An Internet Study of User’s Experiences of the Synthetic Cathinone 4-Methylethcathinone (4-MEC)

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An Internet Study of User’s Experiences of the Synthetic Cathinone 4-Methylethcathinone (4-MEC)

Marie Claire Van Hout, Ph.D., M.Sc., M.Sc. a

Abstract — A synthetic cathinone called 4-methylethcathinone (4-MEC) emerged online in 2010, and was cyber-marketed to be a replacement for mephedrone. The study aimed to present user experiences of 4-MEC as reported on the Internet, with a focus on user profiles, sourcing and product characteristics, routes of administration, dosage, positive and undesirable effects, and comparisons to mephedrone. Twenty-three individual, anonymous trip reports of the sole use of 4-MEC, and 112 screenshots of general 4-MEC user discussion boards, were taken from a purposeful sample of public drug-related sites. A content textual analysis was conducted on extracted qualitative information and produced 41 categories compiled into five general themes: “Type of 4-MEC user”; “Sourcing, informed decision making, product characteristics, and quality assurance”; “Routes of administration, gauging of dosage, and consumption of other drugs”; “Time course effects and outcomes”; and “Comparisons with mephedrone.” 4-MEC is sold as white beads, crystalline shards, or green balls. User motives centered on curiosity, pricing, and ease of web sourcing. Oral, nasal, injecting, eyeball, and rectal routes of administration were described. Testing for purity, “allergy testing,” and gauging of dosage were common. Users described euphoric but short-lived effects, with little comedown. Continued research is vital to inform harm reduction.

Keywords — 4-MEC, 4-methylethcathinone, cathinone, Internet discussion forum, mephedrone, novel psychoactive substance

INTRODUCTION

The diffusion of novel psychoactive substances (NPS) remains of interest to policymakers, clinicians, and scientists given the potential for ill-informed use and harm

Gallagher et al. 2012; Corazza et al. 2013; Iversen et al. 2013 and increasing availability on the Internet (De Luca et al. 2012). The monitoring of online data is crucial to track user trends and the development of new designer compounds responding to legislative control (Deluca et al. 2007). Many are untested compounds for which no formal toxicology profiles exist (Schifano et al. 2011; Winstock et al. 2011), with products developed, manufactured, and aggressively marketed so as to displace controlled drugs and circumvent existing regulatory controls (Walsh 2011; Kelly 2011). NPS products often vary quantitatively and qualitatively, with frequent misrepresentation in the

Thanks to Tim Bingham for retrieval of part of the data set. Substance Abuse Research Group, Centre for Health Behaviour, School of Health Sciences, Waterford Institute of Technology, Waterford, Ireland.

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labelling of actual contents, despite often originating from the same sourcing routes (Davies et al. 2010; Schmidt et al. 2010; Zuba & Byrski 2013; Jebadurai et al. 2013). Risk of criminalization and potential harms for both users and online sellers are evident (Brandt et al. 2010a; 2010b; 2010c).

Of interest for this study is the rising popularity of synthetic cathinones, which are derivatives of the naturally occurring beta-ketone amphetamine analogue found in the Catha edulis plant (Al-Habori 2005; Hassan et al. 2007). These phenylalkylamine derivatives mimic amphetamine and MDMA by producing desirable and distinctive psychoactive affects (Prosser & Nelson 2012). Current availability of information on the short- and long-term human toxicological implications of synthetic cathinone use remains limited. Reported indicators of acute toxicity include psychomotor agitation, motor automatisms, tachycardia, Parkinsonism, tremors; hypertension, chest pain, hyperthermia, mydriasis, delusions, paranoid psychosis, dizziness, depression, rhabdomyolysis, convulsion, panic attacks, abdominal pain, hyponatremia, vomiting, cerebral edema, and seizures, with chronic effects including changes in cognition and emotional stability, S–T segment changes, nephrotoxicity, and monoamine dysfunction (Bajaj, Mullen & Wylie 2010; Mackay, Taylor & Bajaj 2011; Urban et al. 2011; Omer & Doherty 2011; James et al. 2011; Kasick et al. 2012; Spiller et al. 2011; Regan et al. 2011; Van Hout & Bingham 2012). Severe cases of acute toxicity and fatalities have been reported (Maskell et al. 2001; Gustavsson & Escher 2009; Torrance & Cooper 2010; Wood et al. 2010a; 2010b; Lusthof et al. 2011; Wong & Holt 2011; Wood et al. 2011), but in many cases the presence of multiple drugs of abuse contributed to greater monoamine toxicity (Maskell et al. 2011; Coppola & Mondola 2012; Aromatario et al. 2012; Schifano et al. 2012; Prosser & Nelson 2012). Bizarre at-risk behaviors, such as hangings, stabblings, and self-mutilation, have also been reported amongst synthetic cathinone users (Schifano et al. 2012; Marinetti & Antonides 2013).

Despite these incurred user consequences, use of synthetic cathinones is increasingly embedded in contemporary drug culture, whether through blending in existing street-available drugs such as MDMA and cocaine, or through chemical restructuring of compounds (Van Hout & Brennan 2011a; 2010b; 2012). By 2013, more than 30 different synthetic cathinones were recorded by the EMCDDA as potential drugs of abuse (for current reviews on these synthetic cathinones, see Wood & Dargan 2012; Coppola & Mondola 2012; Brennan & Van Hout 2012; German et al. 2013; Caprili 2013). On regulatory control of the popular mephedrone or 4-methylmethcathinone (4-MMC), a new synthetic cathinone called 4-methylthecathinone (4-MEC) emerged online in 2010. It was not the only synthetic cathinone to emerge during this time, but it was heavily cyber-marketed to be a “legal” substitute for mephedrone, providing similar stimulant, entactogenic, and dissociative effects (Khreit et al. 2012; Ayres & Bond 2012) (see Table 1, which presents comparisons between 4-MEC and mephedrone according to user reports from http://www.erowid.com).

4-MEC is structurally derived from cathinone by substitution in the phenyl ring with an alkyl substituent and by substitution at the nitrogen atom with an alkyl group (Ayres & Bond 2012). Its molecular formula is C12H17NO, and its IUPAC is 2-ethylamino-1-(4-methylphenyl) propan-1-one (Figure 1 shows 4-MEC and 4-MMC).

The present study investigates user reporting of 4-MEC use with a focus on user experiences of the drug, current user profiles, sourcing and characteristics of products marketed as 4-MEC, routes of administration, dosage and outcomes, undesirable effects, similarities with mephedrone, and use of 4-MEC within poly-drug-taking repertoires. It has been difficult to estimate trends in 4-MEC given its short history of use (Gil et al. 2013). Peak Google search hits in September 2013 (05/09/2013) indicate some levelling-off in user interest to buy 4-MEC, but still comparable to trend popularity captured in October 2012. Current global web interest originates from two areas, the USA and Germany, with Germany recording the highest interest in 4-MEC (05/09/2013). According to Gil et al. (2013), websites selling “research chemicals” (RCs) purport to sell 98-99% pure concentrations of 4-MEC, despite some seizures containing only 51-78% purity and others reporting relative purity (Khreit et al. 2012). 4-MEC has also been found in RCs with other synthetic cathinones such as 3,4-methylenedioxypyrrrolidin-1-ynbutiophenone (MDPBP), 3,4-methylenedioxypyrrrolidin-1-ynvalerone (MDPV), 4-methyl-pyrrolidin-1-ynpropiophenone (MPPP), pentylone and benzodrone (Brandt et al. 2010a; 2010b; 2010c; Zuba & Byriska 2013; Gil et al. 2013). Packages containing 4-MEC are commonly labelled “not for human consumption” or “not tested for hazards or toxicity” (Wood & Dargan 2012; Khreit et al. 2012; Zawilska & Wojcieszak 2013).

The 4-MEC research base to date is confined to the development of specific drug screening methods for 4-MEC, chemical analysis of seized powders and controlled deliveries, the medical screening of biological material in clinical case presentations (Brandt et al. 2010a; 2010b; 2010c; Jankovics et al. 2011; Ayres & Bond 2012; Khreit et al. 2012; Gil et al. 2013), and the reporting of one fatal 4-MEC poisoning (Rojek et al. 2012). No qualitative study with a primary aim of describing user profiling and experiences of 4-MEC has been conducted to date. Information on 4-MEC user experiences is evident on RC websites, drug user forums, psychonautic trip reporting sites, and on drug retail infrastructures (for example, “Silk Road” or “Atlantis”) operating on the “Deep Web.” The trip recording of drug-taking experiences is, according to Shulgin,
TABLE 1
Comparison Between 4-Methylethcathinone (4-MEC) and 4-methylmethcathinone (4-MMC), Based on User Reports from http://www.erowid.com

<table>
<thead>
<tr>
<th></th>
<th>4-Methylethcathinone (4-MEC)</th>
<th>4-methylmethcathinone (4-MMC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common dosage</td>
<td>5-200 mg insufflated</td>
<td>5-125 mg insufflated</td>
</tr>
<tr>
<td>(recreational use)</td>
<td>15-300 mg oral</td>
<td>15 and 300 mg oral</td>
</tr>
<tr>
<td>Total Duration</td>
<td>2-3 h insufflated</td>
<td>2-5 h insufflated</td>
</tr>
<tr>
<td></td>
<td>2-5 h oral</td>
<td>2-5 h oral</td>
</tr>
<tr>
<td>Positive effects</td>
<td>Mental and physical stimulation, euphoria, mood lift, feelings of empathy, openness, increase in sociability, desire to talk with others, pleasurable rushing, spaced out, relaxed feeling, increased appreciation of music.</td>
<td>Mental and physical stimulation, euphoria, mood lift, empathy, openness, sociability, desire to talk, pleasurable rushing.</td>
</tr>
<tr>
<td>Neutral effects</td>
<td>General change in consciousness (as with most psychoactives), decreased appetite, pupil dilation, unusual body sensations (facial flushing, chills, goosebumps, body energy), change in body temperature regulation, sweating, increase in heart rate and blood pressure, nystagmus, tremor.</td>
<td>General change in consciousness (as with most psychoactives), decreased appetite, pupil dilation, unusual body sensations (facial flushing, chills, goosebumps, body energy), change in body temperature regulation, sweating, increase in heart rate and blood pressure.</td>
</tr>
<tr>
<td>Negative effects</td>
<td>• strong desire to redose, craving to recapture initial euphoric rush</td>
<td>Strong desire to redose, craving to recapture initial euphoric rush, uncomfortable changes in body temperature (sweating/chills), heart palpitations, sense of racing heart, impaired short-term memory, insomnia, tightened jaw muscles, grinding teeth (trismus and bruxia), muscle twitching, nystagmus, dizziness, lightheadedness, vertigo, a couple of reports include serious vasoconstriction, when insufflated: pain and swelling in nose and throat, sinusitis.</td>
</tr>
</tbody>
</table>

Shulgin & Jacok (1986: 317), “of inestimable value, in that they may make direct comparisons to other, familiar altered states, and equate or critically compare some particular property of a drug’s effect.” Similar to other studies of Internet postings on 4-HO-MET (Kellgren & Soussan 2011), Spice (Kjellgren, Henningsson & Soussan 2013), and methoxetamine (Kjellgren & Jonsson 2013), this study observed the lack of controlled experiments with 4-MEC, and chose to utilize the available qualitative Internet research as a valid option to describe and characterize 4-MEC user’s subjective experiences of the drug. The present study sampled a series of public Internet websites and forums where users upload 4-MEC trip reports, discuss their experiences, and interact with other users around its effects, optimal dosage and route of administration, drug-taking episodes, and concurrent or sequential use with other substances. As a consequence, this study presents a unique insight into the available data on reported user experiences of 4-MEC.

METHODS

Research on emerging drug trends increasingly utilizes dedicated online research methodologies which incorporate the textual qualitative analysis of online postings (Fielding et al. 2008; Miller & Sønderlund 2010). Specific Internet searches for the collection of anonymous 4-MEC trip reports and discussion board postings...
FIGURE 1
4-MMC and 4-MEC

4-MMC

4-MEC

made by users were carried out on Google Insights for Search, Google, and Yahoo by using specific key words [4-Methylethcathinone; 4-MEC; 4-methyl-N-ethylcathinone; 4-methylethcathinone; para-methyl-N-ethylcathinone; and para-methylethcathinone] and used in different combinations with the words “experience,” “post,” “trip,” “forum.” A purposeful sample of public sites (N=17) was scrutinized in the first week of September 2013 to identify written descriptions of experiences relating to user purchasing and consumption of 4-MEC (Table 2). Similar to Kjellgren and Jonsson (2013), in the event that a site had a dedicated forum section for drug-related experiences, the search was restricted to this section only. Trip-report searches were restricted to the reported sole use of 4-MEC. Discussion board postings were included to add the user perspectives around concurrent or sequential use of other substances during the 4-MEC experience, so as to give a snapshot of (potential) poly drug interactions and user repertoires. Additional exclusion criteria were applied to duplicate postings and also when the posting or trip report was incomprehensible to the researcher (Kjellgren & Jonsson 2013). A total of 34 records were excluded from the data set. Twenty-three trip reports on the use of 4-MEC on its own and 112 screenshots of general 4-MEC user discussion forums formed the final dataset.

The final data set was stored in an online, password-protected computer. Trip reports and discussion forum screenshots were transferred into a Word file for

<table>
<thead>
<tr>
<th>Website</th>
<th>Language</th>
<th>Discussion Board</th>
<th>Screen shots</th>
<th>Trip Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.erowid.org">www.erowid.org</a></td>
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<td>1</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.hipforums.com">www.hipforums.com</a></td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.shroomery.org">www.shroomery.org</a></td>
<td>English</td>
<td>1</td>
<td>0</td>
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<tr>
<td><a href="http://www.chemrus.com">www.chemrus.com</a></td>
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<tr>
<td><a href="http://www.bluelight.ru">www.bluelight.ru</a></td>
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<tr>
<td><a href="http://www.drugs-forum.com">www.drugs-forum.com</a></td>
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<td>10</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.legalhighsforum.com">www.legalhighsforum.com</a></td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.zoklet.net">www.zoklet.net</a></td>
<td>English</td>
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<td></td>
</tr>
<tr>
<td><a href="http://www.partyvibe.org">www.partyvibe.org</a></td>
<td>English</td>
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<td>0</td>
<td></td>
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<tr>
<td><a href="http://www.ukchemicalresearch.org">www.ukchemicalresearch.org</a></td>
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<td></td>
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<tr>
<td><a href="http://www.forums.herbalhighs.com">www.forums.herbalhighs.com</a></td>
<td>English</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.forum">www.forum</a> opiophile.org</td>
<td>English</td>
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<td>1</td>
<td></td>
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<tr>
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<td></td>
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<tr>
<td><a href="http://www.legalhighs.net">www.legalhighs.net</a></td>
<td>English</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.fromthedeskosaldebalneum.blogspot">www.fromthedeskosaldebalneum.blogspot</a></td>
<td>English</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>112</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>
detailed textual analysis. All records and statements were anonymized by removal of online pseudonyms and URLs for specific threads and postings (Deluca et al. 2007; Gallagher et al. 2012; Jebadurai et al. 2013). The Word file was read three times in order for the researcher to become immersed in the data and to be familiar with the 4-MEC experience. A content textual analysis was conducted as per protocols advised by Holsti (1969) and Babbie (2010). Generation of key words, phrases, opinions, reflections, thoughts, meanings, and attitudes of 4-MEC users was used to formulate categories by placing narratives into identifiable categories and selecting the most illustrative narratives. Frequencies in context routines assisted in the identification of the more important subjective facets or categories of the 4-MEC experience and subsequent development of the coding frame. Emerging themes were identified and coded with assistance from NVivo 8, a qualitative analysis software package. Patterns in the data were additionally analyzed using spider diagrams. The analysis produced 41 categories that were compiled into five general themes (see Table 3 for the emergent categories and themes arising from the content analysis of textual data).

RESULTS

Five themes emerged from the data analysis, and are illustrated below with representative quotations.

Type of 4-MEC User

This theme presents details on the type of 4-MEC user in terms of profile and situation of 4-MEC within poly-drug-taking repertoires. Trip reporters of 4-MEC were recorded as majority male, aged between 30 and 45 years, who reported experience of the psychonautic use of drugs such as THC/cannabis, hydro-codeine, MDMA, MDA, (meth)amphetamine, mephedrone, 5-Meo-dalt, aMT, psilocybin mushrooms, LSD, 5-MeO-DiPT, 2C-C, 2C-E, 2C-I, Ketamine, MXE, JWH-250, salvia, piperazine, 4-FA, 6-APB, 2C-P, 2C-T-2, 5-MeO-MiPT, and 25I-NBOMe.

Sourcing, Informed Decision Making, Product Characteristics, and Quality Assurance

This theme presents user reports around sourcing of 4-MEC, decision-making processes to purchase, product characteristics on receipt, and user quality-assurance practices. 4-MEC trip reports revealed sourcing occurred in all cases via research chemical or RC websites. Of interest was that several individuals had never ordered online before or tried a synthetic cathinone. Many users reported researching 4-MEC online by viewing other trip reports before deciding to order, with consumer decision making grounded in curiosity due to its similarity to mephedrone, its low price, favorable customer reports, and its reputation as an “alternative MDMA.” One user described curiosity and confidence in his/her vendor as stimulating interest in 4-MEC:

I wanted to avoid cathinones but was intrigued when a trusted vendor began to carry 4-MEC. Having never tried 4-MMC [mephedrone] (and having no interest) I was sceptical, but ordered some anyways.

On the whole, users appeared informed and informative about their experiences of 4-MEC, with websites moderating and removing the uploading of information from excessively intoxicated parties. One comment was made on the discussion boards around inexperienced user confusion between 4-MEC and 4-EMC:

Yeah, 4-EMC, not 4-MEC. I think 4-EMC’s biggest downfall is that its name is so close to 4-MEC that people will get it confused.

4-MEC web orders ranged from 1 to 4 grams. The product was described as clean and in well-packaged, silver-sealed, multi-layered bags, which on opening revealed white, translucent, “tiny glass beads” or “rice”-like rectangular crystal shards. One trip reporter reported buying 4-MEC light-green granules and stated, “They look like bright green tiny candy balls.” A few trip reporters described the option of encapsulated forms whereby the 4-MEC crystal shards were sold with empty gel capsules for optional oral use (70 mg per capsule). Some trip report and discussion board comments were made around the “strange smell and taste” of 4-MEC crystals, with some comparisons to “cleaner” and “coconut.” Comments were also made that 4-MEC smelt less pungent than mephedrone, thereby reassuring the user of its authenticity. Crystals were reportedly easy to crush using a credit card for insufflation, and could be dissolved in warm water for injection.

The majority of 4-MEC trip reporters, and particularly first-time buyers, bought test kits and scales with the 4-MEC product, with many initially testing with “<1mg allergy test” prior to experimentation. Most but not all trip reporters or users active on discussion boards reported testing their products for purity prior to consumption. 4-MEC was sold as RC and relatively reliable in terms of its purity. One 4-MEC trip reporter reported purity of 80%. Those who did not perform a purity test reported choosing vendors viewed as reliable and reputable throughout extensive purchase history. Of interest is that one 4-MEC trip reporter ordered Methoxetamine (MXE) online (a derivative of ketamine) and, on testing, received 4-EMC instead.

Routes of Administration, Gauging of Dosage, and Consumption of Other Drugs

This theme presents user information around administration and preferred route(s) of administration and gauging of dosage for optimal experiences. Route of 4-MEC administration was primarily insufflation and oral (dissolved in
### TABLE 3
Forty-one Categories and Five Themes Emerging from the Contextual Analysis of Discussion Forums and Trip Reports as per Protocols Advised by Holsti (1969) and Babbie (2010)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Included categories</th>
</tr>
</thead>
</table>
| **Type of 4-MEC User** | 1. Majority male.  
2. Aged between 30 and 45 years.  
3. Experience of the psychonautic use of drugs THC/cannabis, hydrocodine, MDMA, MDA, (Meth)amphetamine, 4-MMC, 5-MeO-dalt, aMT, psilocybin mushrooms, LSD, 5-MeO-DiPT, 2C-C, 2C-E, 2C-I, Ketamine, MXE, JWH-250, salvia, pipеразине, 4-FA, 6-APB, 2C-P, 2C-T-2, 5-MeO-MiPT, and 25I-NBOMe. |
| **Sourcing, Informed Decision Making, Product Characteristics and Quality Assurance** | 4. Sourcing occurred via research chemical or RC websites.  
5. Informed decision making viewing other trip reports before deciding to order.  
6. Consumer decision making grounded in curiosity due to its similarity to 4-MMC, its low price, favorable customer reports, and its reputation as an “alternative MDMA.”  
7. Inexperienced user confusion between 4-MEC and 4-EMC.  
8. Web orders ranged from 1 to 4 grams.  
9. Products as white, translucent, “tiny glass beads,” or “rice”-like rectangular crystal shards, light-green granules, and encapsulated forms whereby the 4-MEC crystal shards were sold with empty gel capsules for optional oral use (70 mg per capsule).  
10. Strange smell and taste of 4-MEC crystals. 4-MEC smelt less pungent than 4-MMC, thereby reassuring the user of its authenticity.  
11. Crystals were reportedly easy to crush using a credit card for insufflation, and dissolve in warm water for injection.  
12. Initially testing with “<1 mg allergy test” prior to experimentation.  
13. Testing their products for purity prior to consumption.  
14. Vendors viewed as reliable and reputable throughout extensive purchase history.  
15. Ordering of Methoxetamine (MXE) and on testing receiving 4-MEC instead.  
16. Primarily insufflation and oral dissolved in Diet Coke, encapsulated in the provided capsules, and wrapped in paper.  
17. Combinations of nasal and oral routes frequent due to excessive nasal burning, clogging of nasal passages and nasal dripping.  
18. Use of “nose unclogging medicinal aids.”  
19. Eyeballing 70 mg 4-MEC following oral and insufflated use.  
20. Rectal administration, known as “booty bumping” or “plugging” for larger doses, for a more potent intense effect, and for anal sex.  
21. One account of intravenous administration of 4-MEC: 4MEC did not burn when out of the vein, caused only moderate vasoconstriction, and mild to moderate nausea.  
22. No unpleasant taste in the mouth on injecting use.  
23. Extremely active in doses of 75 mg upwards and when administered via the more direct routes of administration.  
24. Oral doses requiring 100 mg or greater for similar outcomes.  
25. Tentative approach to gauging 4-MEC dosage by “allergy testing of <1-5mg” and then starting at a low oral dose of 10mg.  
26. Intentions to use 4-MEC with other RCs and cognisant of the potential interactions between NPS in achieving the optimal outcome. Reports of combinations of 4-MEC with other drugs; 3-Methylmethcathinone (3-MMC), Methiopropamine (MPA), 5,6-Methylenedioxy-2-aminoindane (MDAI), flephedrone, methylene, butylene, 2-FMA, PV8 MDPV substitute, 4-bromomethcathinone (4-BMC), 4-ethylmethcathinone (4-EMC), pentylone, N-ethylbuphedrone (NEB), 4-ethyl-2,5-dimethoxyphenethylamine (2c-E), 4-FMA, 4-Fluoromethamphetamine (4-FMP), methoxetamine, and pentedrone.  
27. 4-MEC trip reports revealed onset around 5-7 minutes, with peak effects within 10-15 minutes and lasting between 2-3 hours.  
28. Short-lived and weak effect. |
| **Routes of administration, gauging of dosage, and consumption of other drugs** |  |
TABLE 3
(Continued)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Included categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>29. Positive effects were described as a general mood lift, detached dissociative feeling, heightened consciousness, increased body temperature, sensual enhancement, waves of euphoria, deep relaxation, increased appreciation of music, and potent analgesic properties when rubbed into the affected area (inflamed gums, back).</td>
<td></td>
</tr>
<tr>
<td>30. Craving to re-use within the 4-MEC drug-taking episode and appears hugely reduced after 24 hours.</td>
<td></td>
</tr>
<tr>
<td>31. Two postings describing a 5-7 day 4-MEC binge (respectively).</td>
<td></td>
</tr>
<tr>
<td>32. Negative effects described as nasty acidic taste on insufflation, nasal burning, nasal drip, jaw clenching, nystagmus, chemical taste on the tongue, hiccups, chemical burns on the tongue, head fogginess, migraine, loss of sight, heart palpitations, laxative effect, excessive sweating in the armpits, nausea, and vomiting.</td>
<td></td>
</tr>
<tr>
<td>33. Advise against eating and drinking before use in order to avoid associated nausea and projectile vomiting.</td>
<td></td>
</tr>
<tr>
<td>34. Mixed comments with regard to its anorectic effects.</td>
<td></td>
</tr>
<tr>
<td>35. Few reported partial erections and inability to climax despite the urge for stimulation.</td>
<td></td>
</tr>
<tr>
<td>36. Lack of 4-MEC comedown symptomatic with users returning to normality within 24 hours, and many observing the ability to sleep.</td>
<td></td>
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<td>37. Compared with mephedrone, its effect is described as less intense, weaker, and short-lived in comparison, resulting in higher and more frequent administration.</td>
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<td>38. 4-MEC is known by users as “MDMA ULTRALITE” and “Diet 4-MMC.”</td>
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<td>39. Comments on discussion boards centered on its effect as a weaker version of 4-MMC.</td>
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<td>40. MEC users with a history of synthetic cathinone use (mephedrone), and who described weak drug effect on use of 4MEC, described higher and more frequent dosing in the drug-taking episode.</td>
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<td>41. No withdrawal syndrome characterized by depression, anergia, anhedonia, or insomnia, as was the case with mephedrone, was observed by 4-MEC users.</td>
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Diet Coke, encapsulated in the provided capsules, and wrapped in paper). Combinations of nasal and oral routes were frequent due to excessive nasal burning, clogging of nasal passages and nasal dripping. Some comments were made around the use of “nose unclogging medicinal aids,” which was observed to compromise absorption of 4-MEC.

I think oral dosing works stronger with this drug than to snort, mainly for the reason that you can take a far bigger dose. Who the heck could snort a 500 mg line of this shit? I know I couldn’t. I tried a bigger line yesterday and it hurt like hell. [LOL] So I’m going back to try oral again.

Two trip reporters described eyeballing 70 mg of 4-MEC following oral and insufflated use. Several comments on discussion boards were made around rectal administration, known as “booty bumping” or “plugging,” given the need for larger doses for a more potent, intense effect, and for anal sex. Only one trip reporter described experience of intravenous administration of 4-MEC (150-200 mg of several injections over the course of eight hours):

A very unusual rush consisting of euphoria and this weird tingling sensation which coalesced into a feeling of intense warmth (literally) lasting about 15 seconds. After that, it was mildly euphoric and empathogenic. A second injection was administered 10 minutes later which boosted the effects tremendously with another of the hot flashes, then moderate euphoria and still virtually NO stimulation. There was, however, some visual distortion like looking through rippling water and some mild visuals comparable sort of like the ones with MDA or 5meoMIPT. The later injections were in an attempt to induce the intense euphoria craved. It seemed used IV most of the pleasant effects were gone after 2 hours, prompting the redoses. But not suffering from any of the usual depression and dark mood often induced.

This trip reporter also noted that 4-MEC did not burn when out of the vein, caused only moderate vasoconstriction, and mild to moderate nausea in the first hour after the second injection. One discussion board post described “terrible, terrible shakiness, paranoia, extreme muscle twitching” on IV use of 4-MEC. Injected 4-MEC, in contrast to intranasal routes of administration, did not produce an unpleasant taste in the mouth.

In terms of dosage, 4-MEC appeared extremely active in doses of 75 mg upwards and when administered via the more direct routes of administration produced an overwhelming “rush” and an “instant roll,” with oral doses.
requiring 100 mg or greater for similar outcomes. Several 4-MEC trip reporters described a tentative approach to gauging 4-MEC dosage by “allergy testing of <1-5mg” and then starting at a low oral dose of 10 mg. One trip reporter said:

There was limited information at the time available but the consensus was that it was active around 50 to 100 mg oral. I allergy tested 1 mg and waited about 6 hours and then tried 50 mg oral. I felt definite mild euphoria and stimulation, and wanted to see where a higher dose would take me.

4-MEC discussion board postings commented on intentions to consume combinations of 4-MEC with other compounds such as 3-Methylmethcathinone (3-MMC); Methiopropamine (MPA); 5,6-Methylenedioxy-2-aminoindane (MDAI); lephedrone; methylone; butylone; 2-FMA; PV8 MDPV substitute; 4-bromomethcathinone (4-BMC); 4-ethylmethcathinone (4-EMC); pentylone; N-ethylbuphedrone (NEB); 4-ethyl-2,5-dimethoxyphenethylamine (2c-E); 4-FMA; 4-Fluoromethamphetamine (4-FMP); methoxetamine; and pentedrone. Trip reports in particular referred to intentions of combining with 4-Fluoromethamphetamine (4-FA), a psychoactive drug of the phenethylamine and amphetamine chemical classes, to boost the effect.

It’s almost like 4-FA but with a more intense body high and more euphoria, very relaxing though. I take a mental note to try combining this [4-MEC] with 4-FA and possibly Butylone or 6-APB in the future.

The most concise report was that 80-100mg 4-MEC with 50mg 2-FMA was a very smooth and functional stimulant with slight euphoria; not a drugged feeling but more like being in a very good, happy, energetic mood.

Time Course Effects and Outcomes

This theme describes user outcomes relating to 4-MEC consumption effects within the drug-taking episode. 4-MEC trip reports revealed onset around 5-7 minutes, with peak effects within 10-15 minutes and lasting between 2-3 hours. One user described his trip:

Tactile sensation felt amplified and I had a strong desire to communicate with friends online, which I spent the majority of the peak doing. The peak lasted approximately 45 minutes and the come down was gentle. The euphoria was comparable to a mild roll, minus the special magic feeling. Coming down took approximately 2 hours, with some mild stimulant after-effects lasting another 2 hours.

Despite unanimous agreement amongst 4-MEC trip reports and user postings on discussion boards of its short-lived and weak effect, positive effects were described as a general mood lift, detached dissociative feeling, heightened consciousness, increased body temperature, sensual enhancement, waves of euphoria, deep relaxation, and increased appreciation of music. One 4-MEC user said:

Wow, I feel fantastic, out of all the RC’s I’ve experimented with, this by far gets me the closest I can to the sensation of “Rolling.”

Many researchers criticise 4-MEC for its “weakness,” but in some cases this is obviously a benefit, not a deficit. It was a more sedative relaxing type of speed, it was gentle but still strong without going over the top or being over speedy . . . . I decided to call it the “The Kind Upper.”

One user described using it as having potent analgesic properties when rubbed into the affected area (inflamed gums, back). One user described it as “a nice high for the day with ability to function and sleep drug.” A trip report described the 4-MEC sensations as follows:

A deep, deep feeling of pleasure, tingles on my skin, the most pleasurable spaced-out feeling imaginable. Thoughts are minimal and are to some degrees unwanted intrusions to the purity of the BLISS of this rush of pleasure. Not a dopamine rush at a speed, but a body and mind-encompassing euphoria. I don’t want anything, all I want is for this feeling to continue . . . . On and on and on forever. There is no eroticism, there are no visual effects. Just the feeling.

All 4-MEC trip reporters and discussion board postings described craving to re-use within the 4-MEC drug-taking episode.

The only serious drawback I can find is that there is a strong desire to take more during the roll. Long-term, however, I find that I have very little urges to try it again, so I’m not too worried about addiction potential. Definitely buying more.

However, this craving for 4-MEC appeared hugely reduced after 24 hours, with only two postings describing a 5-7 day 4-MEC binge (respectively).

During the experience there was a desire to redose which dissipated with the primary effects. It seems as one comes down, which is gentle and leaves no vacuum in its wake, the desire to redose goes with it. Short duration, comparable euphoria, easier on the body the day after.

4-MEC trip reports and discussion board postings revealed reports of a nasty acidic taste on insufflation, nasal burning, nasal drip, jaw clenching, nystagmus, chemical taste on the tongue, hiccups, chemical burns on the tongue, head fogginess, migraine, loss of sight, heart palpitations, laxative effect, excessive sweating in the armpits, tongue, head fogginess, migraine, loss of sight, heart palpitations, laxative effect, excessive sweating in the armpits, nausea and vomiting. Some 4-MEC trip reporters advised against eating and drinking before use in order to avoid associated nausea and projectile vomiting. Mixed comments were made by 4-MEC trip reporters with regard to its anorectic effects. Two 4-MEC trip reporters described...
partial erections and inability to climax despite the urge for stimulation.

Many positive comments were made around the lack of 4-MEC comedown symptomatologies with users returning to normality within 24 hours, and many observing the ability to sleep.

Where 4-MMC [mephedrone] kinda felt like a can of Steel Reserve, this was more like a Honey Weiss. The comedown was easy, no tweaky, fiending, sketched out mode as I often found with 4-MMC. There was energy but not speediness and it was relatively easily slept on. It felt happy, enjoyable, and good. It didn’t leave me feeling sketchy and fiery. There seems to be no hangover depression or afterglow.

Comparisons with Mephedrone

Although 4-MEC acts similarly to mephedrone, its effect is described by users as less intense, weaker, and short-lived in comparison, resulting in higher and more frequent administration. 4-MEC is dubbed by users as “MDMA ULTRALITE” and “Diet 4-MMC.” Comments on discussion boards centered on its similar but weaker effect in comparison to mephedrone.

Tingly body feeling, light “flash” but not in the same range as 4-MMC [mephedrone]: soft stimulation when consumed nasally but strangely sedating when used oral (quite enjoyable). It became quite enjoyable and no real euphoria at all, but a confident headspace with a nice body feeling and some excitement.

4-MEC users with a history of synthetic cathinone use (especially mephedrone), and who described a weak drug effect on use of 4MEC, described higher and more frequent dosing in the drug-taking episode.

Retrospective: I deeply, deeply love this drug and this worries me considerably. Earlier this morning I had no desire to use it again but after writing this report and remembering what I felt I am very tempted to crush up some crystals and do a few lines right now. But if I do, I know what will happen – I’ll just want to do more, and then more, and won’t stop redosing until I start to feel a bit physically ill. Then my day will be shot and I will be a mess.

No withdrawal syndrome characterized by depression, anergia, anhedonia, or insomnia, as was the case with mephedrone, was observed by 4-MEC users.

4-MMC [mephedrone] never made me look back at the experience fondly, it was fun but it always left me feeling a little sketchy and dirty. I don’t get that feeling with 4-MEC. That is possibly the best part of it in comparison to 4-MMC for me personally.

DISCUSSION

The study presented information relating to 4-MEC use, effects, user practices, and situation within poly-drug-taking repertoires. Findings are cognisant of the displacement between the popular banned mephedrone and this “research chemical” with similar but weaker properties. Similar to extant literature on mephedrone, users were recorded as majority male, aged between 30 and 45 years, and experienced in the psychonautic use of drugs such as THC/cannabis, hydro-codone, MDMA, MDA, (meth)amphetamines, mephedrone, 5-MeO-dalt, aMT, psilocybin mushrooms, LSD, 5-MeO-DiPT, 2C-C, 2C-E, 2C-I, Ketamine, MXE, JWH-250, salvia, pipеразине, 4-FA, 6-APB, 2C-P, 2C-T-2, 5-MeO-MiPT, and 25I-NBOMe. Typical mephedrone users are reported to be young adult (age 23-25 years) males who are either employed or in school and with a history of stimulant and poly-substance use (Carhart-Harris et al. 2011; Freeman et al. 2012; Schifano et al. 2012).

Users of 4-MEC appeared informed by other users and Internet forums around decisions to purchase and use the drug. Web retailing and online consumerism has been a powerful driver of the marketing, sale, and diffusion of a host of synthetic cathinones (Solberg 2012; Forsyth 2012). Decisions to use 4-MEC appeared grounded in curiosity due to its similarity to mephedrone, its low price, favorable customer reports, and its reputation. Sourcing occurred in all cases via RC websites, with several consumers new to online ordering of drugs, and who had never tried a synthetic cathinone. Similarities can be drawn with mephedrone, whose popularity was grounded in its low cost and value for money, legal status (at the time), availability, and perceived low health risk, along with its consistent quality, and the reduced quality of the illicit party drugs ecstasy and cocaine (Van Hout & Brennan 2011a; 2012; Winstock et al. 2011a; Freeman et al. 2012).

4-MEC web orders ranged from one to four grams, with the product described as clean, packaged professionally, and available in a variety of forms (white beads, rectangular shards, green granules or capsules). Mephedrone and other synthetic cathinones are generally found as white, yellow, or brown amorphous or crystalline powders with tablet or capsule form less common and primarily designed for insufflation and oral administration (Wood & Dargan 2012; Gil et al. 2013). Some comments illustrated the difference between 4-MEC and mephedrone in terms of smell, with 4-MEC smelling like coconut and less pungent than mephedrone. Most 4-MEC users used test kits to test for purity of the product, and to measure small doses of 10 mg for initial experimentation. Purity in the study by Gil et al. (2013) was between 51 and 78%. Similar practices of the gauging of dosage have been reported in the literature on mephedrone (Van Hout & Brennan 2011a; 2011b; 2011c; McElrath & Van Hout 2011).
Preferred routes of 4-MEC administration were nasal and oral, and often combined due to nasal burning and clogging of nasal passage. Less-favored routes were “eyeballing,” rectal, and intravenous. Similarly, common routes of administration of mephedrone are insufflation and oral ingestion of powders or crushed tablets by dissolving in water or wrapping in paper (“bombing” or “parachuting”) (Measham et al. 2010; McElrath & O’Neill 2011; Van Hout & Brennan 2011a; 2011b; 2011c), with some reports of rectal insertion, intravenous, subcutaneous, and intramuscular injecting use (Schifano et al. 2011; Dargan et al. 2011; Winstock et al. 2011; Brauser 2012; Van Hout & Bingham 2012). Positive comments were made referring to lack of venous burning and mild nausea when injecting 4-MEC. One comment described tremors and muscle twitching on intravenous use. This is of interest given that mephedrone injectors have reported acute burning on injecting, and chronic effects such as necrotizing fasciitis, long-term numbness in extremities, and development of lower extremity spasms and tremors similar to that of Parkinson’s disease (Van Hout & Bingham 2012; Brauser 2012). Also, unlike on injection of mephedrone (Van Hout & Bingham 2012), injected 4-MEC did not produce an unpleasant taste in the mouth.

Although 4-MEC acts similarly to mephedrone, its effect is (according to these reports) less intense, weaker, and short-lived in comparison, and dependent on route of administration. It appears extremely active in doses of 75 mg upwards and with oral doses requiring 100 mg or greater. In contrast, insufflation of mephedrone at typical reported doses of 25-75 mg incurs a rapid, potent, and short-lasting effect appearing within minutes and lasting less than 60 minutes (Zawilska & Wojcieszak 2013). Typical dose ranges for MDPV are between 5 and 30 mg per single dose, with tolerance developing on consumption of more than 200 mg per drug-taking session (Coppola & Mondola 2012). Mephedrone users have described drug-taking sessions lasting typically around 10 hours, with use of several doses (average 6) of 0.5 to 9 g of the synthetic cathinone, and frequently with other drugs (Freeman et al. 2012; Schifano et al. 2012; Van Hout & Bingham 2012; German et al. 2013).

Despite comments centering on its weak, short-lived effect, users described 4-MEC’s positive outcomes relating to general euphoria, dissociation, relaxation, sensual enhancement, and appreciation of music. Synthetic cathinones such as 4-MEC incur empathogenic and psychostimulant effects by increasing synaptic concentrations of dopamine, serotonin, and norepinephrine (Davies et al. 2010a; Schifano et al. 2011; Freeman et al. 2012; German et al. 2013). Desirable empathogenic, entactogenic, and euphoriant effects typical of psychoactive stimulant consumption reported by mephedrone users include increased sociability, energy, sex drive, and intense euphoria (Measham et al. 2011; Winstock et al. 2010; 2011a; 2011b; Van Hout & Brennan 2011a; 2011b; 2011c; McElrath & Van Hout 2011; Freeman et al. 2012; Brennan & Van Hout 2012). Negative effects of 4-MEC related to the chemical taste on the tongue, excessive sweating, nasal burning and drip, migraine, heart palpitations, and nausea. Similar undesirables effects are reported in the literature on synthetic cathinone use and include jaw clenching, reduced appetite, panic attacks, raised body temperature, tremors, aggression, palpitations, insomnia, tinnitus, spasms, psychosis, and sweating with distinct acidic odor (Dargen et al. 2010; Burillo-Putze et al. 2011; Fass et al. 2012; McElrath & Van Hout 2011; Van Hout & Bingham 2012; Winstock et al. 2010; Winstock et al. 2011; German et al. 2013). Two 4-MEC trip reporters described partial erections and inability to climax despite the urge for stimulation. Studies have shown the presence of a dose-response relationship between mephedrone and heightened sex drive, disinhibition, prolonged sex performance in males, and difficulties in reaching climax (Van Hout & Brennan 2011c; Winstock et al. 2011).

On use of 4-MEC, and given its weaker, more short-lived effect, users reported intentions to consume combinations of 4-MEC with other compounds such as 3-Methylmethcathinone (3-MMC); Methiopropamine (MPA); 5,6-Methylenedioxy-2-aminoindane (MDAI); flephedrone; methylene; butylone; 2-FMA, PV8, MDPV substitute; 4-bromomethcathinone (4-BMC); 4-ethylmethcathinone (4-EMC); pentylone; N-ethylbuphedrone (NEB); 4-ethyl-2,5-dimethoxyphenethylamine (2c-E); 4-FMA; Fluoroamphetamine (4-FA); 4-Fluoromethamphetamine (4-FMP); methoxetamine; and pentedrone. Popularity of mephedrone, MDPV, MPPP and a host of mixed synthetic cathinone compounds is reported amongst “students,” “clubbers,” and “psychoanuits” with these NPS’s forming part of their existing poly-drug-taking repertoires (Europol – EMCDDA 2010a; 2010b; Winstock et al. 2010; Dargan et al. 2010; Carhart-Harris et al. 2011; Measham et al. 2011; Bruno et al. 2011; Hill & Thomas 2011; Karila & Reynaud 2011; Hill & Thomas 2011; Measham et al. 2011; McElrath & Van Hout 2011; Brauser 2012; Wood et al. 2012; Corkery et al. 2012; Wood et al. 2012).

The urge to redose when using 4-MEC centered on its weak, short-lived effect, with this craving generally reduced after 24 hours, and occurred alongside low incidence of negative comedown symptoms. This in contrast to the insomnia and agitation experienced when coming down from mephedrone (McElrath & Van Hout 2011; Van Hout & Brennan 2011a). However, for 4-MEC users with a history of synthetic cathinone use and less potent experiences with 4-MEC, higher, more-frequent dosing was reported. Prolonged and binge drug-taking experiences of mephedrone have been reported and are indicative of its potent effect (Deluca et al. 2009; Europol – EMCDDA 2010b; Brunet et al. 2010; Dargan et al. 2011; Vardakou et al. 2011; Davies et al. 2010c;
Carhart-Harris et al. 2011; Van Hout & Brennan 2011a; 2011c; Regan et al. 2011; Hadlock et al. 2011; Freeman et al. 2012). Studies have also reported on the abuse potential of mephedrone and MDPV, which is evident in terms of increased desire and craving in both humans and animals (Winstock et al. 2011; Freeman et al. 2012; Robinson et al. 2012; Watterson et al. 2012; Fantegrossi et al. 2013). Mephedrone and MDPV users have also described a withdrawal syndrome characterized by depression, anergia, anhedonia, and insomnia lasting several weeks (Winstock et al. 2011; Brennan & Van Hout 2012). Of interest was that 4-MEC users generally appeared able to use this drug with little negative outcome and reduced abuse potential, and perhaps indicative of the levelling-off of user interest in Google Trends.

Limitations

It is possible that these textual data sources may be confounded by self-report data where (despite reports of testing for purity) the user believed, perhaps incorrectly, that they have used 4-MEC and where, in some instances, the precise substance was not known (Brandt et al. 2010a; 2010b; 2010c; Spiller et al. 2011; Wood & Dargan 2012; Kjellgren & Johnsson 2013). However, validity of the study is improved by trip reports and discussion forum postings revealing many similarities with the extant literature base on synthetic cathinones. The study presents a unique, web-based insight into the drug 4-MEC in terms of its motives and decisions for use, sourcing routes, types of users and their experiences. Continued scientific monitoring of the Internet for the diffusion of NPSs like 4-MEC and others is vital so as to inform drug and public health policy of new trends, poly-drug-taking repertoires, and identifiable drug user groups. One cannot underestimate the power of the Web in diffusing these new compounds and creating online insular drug consumer communities who advocate new drugs, experimentation, and optimal user practices. Despite evidence for more responsible, informed drug taking within certain Web communities, it remains vital to encourage multi-level dissemination of evidence-based harm-reduction information within an international approach. Timely information on the short- and long-term human toxicological effects of 4-MEC and other synthetic cathinones remains a necessity given the increasing difficulties of clinicians to assess and treat on case presentations.

NOTE

1. Psychonautics describes a methodology for describing and explaining the subjective effects of drugs by eliciting free-form verbal accounts alongside the rating of perception, cognition, affect, and motivation (Newcombe 2008). Websites with trip reports present individual descriptive records and personal evaluations of psychopharmacological aspects of their sessions and perceived strength or intensity of their experiences with a new drug.

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