon known as new psychoactive substances’ (UNODC, 2013a).

It is highly likely that many substances identified by forensic analysis are not in widespread or even limited use. Most substances detected by international warning systems have a limited geographic distribution, and are only detected in one or two countries. Around half (42) of the NPS reported to the EMCDDA’s EWS in 2013 were only detected in one EU member state, and only four substances were detected in five or more EU member states (see Figure 2).

¹¹ The overall number reported to the EMCDDA is more stable, albeit with year-to-year variation. It is likely that the number of substances identified for the first time by FEWS has fallen as other organisations have detected them first, with many of the substances being identified by FEWS at a later date.

Similarly, of the 348 substances reported to the UNODC, 101 have only been reported once (Levissianos, 2014).

Figure 2: Number of member states where substances reported to the EMCDDA have been detected, EU, 2013



Additionally, it is important to note that many of the NPS detected are part of groups of similar substances with similar effects (such as cathinones), or dissimilar substances that produce similar effects (such as synthetic cannabinoids). This is unlike many traditional illicit drugs, such as cocaine, cannabis, ecstasy and heroin, which all have distinct effects. Similarly, despite the large number of substances detected, many of these are already controlled in the UK. As of March 2014¹², 64 per cent (241 out of 377) of the substances listed on the European Database on New Drugs were controlled in the UK under the Misuse of Drugs Act 1971 (Home Office, 2014c). This is highest for cathinones, with 53 out of 56 being controlled, and lower for other groups such as opioids (6 out of 11 controlled) and synthetic cannabinoids (68 out of 111 controlled).

¹² New controls have been introduced since this date, which would increase the percentage of substances under control. However, new substances have also been detected, which may decrease the percentage of substances under control.

3. Prevalence of NPS use

There are several sources of data on the prevalence of NPS use, from the nationally representative Crime Survey for England and Wales (CSEW) to smaller surveys focusing on specific subgroups. These sources tend to show that use of NPS in the general population is low compared to the use of traditional illicit drugs, but that use of NPS is higher in certain subgroups.

This chapter covers the prevalence of NPS use in both the general population and certain subgroups. The subgroups covered are: participants in the night-time economy, clubbers, men who have sex with men, school children, young adults, and psychonauts¹³. Potential approaches to improving data on NPS use are discussed at the end of the chapter in Box 2.

3.1 Use of NPS in the general population

Overall, reported use of NPS in the general population remains low compared to some traditional illicit drugs. Of all the NPS asked about, mephedrone achieved the highest levels of use, but use has fallen since peaking in 2010/11.

3.1.1 Crime Survey for England and Wales (CSEW)

The CSEW¹⁴ is the only nationally representative, random sample survey on drug use in England and Wales. It is a general population household survey that covers adults (aged 16 to 59) in England and Wales. The CSEW provides the best population level data on NPS use but there are some general limitations¹⁵ and some specific to NPS. It is challenging to keep pace with the evolving NPS market and, as only a minority of NPS are likely to be in widespread use, limited use may not be picked up in large-scale surveys of this type. Furthermore, NPS are typically only added to the CSEW when awareness has been raised from other sources; for example, mephedrone was added in the 2010/11 survey, after it had already been controlled.

Questions on selected NPS (GBL/GHB, BZP and spice) were first added into the CSEW in 2009/10¹⁶; these were taken out and replaced with salvia in 2013/14. Mephedrone was added in 2010/11 and, due to the relatively high prevalence of use, is now routinely included in the survey.

¹³ 'Psychonauts' as a term is sometimes used to refer to those who experiment with psychoactive drugs.

¹⁴ Formerly the British Crime Survey (BCS).

¹⁵ An established problem with household surveys such as the CSEW is that marginal groups, for example homeless people or people in institutions, are inadvertently excluded from the sample. As drug use in these groups may be higher than in the general population, overall drug use may be higher than measured by the CSEW. This is likely to be most apparent for the least commonly used drugs such as heroin. Additionally, due to the scale of the survey there is a considerable time lag between the survey being run and the results being published.

¹⁶ Questions on GBL/GHB, BZP and spice were added in October 2009, therefore only six months of data are available for this year, rather than the usual 12 months. However, as each quarter of the CSEW is nationally representative, these figures are still robust.

The CSEW shows that reported mephedrone use has fallen since measurements began in 2010/11 (see Table 1)¹⁷. Last year use of mephedrone among adults aged 16 to 59 was 1.3 per cent in 2010/11; it then fell to 1.0 per cent in 2011/12 and to 0.5 per cent in 2012/13. Use then stabilised between 2012/13 and 2013/14.

Use of other NPS in the CSEW has been relatively low compared with mephedrone, although there was a significant increase in reported use of salvia between 2012/13 and 2013/14 (Home Office, 2014b).

Table 1: Proportion of 16- to 59-year-olds reporting last year use of NPS, England and Wales, 2009/10 to 2013/14

%	2009/10	2010/11	2011/12	2012/13	2013/14
Mephedrone	N/A	1.3	1.0	0.5	0.6
GBL/GHB	0.1	0.0	0.1	N/A	N/A
BZP	0.4	0.1	0.1	N/A	N/A
Spice	0.3	0.2	0.1	N/A	N/A
Salvia	N/A	N/A	N/A	0.3	0.5
<i>Unweighted Base</i>	12,992	27,451	26,831	21,621	21,982

Similarly to most other drug types, use of NPS is higher among young adults. However, the survey shows a general downward trend in the use of NPS (see Table 2). As for all adults mephedrone has historically been the most used NPS, with use in the last year reaching a peak of 4.4 per cent in 2010/11 compared with 1.9 per cent in 2013/14. As with adults, use of the other NPS measured in the 2011/12 survey was low, although reported use of salvia in 2013/14 was at a similar level to mephedrone.

Table 2: Proportion of 16- to 24-year-olds reporting last year use of NPS, England and Wales, 2009/10 to 2013/14

%	2009/10	2010/11	2011/12	2012/13	2013/14
Mephedrone	N/A	4.4	3.3	1.6	1.9
GBL/GHB	0.5	0.1	0.2	N/A	N/A
BZP	1.3	0.2	0.1	N/A	N/A
Spice	1.2	0.4	0.3	N/A	N/A
Salvia	N/A	N/A	N/A	1.1	1.8
<i>Unweighted Base</i>	1,705	3,667	3,559	2,728	2,726

¹⁷ As population estimates from the 2011 Census are now available, previous estimates of drug use have been re-weighted using these new estimates. This means that some of figures in the 2013/14 Drug Misuse publication are different from the previous published trends. For example, last year use of mephedrone among adults (16 to 59) was previously estimated to be 1.4 per cent in 2010/11; this has now changed to 1.3 per cent following the re-weighting.

The CSEW shows that use of mephedrone has declined following control in 2010. The reduction and control happened over the same time period. However, it is plausible that other factors such as increasing reports of the health harms of mephedrone use, and the increasing quality of other comparable illicit drugs also contributed to the fall (Wood and Dargan, 2012c/e; Daly, 2011). As it is not possible to establish a counterfactual, it is not possible to isolate the specific impact of these different factors.

3.2 Use of NPS in subgroups

There are relatively high levels of NPS use in specific subgroups, such as clubbers and men who have sex with men, compared to the general population. There is evidence from the CSEW to support this, as well as a range of other research, which focuses on particular subgroups.

Other research tends to show higher rates of use than the CSEW, but due to the sometimes small-scale and self-selecting nature of the other research in this area, it cannot be used to generalise or identify nationally representative trends. Nevertheless, when used alongside other sources, it helps build a more in-depth picture to understand the use of NPS.

3.2.1 Participants in the night-time economy (NTE)

There is strong evidence of an association between higher levels of use of both traditional illicit drugs and NPS among those who regularly visit pubs and clubs. For example, the CSEW found that those who had visited a nightclub four or more times in the last month were about five times more likely to have used any illicit drug in the last year, compared with those who had not visited a nightclub (32.5% and 6.5% respectively) (Home Office, 2014a).

Of the NPS measured in the CSEW, breakdowns by night-time economy participation are only available for mephedrone. This shows that last year use of mephedrone was highest among adults who had visited a nightclub on four or more occasions in the last month (5.8%), compared with those who had been to a nightclub less frequently in the past month (one to three visits: 2.1%; no visits: 0.3%). A similar pattern is also visible in pub/wine bar visits (see section 4.1 for further demographic breakdowns). This pattern is also seen in traditional illicit drugs such as ecstasy and ketamine.

Other surveys such as the Global Drug Survey, south London nightclub surveys, and Lancashire night-time economy surveys also show high levels of use.

Global Drug Survey

The Global Drug Survey¹⁸ (GDS) is a self-selecting online survey that was initially aimed at readers of the dance music/clubbing magazine *Mixmag*. Its scope has now been widened to include other media partners such as the *Guardian* and *Gay Times*. In total, 3,591 regular clubbers¹⁹ in the UK responded to the GDS in 2013/14.

Although the methodological limitations, summarised below, mean it is not possible to directly compare year-on-year findings, results from the 2013/14 GDS suggest that mephedrone use

¹⁸ Formerly the Mixmag Drug Survey

among regular clubbers¹⁹ is in decline, but that it is still more prevalent than other NPS asked about. Mephedrone use peaked in 2010/11 with 51.0 per cent of regular clubbers who responded to the survey reporting taking mephedrone in the last year; since then it appears to have substantially declined, to 12.5 per cent in 2013/14. Table 3 shows the relatively limited popularity of other NPS measured in the 2011/12 survey when compared to mephedrone (Mixmag, 2012).

Table 3: Proportion of regular clubbers reporting last year use of NPS, GDS, 2011/12

Type of NPS	%
Mephedrone	30
2C-B	12
Methoxetamine	6
2C-I	6
Synthetic Cannabis	5
Benzo Fury	3
MDAI	3
Methylone	2

While the GDS provides insight into NPS use, it does have limitations. The self-selecting sample means the results cannot be generalised to the wider population as the sample may be biased towards those who have drug use to report. Additionally, the sample size has been increasing each year, which makes year-to-year comparisons problematic²⁰.

Surveys in the night-time economy

Surveys in nightclubs have revealed high levels of NPS use and different trends when compared to general population surveys. An in-situ survey of ‘gay-friendly’ dance clubs in south London in 2010 had 308 responses and found that 27 per cent of participants had used, or were planning to use mephedrone that night (Measham *et al.*, 2011a). The same study reported that 41 per cent of respondents reported using mephedrone in the past month and 52 per cent reported mephedrone use in the past year. Prevalence of other NPS was lower: last month use of NRG-1²¹ was 11 per cent and MDAI was four per cent.

A follow-up study (Wood *et al.*, 2012a) using the same method in the same gay-friendly dance clubs in south London gathered 315 responses. It found that:

- 41 per cent of participants had used, or were planning to use mephedrone that night, an increase from the 27 per cent in the original study;

¹⁹ The Global Drug Survey defines regular clubbers as respondents who have been clubbing in the last month.

²⁰ While the survey tries to control this by reporting ‘regular clubbers’, it is possible this control could have been diluted, from dance/rave clubbing where drug use is relatively higher to more mainstream clubbing where drug use is relatively lower.

²¹ NRG-1 is a brand name for naphyrone and was marketed as a replacement for mephedrone at the time the survey was conducted. However, forensic analysis of test purchases has shown that most NPS sold as NRG-1 did not contain naphyrone (Brandt *et al.*, 2010).

- a fifth (20.4%) of participants stated that mephedrone was their favourite drug;
- 24 per cent of participants reported use, or were going to use GHB/GBL that night; and
- two-thirds (65.8%) of participants had reported that they had previously used a ‘legal high’ (Wood *et al.*, 2012b).

However, ‘last month’ and ‘today’ figures were considerably smaller (see Table 4). The majority of the sample had tried NPS and mephedrone was by far the most prevalent. Among customers in gay-friendly dance clubs in south London, mephedrone use is considerably higher than any other NPS. Additionally, use of mephedrone has increased since it was controlled.

Table 4: NPS use in ‘gay-friendly’ south London nightclubs, Wood *et al.* (2012b)

%	Life-time use	Last month	Today/Tonight
Any NPS	65.8	N/A	N/A
Mephedrone	63.8	53.2	41.0
BZP	9.3	1.6	0.6
MDAI	7.7	1.3	0.0
Synthetic Cocaine	9.9	3.5	0.0
Spice/K2	9.0	2.2	0.6
Methoxetamine	6.4	1.9	1.6
Pipradols	1.6	1.0	0.6

These studies, conducted pre- and post-legislation, concluded that ‘the control of mephedrone in the UK has not significantly affected its availability, use or appeal to club-goers in the London night-time economy’ (Measham *et al.*, 2011a; Wood *et al.*, 2012a). Other studies have also shown mixed findings with some mephedrone users continuing and others desisting (Winstock *et al.*, 2010a; Van Hout and Brennan, 2012; Carhart-Harris *et al.*, 2011).

Another in-situ survey, of the night-time economy in Lancashire, found high levels of mephedrone and ‘Bubble’ use²², with 16 per cent of respondents reporting ‘Bubble’ use in the last year and 11 per cent reporting mephedrone use (Measham, *et al.*, 2011c). This was at a similar level to some traditional illicit drugs such as speed (11%) and ecstasy (pills 18%, powder 14%). Last year use of the other NPS asked about in the survey was low (MDAI and NRG-1 were 1%, Ivory wave was 0% (Measham *et al.*, 2011c)). A follow-up survey in 2012 found lower levels of mephedrone (7%) and bubble (11%) use in the last year. The survey also asked about the use of ‘other legal highs’, and found that reported use in the last year was eight per cent, a similar level to mephedrone but lower than ecstasy (pills 16%, crystal 18%) and cocaine (24%) (Measham *et al.*, 2012).

²² ‘Bubble’ is a slang term, commonly used in the North West, to describe any NPS with stimulant effects.

3.2.2 Men who have sex with men

There is evidence that there are high levels of traditional illicit drug and NPS use among men who have sex with men. Additionally, there is evidence that within certain niche subgroups of men who have sex with men, traditional illicit drugs and NPS are being used to facilitate risky sexual practices.

By combining three years of CSEW data, it is possible to analyse drug use by sexual orientation. Although the CSEW does not include breakdowns of NPS use by sexual orientation, there are figures for use of any illicit drugs in the last year. This shows that gay or bisexual men were the group most likely to have taken any illicit drug in the last year (33.0% reported taking drugs in the last year), with higher levels of illicit drug use than gay or bisexual women (22.9%) and heterosexual men (11.1%) (Home Office, 2014b).

Other research with men who have sex with men also supports this finding (Hunter *et al.*, 2014). Additionally, as detailed in the section above, use of NPS in 'gay-friendly' dance clubs is high.

As well as a general high level of drug use, there are reports that within certain niche subgroups of gay men, certain drugs (including NPS) are being used in a highly sexualised context to facilitate or enhance sex. This often involves group sex or a high number of partners (Bourne *et al.*, 2014). This phenomenon has been termed 'chem sex'. Typically the drugs used are crystal methamphetamine, mephedrone and GHB/GBL, with crystal methamphetamine and mephedrone being injected, and GHB/GBL being taken orally (Kirby and Thornber-Dunwell, 2013). 'Chem sex' is not an NPS-specific phenomenon, as traditional illicit drugs are used alongside NPS. However, as it may involve high-risk behaviours such as intravenous drug use and unprotected sex, which can lead to the transmission of HIV and other STIs, this is an area of ongoing concern.

There is a limited amount of research on 'chem sex' and it is not possible to quantify the overall extent of this phenomenon. Research suggests that it is likely that 'chem sex' is confined to niche elements of the men who have sex with men scene, largely within London and other major metropolitan areas.

3.2.3 School-aged children

National Statistics on drug use among 11- to 15-year-olds come from The School Survey of Smoking, Drinking and Drug Use. Mephedrone was the first, and currently only, NPS to be included in the questionnaire. Two years of data on mephedrone use are available.

In 2012, 0.7 per cent of pupils reported that they had taken mephedrone in the last year, a similar level to use in 2013 (0.4%).²³ For comparison, in 2013, 7.0 per cent of pupils reported taking cannabis in the last year, and 3.6 per cent of pupils reported taking volatile substances (glues, gases, aerosols and solvents) (Fuller and Hawkins, 2014; Fuller, 2013).

²³ The difference between these figures is not statistically significant.

3.2.4 Young adults

Other surveys of NPS use among young people support the findings from the CSEW. They show that, similarly to most other drug types, use of NPS is higher among young people relative to the general population.

A survey of 1,006 Scottish school, college and university students in 2010, prior to the classification of mephedrone, found that 20.3 per cent of the sample reported having ever used mephedrone (Dargan, *et al.*, 2010). Of those that had used mephedrone, 23.4 per cent had only used it on one occasion.

A European Commission (2014) Eurobarometer poll of over 13,000 young people aged 15 to 24 years old in EU member states found that eight per cent of respondents reported using NPS. The UK was higher than the EU average with 10 per cent reporting use. Caution is advised when interpreting the Eurobarometer surveys due to the several reasons: while the overall EU sample is large; the sample for each member state is a relatively low 500, the questions used have changed between the 2011 and 2014 surveys making it harder to compare between years, and the Eurobarometer survey tends to overestimate usage when compared to more robust surveys such as the CSEW. Additionally, as previously mentioned in Box 1, the control status of NPS differ between countries, therefore the substances that respondents thought were NPS may also have differed between countries.

3.2.5 Psychonauts

'Psychonauts', is an established term used to refer to those who experiment with psychoactive drugs; they often take detailed notes, partake in online discussions and have detailed technical knowledge (Davey *et al.*, 2012). Despite the smaller user base when compared to recreational users, the potential for serious health harms is high, due to the tendency for early experimentation with novel NPS, although as this group often shares information on harm minimisation, this may reduce risks (Schifano *et al.*, 2005). Specific demographic information about this group is not available, but it seems that the defining characteristics of this group are not demographic characteristics, but rather a shared set of values and beliefs. However, boundaries between this group and other more recreational users remain unclear and there is a clear lack of research in this area.

Box 2: Promising approaches to improving data on NPS use

Better questionnaire design

As discussed throughout this chapter, there are a number of limitations in the current approaches to measuring NPS prevalence. Whilst the CSEW provides high-quality data on the use of specific NPS, it only covers a small range of substances. Other surveys cover a wider range of substances but tend to be small-scale and may lack in scope or methodological robustness. Some of these surveys are also self-selecting, and the results are likely to be biased towards those who have something to report.

The limitations mean it is difficult to produce robust population measures of the total level of NPS use. In response a new group of questions on NPS are being trialled in the CSEW and

the School Survey for 2014/15 with the aim of improving measurement at population level. The new questions build on those developed by the EMCDDA and findings will be available in summer 2015.

Waste water analysis

A recurring issue in NPS is the difference between how NPS are labelled, marketed and sold and the actual psychoactive substances they contain. As detailed in the section 'NPS products', NPS samples often contain more than one substance (Home Office, 2014b). This has implications for the accurate measurement of NPS, particularly for the self-reporting of use. Users are, to some extent, likely to be unaware of all substances they are taking which may result in the prevalence of some individual NPS and poly-substances being higher than the self-reported figures would suggest.

Emerging techniques around waste water analysis and urine analysis may help to overcome issues of self reporting (EMCDDA, 2014c; Chen *et al.*, 2013; Archer *et al.*, 2012; Archer *et al.*, 2013). This technique can provide accurate, location-specific and timely information on the actual substances being used. As drug metabolites are detected, actual consumption of NPS can be determined. However, this technique cannot provide information on individual consumption patterns and should therefore be viewed as a complementary method to self-report survey data, rather than a replacement.

4. Characteristics of NPS users

NPS use is mainly confined to existing drug users. Therefore the demographic profile of NPS users is broadly similar to that of an illicit drug user.

This chapter covers the characteristics of NPS users, including: demographics, the extent to which NPS users take other traditional illicit drugs, the emergence of generic stimulant drugs, and the injection of NPS.

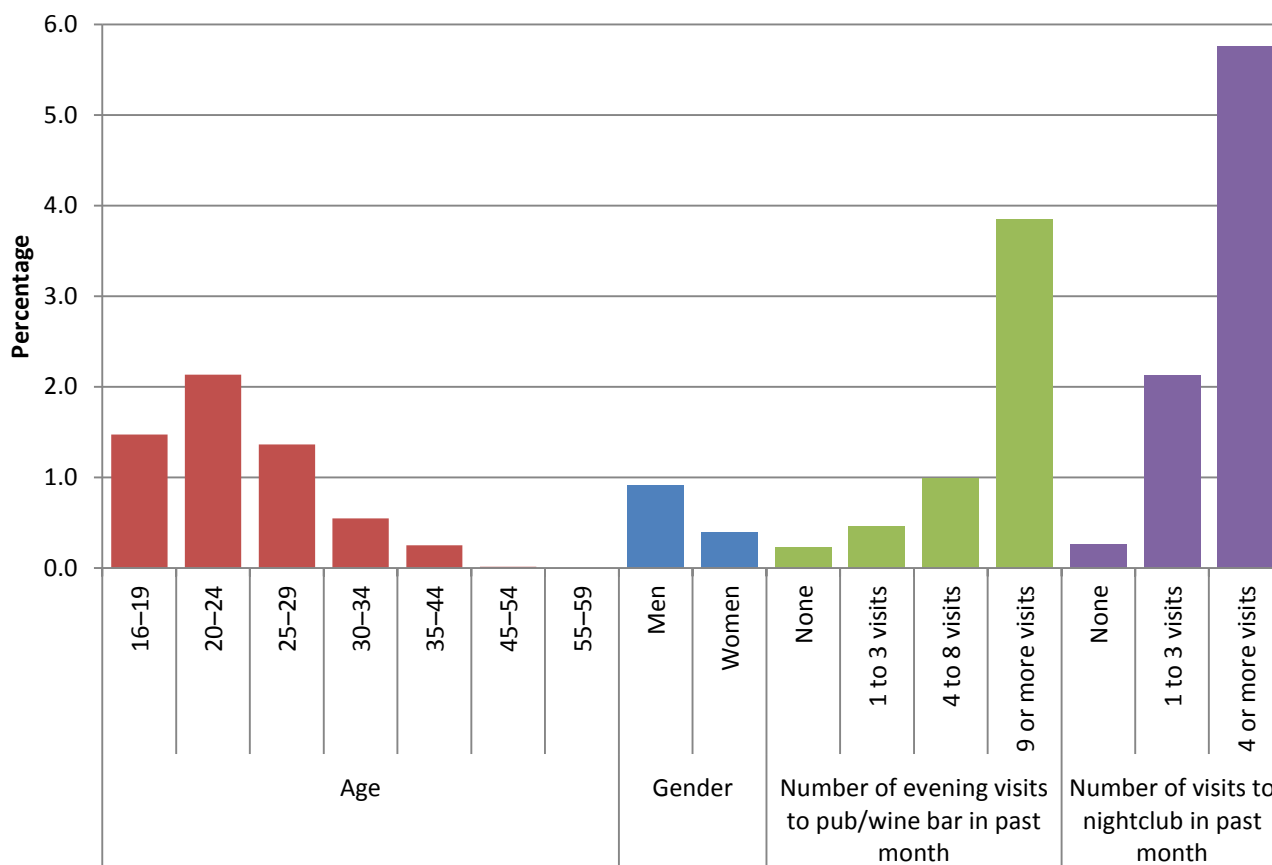
4.1 Demographics

The CSEW reports drug use by a whole range of social and demographic factors (Home Office, 2014b). Figure 3 shows the distribution of mephedrone use by age, sex and interaction with the night-time economy.

- Men were twice as likely as women to report last year use of mephedrone (0.9% and 0.4% respectively).
- The level of mephedrone use was highest among single adults (1.5%) compared with all other marital statuses.
- Adults living in urban areas were more likely to report that they had used mephedrone in the last year compared with adults living in rural areas (0.7% and 0.4% respectively).

These trends are similar to other traditional illicit drugs, such as cocaine and ecstasy, albeit at a lower overall level of use.

Figure 3: Proportion of adults aged 16 to 59 reporting last year use of mephedrone, by age group, sex and interaction with the night-time economy, England and Wales, 2013/14



Other sources of evidence also show similar demographic profiles to the CSEW, with research suggesting that the profile of an NPS user is broadly similar to the profile of other illicit drug users and, in particular, to that of a club drug user²⁴. That is to say, both NPS and club drug users are generally young males and socially functional (National Treatment Agency, 2012).

The 2009 Global Drug Survey reports that 69.3 per cent of mephedrone users were male with an average age of 23.8 years²⁵ (Winstock *et al.*, 2010b). An online survey of mephedrone users also showed similar results (Carhart-Harris *et al.*, 2011).

There is a similar picture for spice: the 2012/13 Global Drug Survey reports that 70.7 per cent of spice users are male, with a median age of 26 and almost all (91.5%) identified as White (Winstock and Barratt, 2013). Similarly, an online survey of 168 spice users found that 83 per cent were male and 90 per cent were White (Vandrey *et al.*, 2012). Additionally, 47 per cent were in full-time employment and 28 per cent were students.

²⁴ Public Health England (PHE) defines a club drug as a 'substance typically used by young people in bars and nightclubs, at concerts and parties'.

²⁵ These findings should be considered in the context of the self-selecting nature of the 2009 survey sample, which was itself mainly male (65.3%) with a mean age of 25.

4.2 Are users of NPS new or existing users of drugs?

A concern surrounding non-controlled NPS is that they could be attracting a new and naive group of drug users. It is supposed that their legal status, veneer of safety and ease of availability might attract users that would not engage in illicit-drug-taking activity. The available research evidence suggests that these naive users probably comprise a small proportion of overall NPS users and that the majority of NPS use is among existing drug users.

The 2013/14 CSEW showed that, of those who had used mephedrone in the last year, 98 per cent had taken any other illicit drug in the last year. Within this:

- 80 per cent had taken cannabis in the last year;
- 73 per cent had taken cocaine in the last year; and
- 62 per cent had taken ecstasy in the last year.

The 2013/14 CSEW also found that, for salvia, an uncontrolled NPS, the majority of users (83%) had used another illicit drug in the last year. However, salvia users were less likely to have taken cocaine and ecstasy compared to mephedrone users. Of those who used salvia in the last year:

- 73 per cent had taken cannabis in the last year;
- 37 per cent had taken ecstasy in the last year; and
- 33 per cent had taken cocaine in the last year.

Additional research with NPS users supports this finding (Winstock *et al.*, 2013; Sheridan and Butler, 2009; Hu *et al.*, 2011; Newcombe, 2009; Barratt *et al.*, 2012; Vandrey *et al.*, 2012; Wilkins *et al.*, 2006). The exact figure varies between studies, but research suggests that between 83 per cent and 99 per cent of NPS users are also users of other traditional illicit drugs.

There appears to be specific relationships between traditional illicit drugs and the NPS that are designed to imitate them. One example is cannabis and synthetic cannabinoids. Analysis of the 2,513 spice users who responded to the Global Drug Survey found that 95.0 per cent of spice users had also used cannabis in the last year (Winstock *et al.*, 2013). This rises to 99.3 per cent for lifetime use of cannabis. Interestingly, 93 per cent of respondents preferred cannabis to spice. A similar analysis of 582 NBOMe users found that 43.1 per cent had lifetime use of magic mushrooms, and 39.4 per cent had lifetime use of LSD (Lawn *et al.*, 2014).

Most of the available research has focused on NPS users who have also used other drugs. The lack of evidence on naive drug users could be because existing and experienced drug users are more numerous than naive users and therefore easier to access for research. This is likely, as the balance of the evidence shows that NPS use is largely confined to existing drug users. However there is an evidence gap surrounding the small proportion of NPS users who do not use other illicit drugs.

4.3 The emergence of generic stimulant drugs

There is emerging evidence to suggest that some NPS users are not expressing preferences for specific substances, and instead they are seeking generic stimulant type drugs (i.e. any white powder).

Measham *et al.* (2011b) describe the emergence of 'Bubble' as a generic term for stimulant drugs. Within the Lancashire night-time economy, it appears that 'Bubble' was initially a slang term for mephedrone, but it has now evolved into a term referring to any synthetic legal high or white powder with stimulant effect. Of the sample of 207, 18 per cent reported having ever used Bubble and 16 per cent reported last year use of Bubble. This is higher than the figures for mephedrone from the same sample, at 13 per cent lifetime use and 11 per cent last year.

Further evidence of this phenomenon comes from the 2013/14 Global Drug Survey. This found that 17.5 per cent of regular clubbers had taken a mystery powder in the last year (Mixmag, 2014). Of these, 12.9 per cent of respondents thought the powder was mephedrone, five per cent thought it was a 'legal high' and 5.9 per cent thought it was an 'research chemical' (Mixmag, 2014). Eighty per cent of those who took a mystery powder were intoxicated at the time (Mixmag, 2014). This is a similar level to the 2012/13 Global Drug Survey, where 20 per cent of regular clubbers reported taking a mystery powder in the last year.

4.4 Injection of NPS

There are reports from drug treatment workers that a small amount of users are injecting mephedrone (Daly, 2012). Overall data on this behaviour is scarce, but it appears that former and existing heroin and crack cocaine users are those most likely to inject mephedrone. For example, a descriptive study of 11 mephedrone injectors in Ireland found that all participants had extensive histories of previous intravenous and poly drug use (Van Hout and Bingham, 2012). These users seem to inject mephedrone due to a scarcity of their preferred drug, therefore this behaviour may be more common in non-urban areas where drug supplies are intermittent. Additionally, comments from recreational mephedrone users indicate an awareness of the inadvisability of mephedrone injection (Newcombe, 2009; Ryall and Butler, 2011). Daly (2012) concludes that:

'the consensus among drug workers is that, even in the context of heroin and crack use, it [mephedrone injection] is a desperate act committed by people with low self-esteem living moribund, dead-end existences, away from the country's major urban centres'

As discussed previously, the intravenous use of NPS may also be higher in niche parts of the gay scene.

5. The market for NPS

NPS are available from a range of different sources: headshops, other non-specialist retailers, the 'clearnet', and the 'darkweb'. Despite ready availability on the clearnet, evidence suggests that the most frequent source for NPS users is from their friends, dealers and headshops. However, less is known about the social supply of NPS, and these friends may be purchasing in bulk from the internet. Analysis of NPS products shows that many contain mixtures of several different substances, and some contain controlled drugs.

This chapter covers the range of different sources for NPS (headshops, other non-specialist retailers, the 'clearnet', and the 'darkweb'), the purchasing behaviour of users, the content of NPS products, the development of novel NPS, and the illicit supply of NPS.

5.1 Headshops and other non-specialist retailers

Non-controlled NPS are often sold from high street outlets called 'headshops'. The Home Office's expert review panel report defines a headshop as:

'Commercial retail outlet specialising in the sale or supply of NPS together with equipment, paraphernalia or literature related to the growing, production or consumption of cannabis and other drugs. These outlets may also have online businesses, but those businesses solely based online would not fit within this definition.'

Headshops are not a new type of business, and some headshops have been established for many years, selling cannabis paraphernalia and counterculture products. However, with the rise in NPS, there have been concerns that the number of headshops may be increasing, driven by the opportunities and profit provided by non-controlled NPS, and some may now be focusing on the sale of NPS over other products. Headshops are unlikely to be a homogenous set of retailers, and there are reports of varying standards of retailing, with some headshops aiming to be responsible and only selling to over-18s, and other less scrupulous shops selling to children (Daly, 2013; DrugScope, 2014).

Despite the concern, there is very little robust evidence on the number of headshops in the UK, nor on how many of them are selling NPS. The Angelus Foundation²⁶ has estimated that there are over 250 headshops in the UK (PRNewswire, 2013). This estimate was produced by trawling internet sites and liaisons with Trading Standards officers. The Angelus Foundation acknowledges that this estimate may be inaccurate, but given the lack of any more reliable estimates, it provides the only indication of the number of headshops in the UK.

There are also reports that NPS are being sold in non-specialist retailers, such as corner shops, petrol stations and takeaways (Daly, 2013; DrugScope, 2014). There is no evidence on the overall number of non-specialist retailers selling NPS, but this is an area of concern, as it has the potential to introduce NPS to casual users who may not actively seek them out in headshops.

²⁶ The Angelus Foundation's aim is to 'educate, encourage and assist individuals to be more knowledgeable about the risks to their health and wellbeing of using 'legal highs' and other new psychoactive substances' (Angelus Foundation, 2014).

5.2 Internet

An important aspect of the debate around NPS has been the use of the internet in the sale of these substances. The evidence in this area suggests that non-controlled NPS are readily available on the clearnet, and some controlled NPS are available on the darkweb. Despite this, internet purchasing is not as widespread as is commonly suggested, and only a small minority of NPS users purchase online.

5.2.1 Clearnet

The 'clearnet' refers to websites that are openly available on the internet. It is likely that NPS retailers on the 'clearnet' in the UK will be selling non-controlled NPS, as these websites are freely accessible and any illegal items could be quickly identified by law enforcement agencies. Those outside the UK may sell NPS that are not controlled in their host jurisdiction, but which are controlled in the UK.

The best available data on the number of NPS internet retailers comes from the EMCDDA Snapshots (2014a). These multi-lingual snapshots aim to identify the online availability of NPS to users within the EU. The January 2013 snapshot identified 651 online shops selling NPS and shipping to at least one EU member state. This is a small decrease from the 693 identified in the January 2012 snapshot, but was more than twice the number of shops identified in January 2011 (314 shops) and a more than a three-fold increase from January 2010 (170 shops).

Breakdowns from the January 2014 snapshot are not published, but the substances most frequently identified for sale in the January 2012 snapshot were kratom (179) and salvia (134), followed by hallucinogenic mushrooms (95), methoxetamine (68), and MDAI (65). The other substances in the top ten were 6-APB (54), MDPV (44), 4-MEC (43), methiopropamine (39) and 5-IAI (38)(EMCDDA, 2012c). The EMCDDA has made slight changes over time to the snapshot method, but despite this these results remain a valid indicator of the growth of online shops selling NPS. However, caution is advised when interpreting these figures, as the snapshots only show the reported availability of NPS, not the extent to which users are actually purchasing NPS online.

The EMCDDA 2011 snapshot reports that, out of the 631 online shops identified selling to the EU, 121 of these were likely based in the UK. These findings are supported by Schmidt *et al.* (2011) who identified 115 UK-based websites selling a total of 1,308 NPS products.

- The most frequently available products were salvia, kratom, hawaiian baby woodrose seeds, fly agaric and a synthetic cannabinoid blend.
- The average product price was £9.69 but there was significant variation with a minimum of £1.75 and a maximum of £54.99.
- Products were available in a variety of formulations, 46.6 per cent were pills or tablets, 29.7 per cent were smoking blends, 18.1 per cent were plant material or extract with the remainder being powders, liquids, orodispersable strips/gum.

- The majority (58.8%) of these were designed to be swallowed, 36.1 per cent smoked and 3.8 per cent snorted; 41.7 per cent of products were stimulants, 32.3 per cent were sedatives, 12.9 per cent were hallucinogens. 8.1 per cent were mixed and 3.8 per cent were aphrodisiacs.
- 40.1 per cent of products did not list ingredients.

5.2.2 Darkweb

NPS may also be supplied on the 'darkweb'. The 'darkweb' refers to websites that are not openly available on the internet, and can only be accessed with anonymising software such as Tor²⁷. As these websites are hidden, and the identity of the seller and buyer are not disclosed, the 'darkweb' provides a platform for the trade in illicit drugs, including controlled NPS. The 'Silk Road' is the most well-known example of a 'darkweb' drug market, and was the initial market leader, but since the 'Silk Road' was shutdown by the FBI in October 2013, the 'darkweb' drug market has become more fragmented, with a wider range of retailers, and no clear market leader (Buskirk *et al.*, 2014; Christin, 2012).

Evidence currently suggests that 'darkweb' sites play a small role in the supply of NPS to users, with the most popular listing being for illicit drugs such as MDMA and cannabis (Barratt *et al.*, 2013a). This is understandable, as there would be little advantage for users to purchase non-controlled NPS on the 'darkweb' when they are freely available on the 'clearnet'. The anonymity would be a benefit for users purchasing controlled NPS; however, when controlled NPS are offered for sale alongside high-quality traditional illicit drugs, it appears that users express a preference towards traditional illicit drugs. However, there is emerging evidence that these sites may play a greater role in the wholesale supply of NPS (Caudevilla, 2014).

5.3 The open sale of NPS

Control of NPS appears to be effective at preventing the open sale of NPS. The ACMD (2012b) reported that the methoxetamine ban 'had a real and immediate impact in tackling internet sales'. However, they also stated that it is 'possible that methoxetamine remains available online but sold under other descriptions'.

There is some evidence that retailers continued to sell NPS after they have been controlled, but this may be inadvertent, due to a lack of awareness of what substances were in their products. Test purchases from online 'legal high' shops by Ramsey *et al.* (2010) found that five out of six products purchased after the April 2010 amendments to the Misuse of Drugs Act (1971) contained Class B drugs, despite four being openly advertised as containing legal substances only. Given the proximity of these purchases to the April 2010 amendments it is possible that suppliers were clearing out products they had purchased prior to classification. Similar findings emerged from Dargan *et al.* (2011), with 85 per cent of spice samples purchased after legislation containing a controlled synthetic cannabinoid.

²⁷ Tor is a piece of anonymising software that allows users to access hidden websites.

To some extent, the market may now have stabilised, as previously mentioned, data from FEWS shows that there are now fewer controlled NPS being found in samples from headshops and internet retailers.

5.4 Purchasing behaviours

Despite NPS being readily available online, and the widely held perception that they are purchased online, it appears that most NPS users do not source NPS in this manner.

The European Commission Eurobarometer (2014) survey of over 13,000 young people in EU member states found that three per cent of users purchased NPS over the internet; for the UK the figure was slightly higher at six per cent. For the UK, the most popular (58%) route was from a friend, followed by drug dealers (39%) and specialist shops (18%). Their findings are similar to the 2011 Eurobarometer, which reported that 7.2 per cent of UK NPS users purchased online.

These findings are supported by a survey of over 1,000 school, college and university students in Scotland prior to the classification of mephedrone which found that 10.7 per cent of users sourced their mephedrone online (Dargan, 2010). The most common (48.8%) source of mephedrone was dealers. However, they did observe a link between age and increasing preference for online acquisition. Around one in twelve (8.3%) 13- to 15-year-olds sourced mephedrone online compared to one in three (30.8%) of those aged over 24. This suggests that younger users may lack the necessary financial tools (debit/credit card) and a safe delivery address that online purchasing requires. Although not specifically NPS based, higher levels of online purchasing were also found in the 2013/14 GDS, with 22.1 per cent of UK respondents reporting having ever bought drugs online.

Low levels of online purchasing have also been found in international research (Matthews and Bruno, 2010; Khey, 2008). However, it is worth noting that these figures are higher than the one per cent of regular illicit drug users who purchased drugs over the internet (Home Office, 2014b).

These findings suggest that purchasing NPS from the internet is relatively uncommon, but it is possible that the internet could play a greater role in social supply, with one friend or dealer within a social group purchasing NPS online to resell to others within the group. There are reports of this taking place, and of users switching from headshops to online retailers to save money (DrugScope, 2014). However, the overall extent to which this is happening remains unknown.

5.5 NPS products

Uncontrolled NPS are often sold as either branded products such as 'Benzo Fury' and 'Annihilation', or specific 'research chemicals'. However, in many cases there is evidence of inconsistency in the content of NPS, with many containing mixtures of different substances or, in a minority of cases, controlled drugs.

Data from the Home Office's FEWS provides evidence of the scale of this problem. Of the samples analysed by FEWS, around nine out of ten were mixtures of either two (61%) or

three (30%) different active components. One per cent of samples were identified as containing up to six different active components.

Findings from FEWS also show that some NPS samples contain controlled drugs. In total, 19.2 per cent of NPS found in the NPS samples collected by FEWS in 2013/14 contained controlled drugs (Home Office, 2014b). This is a similar level to the 19 per cent of samples that contained controlled drugs that were collected by FEWS in the first three months of operation in 2011 (Home Office, 2012b). However, the extent to which NPS contained controlled substances differed substantially depending on the source of the sample. A notable reduction was seen in the proportion of samples from the internet and headshops containing controlled drugs, though this was not the case with samples from festivals. In 2013/14, of the substances found within NPS samples²⁸, 3.0 per cent of substances from the internet and 4.3 per cent of substances from headshops were controlled NPS, compared with 16.1 per cent and 63.5 per cent respectively in 2012/13²⁹. However, 88.1 per cent of festival samples contained controlled drugs in 2013/14, a similar level to 2012/13 (83.8%) (Home Office, 2014b). To some extent, the market may now have stabilised since the research described in section 5.3 was undertaken, as FEWS data shows a reduction in the percentage of controlled NPS found in headshop and internet samples.

Other test purchases have also shown variation in the substances supplied by internet sites. Davies *et al.* (2010) report that over six months of test purchases from internet-based legal high shops, there was variation in the content of 25 per cent of test purchases. Similarly, Baron *et al.* (2011) found that six out of seven products did not contain the advertised active ingredient.

5.5.1 Mislabelling

Retailers will often mislabel NPS with a disclaimer that they are 'Not for human consumption', and therefore provide no information about the use or harms of NPS, such as dosage or harm reduction advice (Newcombe, 2009:4; EMCDDA, 2011:5; Corazza *et al.*, 2012). For example, a study of online NPS retailers found that 91.9 per cent (1,202) of products failed to list any side effects, 81.9 per cent (1,058) of products failed to list any contraindications³⁰ and 86.3 per cent (1,129) failed to list any warnings about potential interactions with other substances (Schmidt *et al.*, 2011). This may potentially increase the harms of NPS, as uninformed users may take NPS in particularly dangerous ways. However, without full testing of a substance, any advice given may provide false assurances of safety for users.

5.6 The development of novel NPS

As previously described, there has been a rise in the number of novel NPS detected in Europe. It is plausible that there are many factors that are driving this rise, such as globalisation and rapid exchange of information on the internet. However, it has also been

²⁸ Many FEWS samples contain more than one substance, and as the data is presented in a way that does not link the substances found to the specific samples, it is only possible to describe the percentage of substances found that contain controlled drugs, as opposed to the percentage of samples that contain controlled drugs.

²⁹ FEWS collection plans vary on a year-to-year basis, and may target different aspects of the NPS market. Therefore each year's figures are not directly comparable.

³⁰ A contraindication is a specific situation in which a drug should not be used because it may be harmful.

suggested that substance-by-substance controls may play a role in the generation of novel NPS (ACMD, 2012a. Dargan *et al.*, 2011. Fattore and Fratta, 2011).

Producers may quickly adapt to changes in legislation by marketing similar compounds that are not controlled. This phenomenon has occurred across different categories of NPS. For example, test purchases after the classification of synthetic cannabinoids revealed two compounds that were not covered by the UK's generic legislation, and shortly after mephedrone was controlled, retailers marketed naphyrone as a replacement (Dargan *et al.*, 2011. Brandt *et al.*, 2010). However, to an extent, this may be a more enduring problem for synthetic cannabinoids than other categories of NPS. As previously mentioned, 53 out of 56 cathinones listed on the European Database of New Drugs are controlled in the UK. This is lower for synthetic cannabinoids, with 68 out of 111 being controlled. This reflects the success of the UK's generic definitions in capturing the broad majority of cathinones, and the remaining challenge in covering the wider array of synthetic cannabinoids.

Furthermore test purchases immediately after mephedrone control found that only one of the 17 samples sold as naphyrone actually contained the substance. Most contained a mixture of banned cathinones, including mephedrone, suggesting that some retailers responded to classification by attempting to sell off their old stocks of recently controlled substances (Brandt *et al.*, 2010). Retailers may also respond to control by offering 'clearance sales' on soon to be controlled NPS. At the time of writing, several internet sites were offering large discounts on alpha-Methyltryptamine (AMT), following an announcement that it would shortly be controlled as a Class A drug.

5.7 Illicit supply

Since classification, the remaining residual market for mephedrone has shifted to illicit suppliers, and there is evidence that the average price of mephedrone has increased. Reports from law enforcement agencies report an increase from around £10 per gram in 2010 to around £20 per gram in 2012 (Davies and Murray, 2013). Other research also shows an increase in the price of mephedrone after classification (Winstock *et al.*, 2010a). However, data from DrugScope suggests that the price has remained stable, at £19 a gram in 2010 and 2012 (Davies and Murray, 2013).

The illicit supply of NPS depends on whether there is considered to be sufficient demand for the substances and, therefore, only popular NPS are likely to move into criminal supply after formal control. So far, this only seems to be the case with mephedrone (EMCDDA, 2013b), and the majority of controlled NPS are not supplied by Organised Crime Groups (OCGs).

However, as mephedrone is now a controlled drug, law enforcement agencies can disrupt illicit suppliers. There were 2,440 seizures of mephedrone by the police in England and Wales in 2011/12, totalling 83kg. Across the UK, the number of seizures increased by 16.4 per cent, but the actual quantity seized fell by 20.0 per cent (Davies and Murray, 2013).

6. Motivations for NPS use

Research into NPS suggests that reasons for initiating NPS use are broadly similar to reasons for initiating use of traditional illicit drugs, such as curiosity, boredom and peer pressure. When considering why people choose NPS over traditional illicit drugs, the most important reasons are likely to be market factors such as price, availability and perceived higher quality when compared to illicit drugs. The evidence that market factors are driving NPS use becomes particularly compelling when we consider that the majority of NPS users are also users of other illicit drugs. In the case of mephedrone it appears that it was considered to be better quality, cheaper, and more easily available than traditional illicit drugs, and thus there were strong reasons for users to switch from traditional club drugs.

The evidence surrounding legality as a motivating factor is less clear. It appears that for existing illicit drug users it is not legality *per se*, but the factors that arise from this status such as quality, convenience and availability. However, for new users legality in itself may be a motivating factor.

This chapter covers the reasons for the initiation and continuation of NPS use, what motivations there may be for choosing NPS over traditional illicit drugs, the subset of users who are motivated by a desire to avoid drug tests, and the inadvertent role the media plays in promoting NPS.

6.1 Initiation and continuation of NPS use

As well as being motivated by the psychoactive effects that NPS have, users have a range of other motivations for initiating drug use. Evidence in this area is by no means conclusive, as it is mainly from comments made in focus groups and interviews with small sample sizes. Nevertheless, it appears that the reasons for initiation of mephedrone use are curiosity and boredom (Newcombe, 2009). These reasons are similar to those given for initiation of traditional illicit substances among school-age children (Fuller, 2012). After initiation, reasons for continuance include liking the effect and developing a habit (Dargan *et al.*, 2010).

6.2 Motivations for choosing NPS over traditional illicit drugs

As previously mentioned, most users of NPS are also users of traditional illicit drugs. However, a key feature of NPS over traditional illicit drugs is that most of them are legal when they first become available. This is demonstrated in the colloquial term 'legal high' that is sometimes used. The concern is that their legal status could be implying a level of safety and encouraging use over other illicit drugs. Evidence suggests a complex relationship between a substance's legality and user preference. It appears that, for existing drug users, the legal status of NPS does not itself motivate use, nor does it imply that the substance is safe. However, there is limited evidence to suggest that, for those who do not use other drugs, the legal status may offer motivations for use, and may imply safety.

Research with existing drug users has found that the legal status of mephedrone was not, in itself, driving its use. In a survey of 446 UK students, around half (52.9%) of respondents

reported that the legal status made no difference to their choices. Additionally, 74.2 per cent of respondents did not consider 'legal highs' to be safer than illicit drugs (Corazza *et al.*, 2014).

Similar results were also found in interviews with 23 adult mephedrone users: none of the respondents thought that legal highs were safe and the legal status of mephedrone did not affect their decision to use it (McElrath and O'Neill, 2010). This is supported by findings from a similar study (McElrath and Van Hout, 2011).

Instead, a consistent theme is that the popularity of mephedrone was driven by factors relating to its legal status such as price, availability and purity. A study of 1,006 school, college and university students in the UK found that mephedrone was used for reasons including legality, accessibility, potency and price (Dargan *et al.*, 2010). A survey of 1,506 users of an online drug website found similar results (Carhart-Harris *et al.*, 2011). Van Hout and Brennan (2011) interviewed 22 young mephedrone users and found that mephedrone initiation was based on several factors, such as exposure, widespread availability, curiosity, peer use, low quality of street drugs and competitive pricing.

However, international evidence shows that the legal status of NPS can affect the perceptions of some users. In New Zealand, interviews with 58 BZP party pill users found that the legal status of BZP conferred several attributes (Sheridan and Butler, 2009). The legality suggested: it was safe, it was a guaranteed product, it had inferior effects to illicit drugs, users did not have to get involved with criminals, it was readily accessible, and that it was socially acceptable. The legal status of BZP was more of a motivating factor in those that had not previously used illicit drugs than those that had.

6.3 Drug tests

One motivation for small subsets of NPS users is the inability of common drug tests to detect NPS use (Loeffler, 2012; UNODC, 2011:14; Ryall and Butler, 2011; Vandrey *et al.*, 2012; Bird, 2010a/b). For those who have to undergo mandatory drug testing (armed forces personnel, transport workers, prisoners, criminals on probation, psychiatric patients etc.), NPS can offer a psychoactive experience without the negative implications of a positive drug test. Evidence in this area mainly comes from comments made in interviews and focus groups. This motivation may reduce over time, as some drug tests are now being updated to detect NPS. However, due to the rapidly moving NPS market, it is unlikely these tests will ever be able to cover all NPS. As mandatory drug testing is relatively uncommon in the UK it is likely that this factor is only driving a small amount of NPS use.

6.4 Media reporting on NPS

A further factor is that media reporting on NPS may have increased interest in NPS and possibly led to increased use (Dargan *et al.*, 2010; Measham *et al.*, 2010). Media reports often highlight the dangers of NPS, but also inadvertently advertise the potency, ready availability and legal status to potential users. As well as comments from users in focus groups and interviews, analysis of Google search trends has shown spikes in internet searches for NPS after prominent news media stories (Forsyth, 2012). However, these trends only show interest in NPS, and not actual purchases or use.

7. Harms of NPS use

One of the main concerns surrounding NPS is the potential for these substances to cause harm. These could be short- or long-term harms to the user's health, but also social harms such as increased acquisitive crime to fund addiction, anti-social behaviour, social isolation, unemployment and family breakdown. The available evidence suggests that the overall harms from NPS are low compared to the overall harms from traditional illicit drugs.

7.1 Health harms of NPS use

Evidence of NPS-related health harms is available from several national data sources: deaths related to NPS, NPS users in treatment, and poison centre contacts.

The existing data is mostly focused on the acute short-term harms of use, but due to the relatively short time the majority of NPS have been in use less is known about chronic long-term harms. There are also evidence gaps around acute toxicity which does not result in death. This is an area that should be closely monitored as there is a precedent in new drugs such as ketamine that initially appear to have relatively low harms, but are then later found to cause long-term harms to users' health (ACMD, 2013).

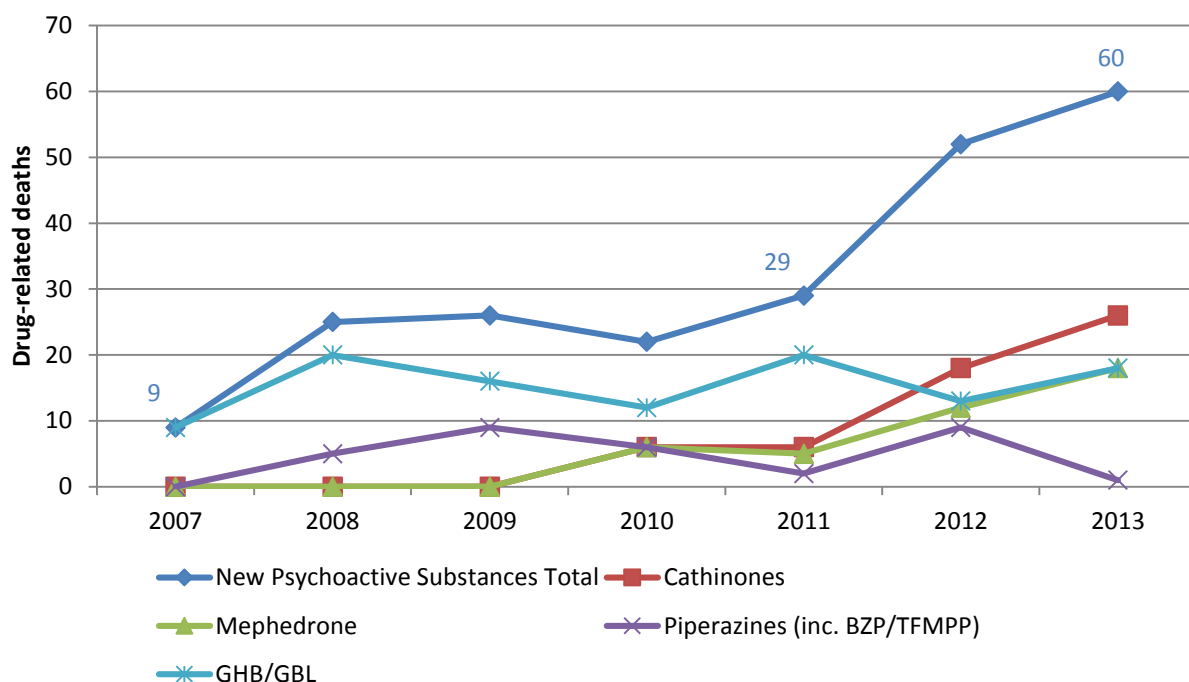
7.1.1 Deaths related to NPS use

The National Statistics on drug related deaths show that overall deaths related to NPS use remain low compared to illicit drugs. In 2013, the ONS reported that there were 60 deaths related to NPS in England and Wales out of a total of 1,957 deaths from drug misuse overall (ONS, 2014a).

However, deaths related to NPS have been increasing. There were 60 NPS related deaths in 2013, a relatively small increase from 52 deaths in 2012, but a sharp increase from 29 deaths in 2011, following a period of relative stability (see figure 4). The increases in NPS related deaths have largely been driven by an increase in deaths related to cathinones (6 in 2011, 18 in 2012, and 26 in 2013) alongside deaths related to other NPS³¹ that are not individually reported by the ONS. Whereas GHB/GBL-related deaths have remained relatively stable, with year-to-year variation (20 in 2011, to 13 in 2012, 18 in 2013).

³¹ The ONS include 29 different substances in their measure of NPS-related deaths. This includes NPS such as synthetic cannabinoids, 6-APB, methoxetamine, methiopropamine and alpha-methyltryptamine.

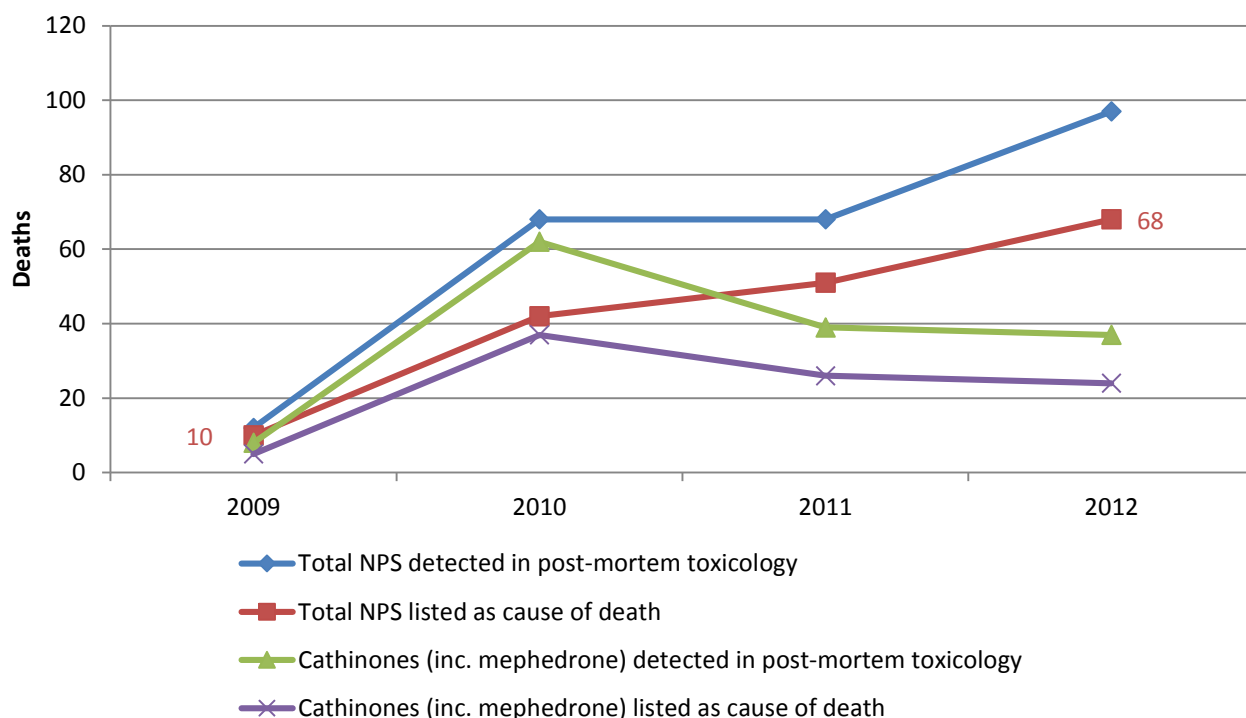
Figure 4: Drug-related deaths where selected substances are mentioned on death certificates, ONS, 2007 to 2013



Another source of data on drug-related deaths is the National Programme on Substance Abuse Deaths (np-SAD). np-SAD gives us additional insight into NPS-related deaths, as they publish more breakdowns on the specific substances involved than those provided by the ONS.

In total, np-SAD report that there were 68 deaths involving NPS in 2012, an increase from 51 in 2011 and 42 in 2010, and a sharp rise from 10 in 2009 (Figure 5).

Figure 5: NPS-related deaths reported by coroners, np-SAD, 2009 to 2012



There are several key differences between ONS and np-SAD statistics (see Table 7) and these affect the overall figures that are produced. The effects these differences have are discussed below.

Table 7: Differences between ONS and np-SAD statistics on drug-related deaths

	ONS	np-SAD
Coverage:	England and Wales (separate official statistics are produced for Scotland and Northern Ireland)	UK
Mandatory reporting?	Coroners are legally required to register deaths	Participation by Coroners is voluntary
Deaths recorded by:	Year registered	Year of death
Non-NPS included?	Yes, only khat	Yes, several natural products including khat and mescaline, PMA, PMMA, two dietary supplements and five types of anabolic steroids

Within the np-SAD data, cathinones in general and specifically mephedrone have the greatest number of mentions. In 2012, mephedrone was listed as the cause of 14 deaths. Within the NPS category in 2012, only PMA caused more deaths (17). However, PMA is not an NPS, and it is likely that these deaths are related to adulterated ecstasy³². The inclusion of these substances (specifically PMA) is one of the reasons that the np-SAD total is higher than the ONS total.

There are often delays in the registration of deaths and this can make year-to-year comparisons less meaningful. The ONS record deaths to the year they were registered in rather than the year they occurred. This is less of a problem for deaths not related to drug use as only 4.5 per cent of all deaths registered in 2012 occurred in a previous year (ONS, 2014b).

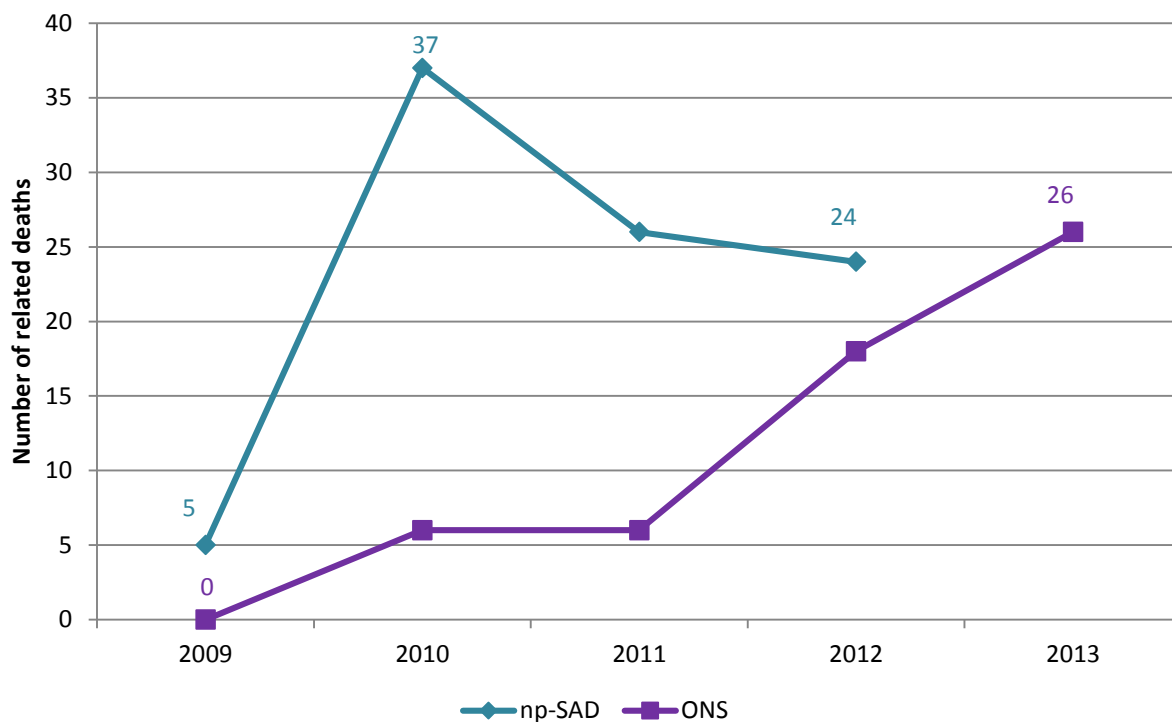
However, drug-related deaths are often more complex, with around four in ten involving multiple substances, and a third involving alcohol. This leads to longer coronial inquiries, and consequently just over half (1,488 out of 2,955) of the deaths related to drug poisoning³³ registered in 2013 occurred in years prior to 2013 (ONS, 2014a).

Unlike the ONS, np-SAD report deaths in the year they occurred, but this does lead to the figures being revised once they have been published. The effect these two different methods have can be seen in a comparison of cathinone deaths: the np-SAD figures show a peak in 2010, whereas the ONS figures show that cathinone deaths are continuing to rise (Figure 6).

³² PMA and PMMA can be found in ecstasy pills. It is likely that those who died were intending to take MDMA.

³³ Drug-poisoning deaths is a wider measure than the drug-misuse deaths, that includes accidental deaths not related to drug misuse and suicides.

Figure 6: Deaths related to cathinones, ONS and np-SAD, 2009 to 2013



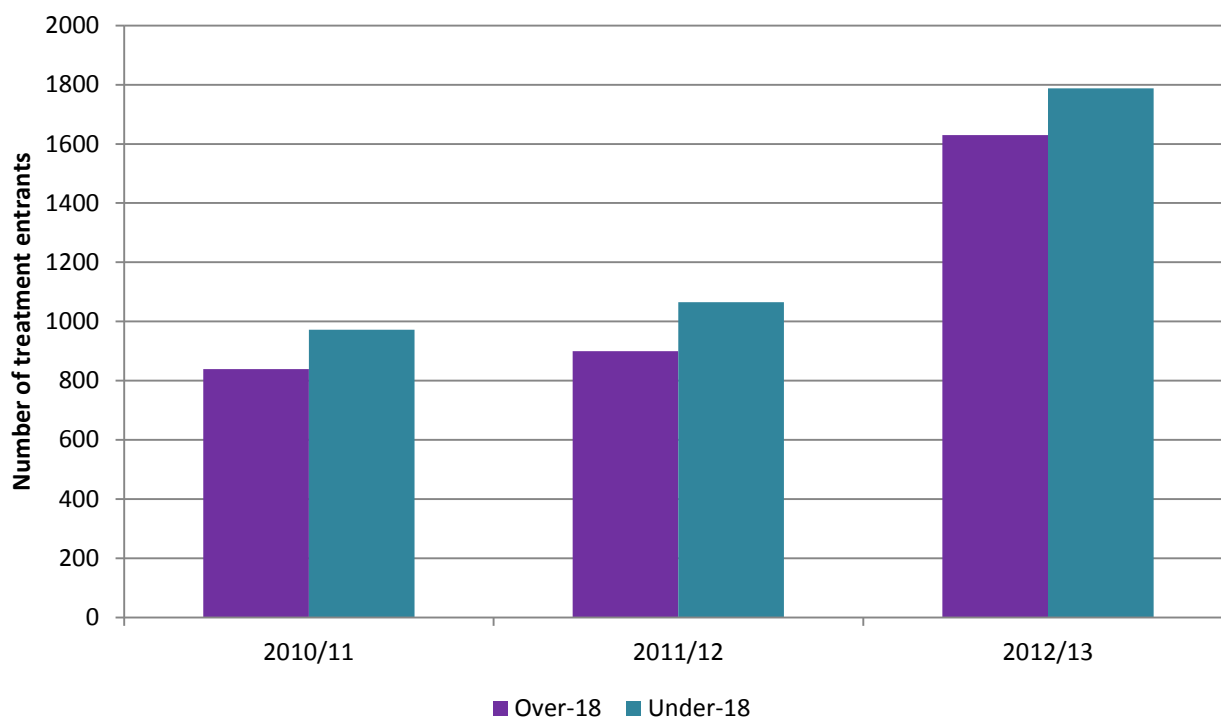
7.1.2 Treatment data

National Statistics from Public Health England show that treatment demand for mephedrone and GHB/GBL use is low compared to many other traditional illicit drugs, but has increased over recent years.

The number of over-18s entering treatment who report mephedrone use has increased since 2010/11³⁴ (see figure 7). In 2010/11, 839 clients entered treatment reporting mephedrone use; this rose to 1,630 clients in 2012/13 (PHE, 2013). A similar picture can also be seen in under-18s. In 2010/11, 972 under-18s entered treatment reporting mephedrone use; this then increased to 1,788 in 2012/13. The figures presented above include all clients who entered treatment reporting mephedrone use, and these clients may have other drugs as their primary drug of misuse.

³⁴ A code for mephedrone was only added to the National Drug Treatment Monitoring System Core Data Set in 2010/11. Any clients reporting mephedrone prior to this were counted in the total measure, but separate figures could not be produced.

Figure 7: New treatment entrants who reported mephedrone use, England, PHE, 2010/11 to 2012/13



Unlike treatment entrants for drugs such as heroin and crack cocaine, mephedrone users are generally young. The National Treatment Agency for Substance Misuse (NTA) found that, in 2012, 56 per cent of over-18s in treatment for mephedrone were between 18 and 24 years old (NTA, 2012).

Treatment for GHB/GBL use is low compared to both mephedrone and traditional illicit drugs, but as with mephedrone it has been increasing. The number of over-18s entering treatment who report GHB/GBL use has increased from 135 in 2010/11 to 231 in 2012/13.

A report on club drugs³⁵ (including NPS) by the NTA³⁶ found that users in treatment for these drugs had positive prospects. Six out of ten (61%) treatment exits involving over-18 club drug users were successful. In 2012/14, club drug users comprised a small proportion of all those in treatment, five per cent of over-18s and fifteen per cent of under-18s (PHE, 2013). The NTA concluded that club drugs were unlikely to replace heroin and crack as the primary drivers of demand for treatment (NTA, 2012).

The increase in treatment for mephedrone is likely to reflect a genuine increase in those experiencing problems with mephedrone use, but could also be partially attributable to increased awareness and capability of treatment services. Also, current treatment data cannot give an indication of the scale of future provision, the unknown untreated population, and there are also unknowns surrounding the addictive potential of some NPS. For the minority who develop problems with NPS use, there is likely to be a time lag, between first use of NPS, and then developing problematic use or dependency, and then presenting to treatment services.

³⁵ The NTA include ecstasy, ketamine and methamphetamine in this category, alongside mephedrone and GHB/GBL.

³⁶ Now part of Public Health England.

7.1.3 Poison centre contacts

The UK's National Poison Information Service (NPIS) provides information and advice to health professionals through telephone enquiries and online access to its TOXBASE service. Figures from these services are not a direct measure of patient presentations or toxicity, as advice is more likely to be sought for sicker patients or when unfamiliar substances are involved. Additionally, the data relies on users and healthcare professionals providing accurate information on the substances, as toxicological confirmation is not usually available. Despite this, they do, however, give a good indication of the substances being encountered by NHS physicians, and therefore provide an indication of non-fatal intoxications from NPS.

Between 2011/12 and 2012/13, there were increases in the numbers of telephone enquiries (49%) and TOXBASE accesses (128%) relating to uncontrolled NPS. Mephedrone remains the most frequently mentioned substance.

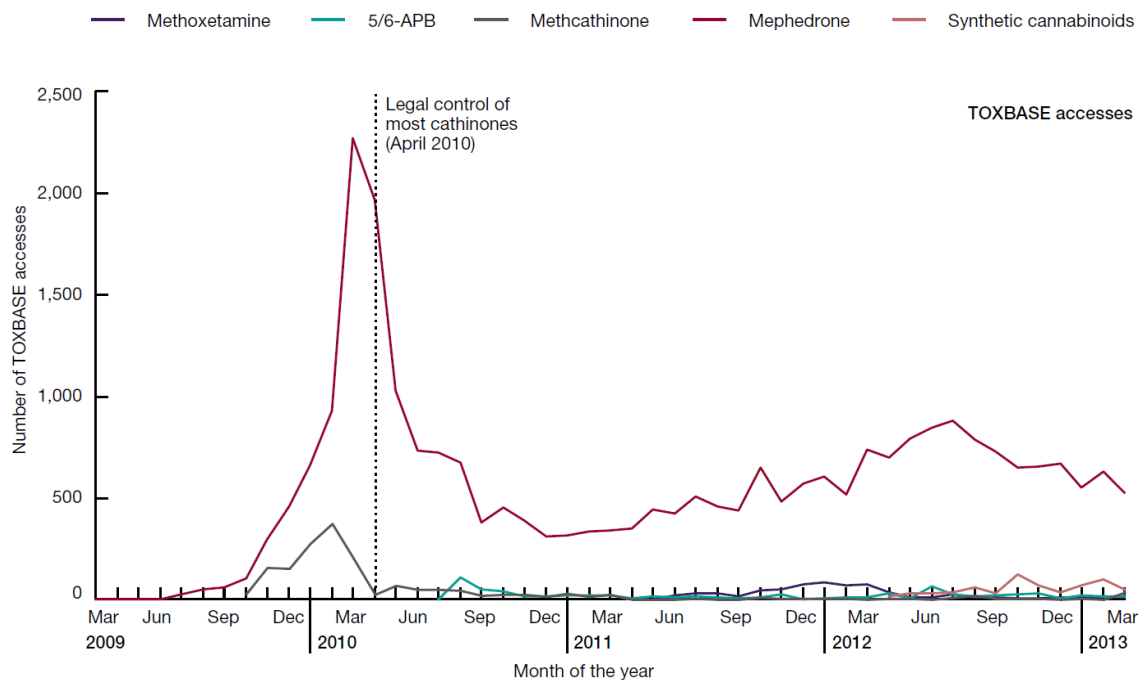
- There were 8,432 TOXBASE enquiries regarding mephedrone in 2012/13, up 36.1 per cent from 2011/12, but down from a peak in March 2010.
- For BZP there were 1,574 enquiries in 2012/13, down 5.0 per cent from 2011/12³⁷.
- For GHB there were 1,476 enquiries in 2012/13, down 13.7 per cent from 2011/12³⁷.

'Legal highs' (not otherwise specified) and mephedrone were in the top ten for telephone enquiries. Other NPS asked about included alpha-Methyltryptamine (13th), synthetic cannabinoids (15th), 5/6-APB (16th) and 25I-NBOMe (22nd).

Figure 8 shows monthly trend data for TOXBASE accesses for several different NPS. There was a peak in cathinones around February/March 2010; this is predominantly mephedrone but there are also a smaller amount of accesses related to methcathinone. After peaking in March 2010, mephedrone accesses have reduced but remain high relative to other NPS. This reflects the enduring popularity of mephedrone since it was controlled in April 2010 and the relative obscurity of other NPS. Immediately after mephedrone was classified there was an increase in access related to naphyrone. This drug was marketed as a legal replacement for mephedrone. Accesses related to naphyrone decreased following its classification in July 2010.

³⁷ These declines could be down to increasing clinical familiarity with these substances rather than declining use.

Figure 8: Monthly TOXBASE accesses relating to selected drugs of abuse, NPIS, March 2009 to March 2013



Analysis of poison centre contacts suggests there is a correlation between legislation controlling specific NPS and a reduction in poison centre contacts (Loeffler and Craig, 2013). A similar pattern is also visible in presentations to an emergency department (Wood *et al.*, 2012d).

7.2 Social harms of NPS use

Data on the social harms caused by NPS are extremely limited. However, there is no evidence to suggest that NPS are driving crime and other social harms to the same degree as heroin and crack cocaine.

It is plausible to expect that societal harms have the *potential* to be comparable to those of the drugs NPS imitate (ACMD, 2009). At present NPS are not imitating drugs that are the main drivers of crime and other social harms (heroin and crack cocaine). Instead they appear to be imitating, displacing and supplementing drugs such as ecstasy, amphetamine, cocaine, cannabis and ketamine. However, opioid NPS such as AH-7921 and MT-45 have now been identified, and despite the limited evidence of use, these NPS could potentially become drivers of crime and other social harms.

There are, however, limited reports that some problematic mephedrone users are involved in violent behaviour, though these tend to be based on users who are already involved with services and often users of other drugs. As such they are unlikely to represent the vast majority of mephedrone users.

There have been reports from drug treatment workers that suggest heroin users who start injecting mephedrone are more difficult to deal with (Daly, 2012). Similarly, a study of 67 mephedrone users in contact with services identified a ‘violent subset’, though these tended to report daily mephedrone use alongside other drugs and alcohol (Brookman, 2014).

8. Conclusion

This report has provided an overview of the available evidence on NPS. This is a relatively new and developing area of study; many innovative methodologies are being used and conventions surrounding how best to research NPS are still being established.

NPS is a dynamic and fluid area. High-quality research takes time to produce and these long timescales are not best suited to providing the most up-to-date evidence in a fast-moving market. For example, there are many articles about mephedrone prior to and immediately after classification, but a relative dearth of articles since then. While high-quality research into NPS is very beneficial, there are issues surrounding timeliness that need considering.

Fundamentally, NPS is a difficult area to research; new NPS are appearing on the market at an increasing rate and they are marketed and packaged in ways that decrease the validity of commonly used self-reporting methods. Additionally, only a small proportion of NPS identified achieve even limited popularity. Given these issues, it would be unwise to comprehensively research all NPS identified. Instead, resources would be better focused on the most popular NPS, groups of NPS, or NPS as a whole.

As discussed in the introduction and throughout this review, there are issues with how the concept of NPS is defined. This is important when estimating the overall extent of the NPS phenomenon, as the inclusion or exclusion of different substances as NPS can considerably affect overall estimates of scale. It is often the case that many of the larger estimates of NPS activity have the loosest or most expansive definition of what an NPS is.

8.1 Summary of the evidence

Throughout the review it has become clear that some areas of research on NPS are better developed and understood than others.

There is good evidence on the incidence of NPS, with well-established systems effectively identifying new NPS as they emerge on the UK and European markets. These systems show us that the rate at which NPS are appearing on the European and international market is increasing. The picture in the UK is slightly different, with greater year-to-year variation.

There is relatively detailed information available about the use of some NPS (such as mephedrone) but less is known about less commonly used NPS or the overall scale of NPS use. Data on the prevalence of NPS use (for example, the CSEW) shows that mephedrone is more popular than other types of NPS measured, but its use has been declining. Smaller-scale studies in subgroups have identified interesting results, although these findings need considering within the limitations of the method employed.

When used together the several sources of data on health harms provide a reasonable yet incomplete picture of some of the current health problems with NPS use. These sources show that the health harms from NPS have been increasing but remain low compared to some traditional illicit drugs. However, there is additional scope for improvement in this area and there are large evidence gaps around long-term health harms.

8.2 Evidence gaps

This review has identified a number of gaps in the evidence base on NPS. The report of the expert panel has also identified many of these gaps, and contains recommendations for improving our knowledge in these areas. Many of these gaps are not unique to NPS, as the evidence base on traditional illicit drugs is also underdeveloped in a number of areas. As there is considerable interplay between traditional illicit drugs and NPS, many of these gaps may be best filled by research that aims to improve our understanding of drug use in general, rather than research aimed specifically at NPS. It is also possible that some of these gaps may be filled by ongoing cross-government and wider academic research into NPS.

- Given the large number of NPS detected, and the fluidity of the NPS market, there is an evidence gap surrounding the **prevalence of NPS use**. It is possible that some NPS are only used for a short amount of time, but it is not possible to gauge the extent to which this happens as the current population level prevalence indicators are unsuited for detecting this.
- Similarly, we do not currently have a general population measure of the **total level of NPS use**, although the 2014/15 CSEW includes questions aimed at improving measurement at population level.
- Given the discrepancy between the way NPS are labelled and the substances they contain, there are limitations with the **reliability and validity of prevalence data**. Many users will not know the exact substances they are taking, and therefore self-report surveys only provide a measure of the substances users intended to take, rather than the actual substance consumed.
- Less is known about the **use of NPS among subgroups other than night-time economy participants**. Of all the subgroups researched, participants in the night-time economy have the greatest amount of research, although this is still limited. It is possible that NPS may be used in subgroups other than those mentioned in this report, but a lack of research makes it difficult to identify these subgroups, the NPS they use, and to quantify their use of NPS.
- There is a lack of evidence on the **long-term health harms of NPS use**. It is not currently possible to know the long-term harm of some NPS, as they have not been in use for a long time. However, this is an area that needs monitoring, as there is a precedent for emerging drugs (ketamine) to cause chronic harms.
- There is also a lack of evidence on the **acute health harms of NPS use**. The only indication of acute non-fatal intoxications is the NPIS, although there are several caveats that limit the insight that can be gained. Data on acute intoxications (for example, A&E presentations and hospital admissions) for NPS use would complement the existing sources; however, the ICD-10 system used to code hospital admissions does not include codes for NPS (nor a variety of traditional illicit drugs), which makes it difficult to systematically collect this data (Wood *et al.*, 2014).

- The **extent to which NPS use drives social harms is unknown**. We are currently reliant on making assumptions based on existing knowledge of illicit drugs that are similar to NPS.
- Despite legislation being one of the primary means used to tackle NPS and illicit drug use, there is an evidence gap on the **impact and effectiveness of legislation**, and we cannot conclusively state that falls in mephedrone use are exclusively due to control. This is a problematic area to research as it is not possible to establish a counterfactual, or to isolate the impact of the other factors that may have led to falls in drug use.
- Much of the research covered in this review has focused on mephedrone and **less is known about other types of NPS**. We do not know the extent to which mephedrone users are similar or dissimilar to other NPS users and therefore generalising results from mephedrone studies to wider NPS is problematic. Mephedrone is now controlled, and therefore the findings may not apply to currently uncontrolled NPS.
- This report has identified evidence that suggests NPS both displace and supplement conventional illicit drugs. However, the **exact factors and mechanisms that affect displacement and supplementation are unclear**.
- The research identified on purchasing habits suggests that only a small amount of users purchase NPS online. However, the **extent to which individuals within social groups purchase online and then distribute within their social group is unknown**.

9. References

Advisory Council on the Misuse of Drugs (2009) *ACMD report on the major Cannabinoid agonists* Available: <https://www.gov.uk/government/publications/acmd-report-on-the-major-cannabinoid-agonists>

Advisory Council on the Misuse of Drugs (2011) *Consideration of the Novel Psychoactive Substances ('Legal Highs')* Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/119139/acmdnps2011.pdf

Advisory Council on the Misuse of Drugs (2012a) *Further considerations of the synthetic Cannabinoids* Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/119042/synthetic-cannabinoids-2012.pdf

Advisory Council on the Misuse of Drugs (2012b) *Methoxetamine report* Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/119087/methoxetamine2012.pdf

Advisory Council on the Misuse of Drugs (2013) *Ketamine: a review of use and harm* Available: <https://www.gov.uk/government/publications/ketamine-report>

Angelus Foundation (2014) *What we do* Available: <http://www.angelusfoundation.com/what-we-do/>

Archer, J.R.H., Dargan, P.I., Hudson, S. and Wood, D.M. (2012) Analysis of anonymous pooled urine from portable urinals in central London confirms the significant use of novel psychoactive substances *Q J Med* vol. 106 (2) pp 147-152

Archer, J.R.H., Dargan, P.I., Hudson, S., Davies, S., Puchnarewicz, M., Kicman, A., Ramsey, J., Measham, F., Wood, M., Johnston, A. and Wood, D.M. (2013) Taking the Pissoir – a novel and reliable way of knowing what drugs are being used in nightclubs *Journal of Substance Use* vol. 19 (1-2) pp 103-107

Baron, M., Elie, M., and Elie, L. (2011) An analysis of legal highs: do they contain what it says on the tin? *Drug Testing and Analysis* vol. 3 (9) pp 576-81

Barratt, M.J., Cakic, V. and Lenton, S. (2012) Patterns of synthetic Cannabinoid use in Australia *Drug Alcohol Rev* vol. 32 (2) pp 141-146

Barratt, M.J., Ferris, J.A. and Winstock, A.R. (2013a) Use of Silk Road, the online drug marketplace, in the United Kingdom, Australia and the United States *Addiction* vol. 109 pp 774–783

Barratt, M.J., Lenton, S. and Allen, M. (2013b) Internet content regulation, public drug websites and the growth in hidden Internet services *Drugs: Education, prevention and policy* vol. 20 (3) pp 195-202

- Bird, S. (2010a) *Banned drug may have saved lives, not cost them* Available: <http://www.straightstatistics.org/article/banned-drug-may-have-saved-lives-not-cost-them>
- Bird, S. (2010b) *Drug use by soldiers declining* Available: <http://www.straightstatistics.org/article/drug-use-soldiers-declining>
- Bourne, A., Reid, D., Hickson, F., Rueda, S.T. and Weatherburn, P. (2014) *The Chemsex study: drug use in sexual settings among gay and bisexual men in Lambeth, Southwark and Lewisham*. London: Sigma Research Available: <http://sigmaresearch.org.uk/projects/gay/project59?/chemsex>
- Brandt, S.D., Sumnall, H.R., Measham, F. and Cole, J. (2010) Second generation mephedrone. The confusing case of NRG-1. *BMJ* vol. 341 pp.3564
- Brookman, F. (2014) *The links between mephedrone use, violence and other harms in South Wales* Available: <http://wales.gov.uk/docs/dhss/publications/140708Mephedroneen.pdf>
- Buskirk, J.V., Roxburgh, A., Farrell, M. and Burns, L. (2014) The closure of the Silk Road: what has this meant for online drug trading? *Addiction* vol. 109 pp 517-518
- Carhart-Harris, R.L., King, L.A. and Nutt, D.J. (2011) A web-based survey on mephedrone *Drug and Alcohol Dependence* vol. 118 (1) pp 19-22
- Caudevilla, F. (2014) *The importance of NPS in online drug markets: data from Silk Road 2.0* Third international conference on novel psychoactive substances, 15 May 2014, Rome
- Chen, C., Kostakis, C., Irvine, R.J. and White, J.M. (2013) Increases in use of novel synthetic stimulant are not directly linked to decreased use of 3,4-methylenedioxy-N methylamphetamine (MDMA) *Forensic Science International* vol. 231 pp 278-283
- Christin, N. (2012) *Travelling the Silk Road: A measurement analysis of a large anonymous online marketplace*. Available: <https://www.andrew.cmu.edu/user/nicolasc/publications/Christin-WWW13.pdf>
- Corazza, O., Schifano, F., Simonato, P., Fergus, S., Assi, S., Stair, J., Corkery, J., Trincas, G., Deluca, P., Davey, Z., Blaszkowski, U., Demetrovics, Z., Moskalewicz, J., Enea, A., di Melchiorre, G., Mervo, B., di Furia, L., Farre, M., Flesland, L., Pasinetti, M., Pezzolesi, C., Pisarska, A., Shapiro, H., Siemann, H., Skutle, A., Enea, A., di Melchiorre, G., Sferrazza, E., Torrens, M., van der Kreeft, P., Zummo, D. and Scherbaum N. (2012) Phenomenon of new drugs on the internet: the case of ketamine derivative methoxetamine *Hum Psychopharmacol Clin Exp* vol. 27 pp 145-149
- Corazza, O., Simonato, P., Corkery, J., Trincas, G. and Schifano, F. (2014) 'Legal highs': safe and legal 'heavens'? A study on the diffusion, knowledge and risk awareness of novel psychoactive drugs among students in the UK *Riv Psichiatr* vol. 49 (2) pp 89-94 Available: [http://researchprofiles.herts.ac.uk/portal/en/publications/legal-highs-safe-and-legal-heavens\(7dfb8005-7444-4839-bab1-60447c9f0514\).html](http://researchprofiles.herts.ac.uk/portal/en/publications/legal-highs-safe-and-legal-heavens(7dfb8005-7444-4839-bab1-60447c9f0514).html)

Coleman, K. (2013) *Seizures of Drugs in England and Wales, 2012/13 Home Office Statistical Bulletin 04/13*. London: Home Office Available:
<https://www.gov.uk/government/publications/seizures-of-drugs-in-england-and-wales-financial-year-ending-2013>

Daly, M. (2011) *The Ketamine Zone: Street Drug Trends Survey 2011* Available:
http://www.drugscope.org.uk/Resources/Drugscope/Documents/PDF/111111_Druglink_survey_article.PDF

Daly, M. (2012) *'Drone Strikes': 2012 Druglink Street Drugs Trends Survey 2012* Available:
<http://www.drugscope.org.uk/Resources/Drugscope/Documents/PDF/Publications/StreetDrugTrendsSurvey.pdf>

Daly, M. (2013) *High Times: Druglink 2013 Street Drug Trends Survey* Available:
<http://www.drugscope.org.uk/Resources/Drugscope/Documents/PDF/Info/High%20Times.pdf>

Dargan, P.I., Albert, S. and Wood, D.M. (2010) Mephedrone use and associated adverse effects in school and college/university students before the UK legislation change *Q J Med* vol. 103 (11) pp 875-879

Dargan, P.I., Hudson, S., Ramsey, J. and Wood, D.M. (2011) The impact of changes in UK classification of synthetic Cannabinoid receptor agonists in 'Spice' *International Journal of Drug Policy* vol. 22 pp 247-277

Dargan, P.I. and Wood, D.M. Eds. (2013) *Novel Psychoactive Substances: Classification, Pharmacology and toxicology* London: Academic Press

Davey, Z., Schifano, F., Corazza, O. and Deluca, P. (2012) e-Psychonauts: Conducting research in online drug forum communities *Journal of Mental Health* vol. 21 (4) pp 386-394

Davies, S., Wood, D.M., Smith, G., Button, J., Ramsey, J., Archer, R., Holt, D.W. and Dargan, P.I. (2010) Purchasing 'legal highs' on the Internet – is there consistency in what you get? *Q J Med* vol. 103 pp 489-493

Davies, C. and Murray, R. (2013) *United Kingdom Drug Situation: Annual report to the European Monitoring Centre for Drug and Drug Addiction (EMCDDA) 2013* London: Public Health England Available online:
<http://www.nta.nhs.uk/uploads/24780focalpointreport2013.pdf>

DrugScope (2014) *Business as usual: A status report on new psychoactive substances (NPS) and 'club drugs' in the UK* Available:
<http://www.drugscope.org.uk/Resources/Drugscope/Documents/PDF/Policy/BusinessAsUsual.pdf>

EMCDDA (2009) *Understanding the Spice phenomenon* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_80086_EN_Spice%20Thematic%20paper%20—%20final%20version.pdf

EMCDDA (2011) *Online sales of new psychoactive substances/'legal highs': summary of results from the 2011 multilingual snapshots* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_143801_EN_SnapshotSummary.pdf

- EMCDDA (2012a) *EMCDDA–Europol 2011 Annual Report on the implementation of Council Decision 2005/387/JHA* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_155113_EN_EMCCDDA-Europol%20Annual%20Report%202011_2012_final.pdf
- EMCDDA (2012b) *Drugnet Europe online 80* Available:
<http://www.emcdda.europa.eu/publications/drugnet/online/2012/80/article6>
- EMCDDA (2012c) *Annual Report 2012* Available:
<http://www.emcdda.europa.eu/publications/annual-report/2012>
- EMCDDA (2013a) *EMCDDA–Europol 2012 Annual Report on the implementation of Council Decision 2005/387/JHA* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_212366_EN_EMCCDDA-Europol%202012%20Annual%20Report_final.pdf
- EMCDDA (2013b) *EU Drug Markets Report: A Strategic Analysis* Available:
<http://www.emcdda.europa.eu/publications/joint-publications/drug-markets>
- EMCDDA (2014a) *European Drug Report 2014: Trends and Developments* Available:
<http://www.emcdda.europa.eu/publications/edr/trends-developments/2014>
- EMCDDA (2014b) *Perspectives On Drugs: Controlling new psychoactive substances* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_211257_EN_EMCCDDA_POD_2013_Co ntrolling%20new%20psychoactive%20substances.pdf
- EMCDDA (2014c) *Perspectives On Drugs: Wastewater analysis and drugs: a European multi-city study* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_228234_EN_POD2014_Wastewater analysis and drugs.pdf
- EMCDDA–Europol (2014) *EMCDDA–Europol 2013 Annual Report on the implementation of Council Decision 2005/387/JHA: In accordance with Article 10 of Council Decision 2005/387/JHA on the information exchange, risk assessment and control of new psychoactive substances* Available:
http://www.emcdda.europa.eu/attachements.cfm/att_229598_EN_TDAN14001ENN.pdf
- European Commission (2011) *Flash Eurobarometer 330: Youth Attitudes on drugs* Available:
http://ec.europa.eu/public_opinion/flash/fl_330_en.pdf
- European Commission (2014) *Flash Eurobarometer 401: Young People And Drugs* Available: http://ec.europa.eu/public_opinion/archives/flash_arch_404_391_en.htm
- Fattore, L. and Fratta, W. (2011) Beyond THC: the new generation of Cannabinoid designer drugs *Front Behav Neurosci* vol. 5 (6) Available:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3187647/>
- Forsyth, A.J. (2012) Virtually a drug scare: mephedrone and the impact of the internet on drug news transmission. *International Journal of Drug Policy* vol. 23 (3) pp.198-209

- Fuller, E. (2012) *Smoking, drinking and drug use among young people in England in 2011* London: NatCen Available: <https://catalogue.ic.nhs.uk/publications/public-health/surveys/smok-drin-drug-youn-peop-eng-2011/smok-drin-drug-youn-peop-eng-2011-rep2.pdf>
- Fuller, E. (2013) *Smoking, drinking and drug use among young people in England – 2012* London: Health and Social Care Information Centre Available: <http://www.hscic.gov.uk/catalogue/PUB11334/smok-drin-drug-youn-peop-eng-2012-repo.pdf>
- Fuller, E. and Hawkins, V (2014) *Smoking, drinking and drug use among young people in England in 2013* London: Health and Social Care Information Centre Available: <http://www.hscic.gov.uk/catalogue/PUB14579/smok-drin-drug-youn-peop-eng-2013-rep.pdf>
- Hammersley, R. (2010) Dangers of banning spice and synthetic Cannabinoid agonists *Addiction* vol. 105 pp 373-375 Available: <http://onlinelibrary.wiley.com/doi/10.1111/j.1360-0443.2009.02845.x/pdf>
- Home Office (2010) *Drug Misuse Declared: Findings from the 2009/10 British Crime Survey England and Wales* London: Home Office Available: <https://www.gov.uk/government/publications/drug-misuse-declared-findings-from-the-2009-10-british-crime-survey-england-and-wales>
- Home Office (2011) *Drug Misuse Declared: Findings from the 2010/11 British Crime survey, England and Wales* London: Home Office Available: <https://www.gov.uk/government/publications/drug-misuse-declared-findings-from-the-2010-11-british-crime-survey-england-and-wales--12>
- Home Office (2012a) *Drug misuse declared findings from the 2011 to 2012 Crime Survey for England and Wales (CSEW) (second edition)* London: Home Office Available: <https://www.gov.uk/government/publications/drug-misuse-declared-findings-from-the-2011-to-2012-crime-survey-for-england-and-wales-csew-second-edition>
- Home Office (2012b) *Annual Report on the Forensic Early Warning System (FEWS): A system to identify new psychoactive substances in the UK* London: Home Office Available: <https://www.gov.uk/government/publications/forensic-early-warning-system-fews-annual-report>
- Home Office (2013a) *Drug Misuse: Findings from the 2012 to 2013 Crime Survey for England and Wales* London: Home Office Available: <https://www.gov.uk/government/publications/drug-misuse-findings-from-the-2012-to-2013-csew/drug-misuse-findings-from-the-2012-to-2013-crime-survey-for-england-and-wales>
- Home Office (2013b) *Annual Report on the Forensic Early Warning System (FEWS): A system to identify New Psychoactive Substances in the UK* London: Home Office Available: <https://www.gov.uk/government/publications/forensic-early-warning-system-fews-annual-report>

Home Office (2014a) *Annual Report on the Home Office Forensic Early Warning System (FEWS): A system to identify New Psychoactive Substances in the UK* London: Home Office Available:

[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/344551/2014-08-12 - FEWS Annual Report Aug 2014 - Final 2 .pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/344551/2014-08-12_-_FEWS_Annual_Report_Aug_2014_-_Final_2_.pdf)

Home Office (2014b) *Drug misuse: Findings from the 2013/14 Crime Survey for England and Wales* London: Home Office Available: <https://www.gov.uk/government/publications/drug-misuse-findings-from-the-2013-to-2014-csew/drug-misuse-findings-from-the-201314-crime-survey-for-england-and-wales>

Home Office (2014c) *Internal analysis based on data from the European Database on New drugs (EDND)*

Hu, X., Primack, B.A., Barnett, T.E. and Cook, R.L. (2011) College students and use of K2: an emerging drug of abuse in young persons *Substance Abuse Treatment, Prevention and Policy* vol. 6 (16) Available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3142218/pdf/1747-597X-6-16.pdf>

Hunter, L.J., Dargan, P.I., Benzie, A., White, J.A. and Wood, D.M. (2014) Recreational drug use in men who have sex with men (MSM) attending UK sexual health services is significantly higher than in non-MSM. *Postgrad Med J.* vol. 90 (1061) pp 133-8

Khey, D., Miller, B.L. and Griffin, O.H. (2008) Salvia Divinorum use among a college student sample *J. Drug Education* vol. 38 (3) pp 297-306 Available: <http://www.sagewisdom.org/kheyetal.pdf>

King, L.A. and Nutt, D. (2014) Deaths from 'legal highs': a problem of definitions *The Lancet* vol. 383 (9921) p 952

King, L.A. (2014) Legal controls on cannabimimetics: An international dilemma *Drug Testing and Analysis* vol. 6 pp 80-87

Kirby, T. and Thornber-Dunwell, M. (2013) High-risk drug practices tighten grip on London gay scene *The Lancet* vol. 381 (9861) pp 101-102 Available: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(13\)60032-X/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)60032-X/fulltext)

Lawn, W., Barratt, M., Williams, M., Horne, A. and Winstock, A. (2014) The NBOMe hallucinogenic drug series: Patterns of use, characteristics of users and self-reported effects in a large international sample *Journal of Psychopharmacology* vol. 1 (9)

Levissianos, S. (2014) *The UNODC Early Warning Advisory on novel psychoactive substances: new trends* Third international conference on novel psychoactive substances, 15 May 2014, Rome

Loeffler, G. and Craig, C. (2013) The effect of legal bans on poison control centre contacts regarding 'legal highs' *Addiction* vol. 108 pp 1346–1350 Available: <http://onlinelibrary.wiley.com/doi/10.1111/add.12194/pdf>

Loeffler, G., Hurst, D., Penn, A. and Yung, K. (2012) Spice, bath salts, and the U.S. military: the emergence of synthetic Cannabinoid receptor agonists and Cathinones in the U.S. Armed forces. *Mil Med* vol. 17 pp1041-1048 Available:

<http://www.tmcnet.com/usubmit/2012/09/14/6583622.htm>

Matthews, A.J. and Bruno, R. (2010) *Mephedrone use among regular ecstasy consumers in Australia*. EDRS Drug Trends Bulletin, December 2010. Sydney: National Drug and Alcohol Research Centre

McElrath, K. and O'Neill, C. (2010) Experiences with mephedrone pre- and post-legislative controls: perceptions of safety and sources of supply *International Journal of Drug Policy* vol. 22 (2) pp 120-127

McElrath, K. and Van Hout, M.C. (2011) Preference for Mephedrone: drug markets, drugs of choice, and the emerging 'legal high' scene *Journal of Drug Issues* vol. 41 (4) pp 487-508

Measham, F., Moore, K., Newcombe, R. and Welch, Z. (2010) Tweaking, bombing, dabbing and stockpiling: the emergence of mephedrone and the perversity of prohibition *Drugs and Alcohol Today* vol. 10 (1) pp 14-21

Measham, F., Wood, D.M., Dargan, P.I. and Moore, K. (2011a) The rise in legal highs: prevalence and patterns in the use of illegal drugs and first- and second-generation 'legal highs' in south London gay dance clubs *Journal of Substance Use* vol. 16 (4) pp 263-272

Measham, F., Moore, K. and Østergaard, J. (2011b) Mephedrone, 'Bubble' and unidentified white powders: the contested identities of synthetic 'legal highs' *Drugs and Alcohol Today* vol. 11 (3) pp 137-146

Measham, F., Moore, K. and Østergaard, J. (2011c) *Emerging Drug Trends in Lancashire: Night Time Economy Surveys Phase One report* Available:

www.lancashire.gov.uk/corporate/web/viewdoc.aspx?id=114302

Measham, F., Moore, K. and Welch, Z. (2012) *Emerging Drug Trends in Lancashire: Night Time Economy Surveys Phase Three report* Available:

www.lancashire.gov.uk/corporate/web/viewdoc.aspx?id=114768

Mixmag (2012) *Mixmag Drug Survey: the Results* Available:

http://issuu.com/mixmagfashion/docs/drugs_survey_2012_2

Mixmag (2013a) *Global Drug Survey* Available:

http://issuu.com/mixmagfashion/docs/mm_may13_drug_survey?mode=a_p

Mixmag (2013b) *Global drug survey reveals popularity of mystery powders* Available:

<http://www.mixmag.net/words/news/global-drug-survey-reveals-popularity-of-mystery-powders>

Mixmag (2014) *Global Drug Survey 2014*

Moore, K., Dargan, P., Wood, D. and Measham, F. (2013) Do novel psychoactive substances displace established club drugs, supplement them or act as drugs of initiation? The relationship between mephedrone, ecstasy and cocaine. *Eur Addict Res* vol. 19 (5) pp 276-282

National Poison Information Service (2012) *Annual Report 2011-12* Available: <http://www.npis.org/NPISAnnualReport2011-12.pdf>

National Poison Information Service (2013) *Annual Report 2012-13* Available: <http://www.npis.org/NPISAnnualReport2012-13.pdf>

National Programme on Substance Abuse Deaths (2012) *13th annual report* Available: <http://www.sgul.ac.uk/research/projects/icdp/pdf/np-sad-13th-annual-report-2012.pdf>

National Programme on Substance Abuse Deaths (2014) *Annual Report 2013* Available: <http://www.sgul.ac.uk/research/projects/icdp/our-work-programmes/pdfs/National%20Programme%20on%20Substance%20Abuse%20Deaths%20-%20Annual%20Report%202013%20on%20Drug-related%20Deaths%20in%20the%20UK%20January-December%202012%20PDF.pdf>

National Treatment Agency for Substance Misuse (2012) *Club Drugs: Emerging Trends and Risks* Available: <http://www.nta.nhs.uk/uploads/clubdrugsreport2012%5B0%5D.pdf>

Newcombe, R. (2009) *The use of Mephedrone (M-cat, Meow) in Middlesbrough* Available: <http://www.lifeline.org.uk/articles/the-use-of-mephedrone-m-cat-meow-in-middlesbrough/>

Office for National Statistics (2012) *Deaths Related to Drug Poisoning in England and Wales, 2011* Available: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-266060>

Office for National Statistics (2013) *Deaths Related to Drug Poisoning in England and Wales, 2012* Available: <http://www.ons.gov.uk/ons/rel/subnational-health3/deaths-related-to-drug-poisoning/2012/stb---deaths-related-to-drug-poisoning-2012.html>

Office for National Statistics (2014a) *Deaths Related to Drug Poisoning in England and Wales, 2013* Available: <http://www.ons.gov.uk/ons/rel/subnational-health3/deaths-related-to-drug-poisoning/england-and-wales---2013/stb---deaths-related-to-drug-poisoning-in-england-and-wales--2013.html>

Office for National Statistics (2014b) *Quality and Methodology Information for Mortality Statistics in England and Wales*. Available: <http://www.ons.gov.uk/ons/guide-method/method-quality/quality/quality-information/quality-and-methodology-information-reports-by-theme/population/quality-and-methodology-information-for-mortality-statistics-in-england-and-wales.pdf>

PRNewswire (2013) *Over 250 Headshops in UK Are Selling Legal Highs Says Angelus Foundation* Available: <http://www.prnewswire.co.uk/news-releases/over-250-headshops-in-uk-are-selling-legal-highs-says-angelus-foundation-232476221.html>

Public Health England (2013) *Drug treatment activity in England 2012-13* London: Public Health England Available: <http://www.nta.nhs.uk/uploads/annualdrugstatistics2012-13-statisticalreport.pdf>

Public Health England (2013) *Substance misuse among young people: the data for 2012-13* London: Public Health England Available: [http://www.nta.nhs.uk/uploads/annualypstatistics2012-13-final\[0\].pdf](http://www.nta.nhs.uk/uploads/annualypstatistics2012-13-final[0].pdf)

Ramsey, J., Dargan, P.I., Smyllie, M., Davies, S., Button, J., Holt, D.W. and Wood, D.M. (2010) Buying 'legal' recreational drugs does not mean that you are not breaking the law *Q J Med* vol. 103 pp 777-783 Available: <http://qjmed.oxfordjournals.org/content/103/10/777.full.pdf+html>

Ryall, G. and Butler, S. (2011) The great Irish headshop controversy *Drugs: education, prevention and policy* vol. 18 (4) pp 303-311

Schmidt, M.M., Sharma, A., Schifano, F. and Feinmann, C. (2011) 'Legal highs' on the net – Evaluation of UK-based websites, products and product information *Forensic Science International* vol. 206 pp 92-97

Schifano, F., Baldacchini, A., Bonan, C., Comacchio, A., Di Furia, L., Eastwood, D., Farre', M., Ferreira, S., Flores, I., Guionnet, C., Harder, L., Littlejohn, C., Majava, A., Peltoniemi, T., Pizza, M., Prandin, C., Robert, D., Scherbaum, N., Siemann, H., Tarrago, J. and Torrens, M. (2005) *The Psychonaut 2002 project: Final report*

Sheridan, J. and Butler, R. (2009) 'They're legal so they're safe, right?' What did the legal status of BZP-party pills mean to young people in New Zealand? *International Journal of Drug Policy* vol. 21 pp.77-81

United Nations Office on Drugs and Crime (2011) *Synthetic Cannabinoids in herbal products* Available: http://www.unodc.org/documents/scientific/Synthetic_Cannabinoids.pdf

United Nations Office on Drugs and Crime (2013a) *World Drug Report 2013* Available: http://www.unodc.org/unodc/secured/wdr/wdr2013/World_Drug_Report_2013.pdf

United Nations Office on Drugs and Crime (2013b) *The challenge of new psychoactive substances* Available: http://www.unodc.org/documents/scientific/NPS_2013_SMART.pdf

United Nations Office on Drugs and Crime (2014) *2014 Global Synthetic Drugs Assessment Amphetamine-type stimulants and new psychoactive substances* Available: http://www.unodc.org/documents/scientific/2014_Global_Synthetic_Drugs_Assessment_web.pdf

Van Hout, M.C. and Bingham, T. (2012) 'A costly turn on': patterns of use and perceived consequences of mephedrone based headshop products amongst Irish injectors *International Journal of Drug Policy* vol. 23 pp 188-197

Van Hout, M.C. and Brennan, R. (2011) Plant food for thought: a qualitative study of mephedrone use in Ireland *Drugs: Education, prevention and policy*. vol. 18 (5) pp 371-381

- Van Hout, M.C. and Brennan, R. (2012) Curiosity killed M-Cat: A post-legislative study on mephedrone use in Ireland *Drugs: Education, prevention and policy*. vol. 19 (2) pp 156-162
- Vandrey, R., Dunn, K.E., Fry, J.A. and Girling, E.R. (2012) A survey study to characterise the use of Spice products (synthetic Cannabinoids) *Drug Alcohol Dependence* vol. 120 pp 238-241 Available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217086/>
- Wilkins, C., Girling, M., Sweetsur, P., Huckle, T. and Huakau, J. (2006) *Legal party pill use in New Zealand: Prevalence of use, availability, health harms and 'gateway effects' of benzylpiperazine (BZP) and trifluoromethylphenylpiperazine (TFMPP)*. Available: <http://www.whariki.ac.nz/massey/fms/Colleges/College%20of%20Humanities%20and%20Social%20Sciences/Shore/reports/Legal%20party%20pills%20in%20New%20Zealand%20report3.pdf>
- Winstock, A.R. and Barratt, M.J. (2013) Synthetic cannabis: A comparison of patterns of use and effect profile with natural cannabis in a large global sample *Drug and Alcohol Dependence* vol. 131 (1-2) pp 106-111
- Winstock, A.R., Mitcheson, L.R. and Marsden, J. (2010a) Mephedrone: still available and twice the price *The Lancet* vol. 376 p 1537
- Winstock, A.R., Mitcheson, L.R., Deluca, P., Davey, Z., Corazza, O. and Schifano, F. (2010b) Mephedrone, new kid for the chop? *Addiction* vol. 106 (1) pp 154-161
- Wood, D.M., Measham, F. and Dargan, P.I. (2012a) 'Our favourite drug': prevalence of use and preference for mephedrone in the London night-time economy 1 year after control *Journal of Substance Use* vol. 17 (2) pp 91-97
- Wood, D.M., Hunter, I., Measham, F. and Dargan, P.I. (2012b) Limited use of novel psychoactive substances in South London nightclubs *Q J Med* vol. 105 pp 959-964
- Wood, D.M. and Dargan, P.I. (2012c) Mephedrone (4-methylmethcathinone): What is new in our understanding of its use and toxicity *Progress in Neuro-Psychopharmacology and Biological Psychiatry* vol. 39 pp 227-233
- Wood, D.M., Greene, S.I. and Dargan, P.I. (2012d) Emergency department presentations in determining the effectiveness of drug control in the United Kingdom: mephedrone (4-methylmethcathinone) control appears to be effective using this model *Emerg Med J* vol. 30 pp 70-71
- Wood, D.M. and Dargan, P.I. (2012e) Understanding how data triangulation identifies acute toxicity of novel psychoactive drugs. *J Med Toxicol* vol. 8 pp 300-303
- Wood, D.M., Conran, P. and Dargan, P.I. (2014) ICD-10 coding: poor identification of recreational drug presentations to a large emergency department *Emerg Med J* vol. 28 pp 387-389

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