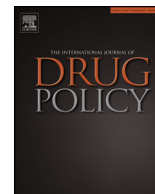




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Research paper

## I like the old stuff better than the new stuff? Subjective experiences of new psychoactive substances

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## ABSTRACT

**Background:** Over the past decade, monitoring systems have identified the rapid emergence of new psychoactive substances (NPS). While the use of many NPS is minimal and transitory, little is known about which products have potential for capturing the attention of significant proportions of the drug consuming market. The aim of this study was to explore self-reported experiences of three commonly used NPS classes within the Australian context (synthetic cathinones, hallucinogenic phenethylamines and hallucinogenic tryptamines) relative to traditional illicit drug counterparts.

**Methods:** Frequent psychostimulant consumers interviewed for the Australian Ecstasy and related Drugs Reporting System (EDRS) (n = 1208) provided subjective ratings of the pleasurable and negative (acute and longer-term) effects of substances used in the last six months on the last occasion of use, and the likelihood of future use.

**Results:** Stimulant-type NPS (e.g., mephedrone, methylone) were rated less favourably than ecstasy and cocaine in terms of pleasurable effects and likelihood of future use. DMT (a hallucinogenic tryptamine) showed a similar profile to LSD in terms of pleasurable effects and the likelihood of future use, but negative effects (acute and comedown) were rated lower. Hallucinogenic phenethylamines (e.g., 2C-B) showed a similar negative profile to LSD, but were rated as less pleasurable and less likely to be used again.

**Conclusion:** The potential for expanded use of stimulant-type NPS may be lower compared to commonly used stimulants such as ecstasy and cocaine. In contrast, the potential of DMT may be higher relative to LSD given the comparative absence of negative effects.

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## Introduction

New psychoactive substances (NPS) have emerged rapidly on global drug markets over the past decade (EMCDDA, 2015). NPS are comprised of both synthetic and naturally occurring substances, which are often analogous in their effects to traditional controlled substances such as ecstasy/MDMA, cocaine and lysergic acid diethylamide (LSD). For many NPS there has been little research examining their effects and associated risks for consumers, both in the short-term and long-term (Sumnall, Evans-Brown, & McVeigh, 2011). In 2014, NPS were detected at a rate of two per week in the European Union, with over 450 different NPS currently being monitored by the European Centre for Drugs and Drug Addiction

(EMCDDA, 2015). While the availability and use of many NPS is short-lived, some of these substances remain popular with continued use noted amongst regular psychostimulant consuming populations (Sumnall et al., 2011).

Given the ongoing access to NPS it is important to understand the consumers' potential willingness to substitute traditional illicit drugs with NPS, and consequently maintain their popularity on the illicit drug market. Amongst regular consumers, preference for particular NPS has previously been linked to a number of variables including: preference for stimulant or psychedelic effects, perceived quality and purity relative to traditional substances, low probability of short-term and long-term harms, and positive ratings by peers or on the internet (Freeman et al., 2012; Moore, Dargan, Wood, & Measham, 2013; Sumnall et al., 2011; van Amsterdam, Nabben, Keiman, Haanschoten, & Korf, 2015). The present study will focus on subjective experiences of the positive and negative effects of NPS and how these compare to traditional illicit psychostimulant substances.

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Amongst Australian samples of regular psychostimulant consumers, the use of NPS in the last six months has risen significantly from 33% in 2010 to 42% in 2015 (Sutherland et al., 2016). The most commonly used NPS classes within this context were hallucinogenic phenethylamines (e.g., 2C-I, 2C-B, 2C-E), hallucinogenic tryptamines (e.g., DMT, 5-meo-DMT), and synthetic cathinones (e.g. mephedrone, methylone, and MDPV/Ivory wave), and while recent use of synthetic cathinones decreased over this six year period (18.5% vs 7.7%), there were overall increases in the recent use of hallucinogenic phenethylamines (8.5% vs 18.6%) and tryptamines (7.5% vs 10.9%) (Sutherland et al., 2016).

The synthetic cathinone class includes substances such as mephedrone, methylone, and MDPV. Originally mephedrone (4-methylmethcathinone; 'MCAT'; 'meow-meow'; 'plant food') was marketed as a 'legal high' and was largely sold online or in speciality shops (Brunt, Poortman, Niesink, & Van den Brink, 2010; Davey, Corazza, Schifano, & Deluca, 2010; Measham, Moore, Newcombe, & Welch, 2010), and despite the introduction of legislative controls, it has remained available via traditional face-to-face dealing in addition to online purchases (Winstock, Mitcheson, & Marsden, 2010). In contrast, other NPS such as MDPV and methylone have not necessarily had such a pervasive or lasting presence.

Several studies have examined consumers' subjective reports of the positive and negative effects of mephedrone (Winstock et al., 2011; Winstock, Mitcheson, Deluca et al., 2010), but few studies have directly compared these subjective reports to other traditional illicit substances (Carhart-Harris, King, & Nutt, 2011; Kapitany-Foveny et al., 2013; Winstock, Mitcheson, Deluca et al., 2010), and there has been little research into the subjective effects of other popular synthetic cathinone derivatives such as methylone and MDPV. In one study examining the subjective effects of mephedrone ( $n = 145$ ), the overall profile of subjective effects was rated as similar to MDMA, but positive and negative effects were not compared (Kapitany-Foveny et al., 2013). Similarly, amongst a sample who had consumed both ecstasy and mephedrone, almost three-quarters (73%) indicated that they preferred the effects of MDMA, but the specific profile of effects was not directly compared (Carhart-Harris et al., 2011). In contrast, in a study comparing the subjective effects of mephedrone and cocaine, over one-half of the sample reported that the quality (55%) and duration (65%) of the 'high' was greater for mephedrone (Winstock, Mitcheson, Deluca et al., 2010). In the only study to compare subjective ratings amongst recent consumers of ecstasy, cocaine, and mephedrone, ecstasy was rated as highest in terms of the pleasurable 'high' and lowest in terms of acute negative effects (Uosukainen, Tacke, & Winstock, 2015).

In relation to hallucinogenic NPS, few studies have evaluated the subjective effects of hallucinogenic tryptamines such as DMT (*N,N*-dimethyltryptamine), and to our knowledge, no previous research has compared hallucinogenic phenethylamines (e.g., 2C-I, 2C-B, 2C-E) to more commonly used hallucinogenic substances such as LSD. One previous study compared the effect and risk profile amongst first-time users of DMT ( $n = 472$ ), magic mushrooms ( $n = 1157$ ), LSD ( $n = 1130$ ) or ketamine ( $n = 993$ ) (Winstock, Kaar, & Borschmann, 2014). DMT was reported to have a desirable effect profile characterised by a high strength of pleasurable effects, and a lack of negative effects (Winstock et al., 2014).

The aim of the present study was to explore subjective experiences of specific substances within the three most commonly used NPS classes amongst regular psychostimulant consumers in Australia: synthetic cathinones, hallucinogenic phenethylamines and hallucinogenic tryptamines. The research complements previous studies which have examined subjective ratings of specific NPS in comparison to substances that are already established in the illicit drug market (Uosukainen et al., 2015;

Winstock et al., 2014). However, previous studies have not conducted statistical tests to directly compare subjective ratings amongst the same group of participants. Thus, in the present study subjective ratings were compared amongst matched samples who report recent use of each substance. To this end, synthetic cathinones were compared to ecstasy and cocaine, and hallucinogenic phenethylamines and tryptamines were compared to LSD.

## Method

### *Participants and procedure*

The current study comprised regular psychostimulant consumers ( $n = 1260$ ) interviewed as part of the Australian Ecstasy and Related Drugs Reporting System (EDRS) in 2012 ( $n = 607$ ) or 2013 ( $n = 653$ ). To ensure independence, participants who completed the survey in 2012 ( $n = 33$ ) were excluded from the 2013 sample. Inclusion criteria comprised: aged 16 years or older; at least monthly use of ecstasy or other psychostimulant drugs in the last six months; and residence in the Australian capital city of recruitment for the preceding 12 months.

Recruitment was via posters/flyers, internet forums, and word of mouth. Participants contacted the researchers and confidential face-to-face structured interviews (~60 min) were conducted in public locations. Participants received \$AUD40 reimbursement for their time and out-of-pocket expenses.

The EDRS is a national Australian study which aims to examine trends in ecstasy and related drug use and associated risk behaviours and health-related harms amongst regular psychostimulant consumers in Australian capital cities on a yearly basis. A full description on the methods and survey instrument can be found elsewhere (Sindicich & Burns, 2013, 2014).

### *Key measures*

If participants had used any specified NPS in the last six months, they were asked to report number of days of use and provide subjective ratings of their effects on the last occasion of use. Those who had used ecstasy, cocaine or LSD in the last six months also provided days of use and subjective ratings for these substances. Subjective rating scales were devised by the authors and referred to the pleasurable and negative effects 'during the high' and the negative effects during the 'comedown' on the last occasion of use (from 0 'no effect' to 10 'best/worst ever had (any drug)') and the likelihood that they would use the drug again if offered (0 'definitely not' to 10 'definitely yes').

### *Design and analysis*

Mean subjective ratings were examined for stimulant (mephedrone, methylone, MDPV) and hallucinogenic (2C-B, 2C-I, 2C-E, DMT, mescaline) NPS. Statistical comparisons (paired t-tests) were conducted for matched samples ( $n > 20$ ) who had used one of these NPS substances as well as other common psychostimulant (ecstasy and cocaine) or hallucinogenic (LSD) substances during this time. The matched samples were as follows: ecstasy and mephedrone ( $n = 66$ ); ecstasy and methylone ( $n = 46$ ); cocaine and mephedrone ( $n = 33$ ); cocaine and methylone ( $n = 25$ ); LSD and 2CB ( $n = 89$ ); LSD and 2CI ( $n = 46$ ); LSD and DMT ( $n = 107$ ).

## Results

### *Demographics and substance use*

The mean age of the sample was 22 years ( $SD = 6.5$ ) and two thirds (66%) were male. Participants had completed a median of

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