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### A web-based survey on mephedrone<sup>☆</sup>

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#### ABSTRACT

**Background:** This study sought to collect information on the former legal-high 'mephedrone' using a web-based survey targeted at mephedrone users.

**Methods:** The survey was advertised on websites frequented by drug users. Individuals were invited to complete the survey if they had taken mephedrone on at least one occasion in the past.

**Results:** One thousand and six completed forms were received from declared users, making this the largest survey on mephedrone to date.

**Conclusion:** Results showed that mephedrone users consider its effects to compare best with those of MDMA, and while MDMA was considered marginally safer and its effects more pleasurable, mephedrone's appeal lay in its availability, low price and reliable purity.

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#### 1. Introduction

Mephedrone (4-methylmethcathinone) is a substituted cathinone with stimulant properties. The popularity of mephedrone in the UK rose sharply in 2009 after it became seen as a legal, cheap and easily available alternative to MDMA (ecstasy). Adverse events associated with its use, including a series of alleged deaths, attracted media attention and the hastening of a government report (ACMD, 2010). Mephedrone was made Class B in April 2010, largely on the basis that it shares similar properties to amphetamines, most of which are Class B. The present study sought to collect information on various aspects of mephedrone use via a web-based survey targeted at mephedrone users. An extensive web-based survey on mephedrone has been carried out before (Winstock et al., 2011) but because the present survey opened shortly after the ban, its results extend current knowledge by providing information on the opinions and behaviours of mephedrone users during this period.

#### 2. Methods

This study was approved by the Imperial College Research Ethics Committee. The survey was built using Bristol Online Survey ([www.survey.bris.ac.uk](http://www.survey.bris.ac.uk)), a web survey development service. The survey can be viewed at the following address ([www.survey.bris.ac.uk/jscd/mephedrone](http://www.survey.bris.ac.uk/jscd/mephedrone)). The survey was formally

advertised on the websites: [www.bluelight.org](http://www.bluelight.org), [www.drugs-forum.com](http://www.drugs-forum.com) and [www.drugscience.org.uk](http://www.drugscience.org.uk). It was entirely anonymous, took 20–30 min to complete, and featured 56 questions requiring both restricted/categorical and open responses. Completion of every question was mandatory. Subjects were informed that they should only complete the survey if they had taken mephedrone on at least one occasion in the past. The first forms were received on 17th May 2010 and the last forms on 21st September 2010. The survey questions addressed a broad range of issues, from parameters specific to mephedrone use to the perceived harms of other drugs. This report focuses on the questions that were specific to mephedrone.

#### 3. Results

##### 3.1. Basic and demographic data

One thousand, five hundred and six completed forms were received. All respondents declared that they had taken mephedrone at least once. Most had heard about the survey through [www.drugs-forum.com](http://www.drugs-forum.com) or [www.bluelight.org](http://www.bluelight.org). Eighty four percent of respondents were male and 80% percent lived in Britain. Their mean age was 26 (SD = 9, range 10–73).

##### 3.2. Mephedrone use parameters

The modal number of lifetime uses of mephedrone was 11–50. Eighty percent first used mephedrone in 2010 or 2009 and only 20% before then. Forty three percent typically referred to the drug as 'mephedrone', 16% as 'meph', 13% as 'm-cat', 11% as 'drone' and 6% as either 'meow' or 'meow meow'. The modal amount of mephedrone used in a typical session was 'about 500 mg'. The

<sup>☆</sup> Supplementary information for this article is available. Please see Appendix A for more information.

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**Table 1**  
Basic and demographic data.

Question	Response
1. Received forms and total sample size	1506
2. Sex	84% male, 16% female
3. Age	Mean = 26, SD = 9, range = 10–73
4. Country of residence	84% UK, 4% Ireland, 8% Other in Europe, 5% North America, 2% Australia
5. Where did you hear about the survey?	34% <a href="http://www.drugs-forum.com">www.drugs-forum.com</a> , 32% <a href="http://www.bluelight.org">www.bluelight.org</a> , 38% other
6. Lifetime uses of mephedrone	37% 11–50, 35% <11, 28% >50
7. First use of mephedrone	55% 2009, 25% 2010, 14% 2008, 6% 2007 or before
8. By what name do you typically refer to mephedrone?	44% 'mephedrone', 16% 'meph', 13% 'm-cat', 11% 'drone', 6% 'meow' or 'meow meow', 13% other
9. Typical amount of mephedrone used in a single session	25% 'about 500 mg', 28% <500 mg, 39% >500 mg
10. Largest ever purchase of mephedrone	20% 'about 5g', 43% >5g, 17% <5g
11. Preferred route of administration	57% intranasal, 28% oral, 3% injected (intravenous or intramuscular not specified)

modal largest purchase of mephedrone was 'about 5 g'. Fifty seven percent selected intranasal as their preferred route of administration, and 28% chose oral. The remainder said they used both techniques and 3% claimed to have injected mephedrone (41 respondents).

The percentage of respondents that reported having used other illegal drugs (column 1 in Table 1), the proportion of respondents that typically combined a drug with mephedrone (column 2), the relative harms of each drug (ranked 1–13; 1 = the most harmful) as perceived by the total sample (column 3), and the relative harms of each drug as perceived by a filtered sample that included only those that claimed to have used all of the listed illegal drugs (column 4). NA = 'not applicable' or 'not asked'.

### 3.3. Impact of the ban

Table 2 shows questions relevant to the impact of the recent ban; these responses were filtered to exclude non-UK residents.

64% of UK-based respondents said that they use mephedrone less now that it is illegal. Fifty eight percent said that they would *not* try to get hold of mephedrone now that it is illegal. Fifty three percent said that mephedrone had become noticeably less available in their area. Thirty percent reported stockpiling mephedrone in anticipation of it being made illegal but the majority (70%) had not done this. Forty nine percent of respondents said that the recent ban on mephedrone would make them more likely to use MDMA, 27% said it would not and 25% were not sure.

### 3.4. Mephedrone and MDMA

Of those respondents that had taken MDMA and cocaine before, twice as many thought that the effects of mephedrone compared best with those of MDMA than cocaine. Of those that had taken MDMA, 73% said that they prefer the effects of MDMA to those of mephedrone.

**Table 2**  
Questions relevant to the impact of the ban on mephedrone.

Question	Response
1. Do you use mephedrone less now that it is illegal?	64% yes, 36% no
2. Will you still try to get hold of mephedrone now that it is illegal in the UK?	42% yes, 58% no
3. As far as you can tell, has the banning of mephedrone in the UK affected its availability in your area?	47% 'yes, it is noticeably less available', 53% 'no, not really'
4. Did you stockpile mephedrone in anticipation of it being made illegal?	30% yes, 70% no
5. When it was legally available, did mephedrone's ease of availability encourage you to be especially reckless in your use of it?	11% yes, 20% possibly, 70% no
6. Now that mephedrone is illegal in the UK, do you think you'll use more MDMA?	49% yes, 25% not sure, 27% no

Table 3 lists questions relevant to the comparison between mephedrone and MDMA. Results are filtered to only include those that had taken MDMA and cocaine (question 1,  $n = 1143$ ) or just MDMA (questions 2 and 3,  $n = 1306$ ). For question 3, the reasons most often given were that mephedrone is/was cheap, easily available and of relatively reliable purity.

### 3.5. Negative effects

Questions relevant to the negative effects of mephedrone can be found in Table 4.

Twenty percent of respondents said that they *had* experienced a 'significant negative reaction' after taking mephedrone. The most prevalent negative effects were anxiety, panic, and palpitations. The percentage of respondents that knew of a friend or associate that had had a significant negative reaction was slightly higher (28%). Approximately half of respondents said that they found mephedrone addictive.

## 4. Discussion

Web surveys are useful for collecting large datasets and this is the largest sample of mephedrone users to date. The main findings can be summarised as: (1) mephedrone users consider its effects to compare best with those of MDMA, (2) the effects of MDMA are generally preferred to those of mephedrone, (3) mephedrone's popularity was driven by factors related to its legality and the unreliable purity of MDMA, (4) now that mephedrone is illegal, users expect to take less of it, and (5) mephedrone users consider it to be less harmful than alcohol and tobacco but more harmful than the class A drugs LSD, psilocybin and MDMA (see Table 5).

Previous reports have noted that mephedrone users tend to compare its effects with those of MDMA and cocaine (Winstock et al., 2011) but its relationship to MDMA seems especially important, not least because it may explain the drug's rapid rise in popularity prior to its ban (Brunt et al., in press). That users considered the effects of mephedrone to compare best with those of

**Table 3**  
Questions relevant to the relationship between MDMA and mephedrone.

Question	Response
1. In terms of subjective effects, what drug is mephedrone most similar to?	49% MDMA, 21% cocaine, 30% other (e.g. combination of MDMA and cocaine or most like methamphetamine).
2. Do you prefer the effects of mephedrone to those of MDMA?	27% yes, 73% no
3. Is mephedrone your drug of choice, or do/did you choose to use it for other reasons?	26% yes, 74% no

**Table 4**  
Questions relevant to the negative effects of mephedrone.

Question	Response
1. Have you ever had a significant negative reaction to mephedrone?	20% yes, 80% no
2. Has a friend or associate ever had a significant negative reaction to mephedrone?	28% yes, 72% no
3. Have you experienced any skin discolouration (e.g. blotches on your chest or blue/purple fingers or joints) following mephedrone use?	21% yes, 79% no
4. Does mephedrone make you say or do things that you later regret?	13% definitely yes, 43% maybe a bit, 45% no
5. How easy do you find it to stop using mephedrone if you have a large supply available?	52% 'I find it easy to stop using', 34% 'I can stop but it's difficult', 14% 'I usually keep using until all of my supply has gone'
6. Do you crave for mephedrone when you run out of it?	11% 'yes, very much so', 28% 'yes, moderately', 61% 'no, not really'
7. Do you find mephedrone addictive?	14% 'yes, I find it very addictive', 38% 'yes, I find it moderately addictive', 49% 'no, I do not find it addictive'
8. What is the longest period over which you have used mephedrone?	53% 'over 12 h without sleep', 42% 'between 3 and 12 h', 6% 'for less than 3 h'

MDMA is interesting. MDMA increases synaptic 5-HT by inhibiting the reuptake and stimulating the release of 5-HT (Green et al., 2003). Increased synaptic 5-HT is thought to account for MDMA's characteristic euphorogenic and empathogenic properties. It is currently unknown whether mephedrone shares similar serotonergic properties. The related compound methcathinone has been shown to stimulate 5-HT release via a similar mechanism to MDMA (Cozzi and Foley, 2003). Some users described feelings of warmth and empathy with mephedrone but these were said to be less marked than with MDMA. Thus, the sparse data that is available on mephedrone indicates that its pharmacology is primarily catecholaminergic but future work is required to explore the possibility that it possesses some serotonergic properties.

A consistent theme that emerged from the data was that the popularity of mephedrone was driven by factors related to its former legal status (i.e., price, availability and purity) and that these

factors had encouraged potential MDMA users to use mephedrone instead. However, with mephedrone being made illegal, many users expected to return to using MDMA.

It is important to highlight some limitations of this study. Firstly, web-based surveys suffer from a lack of experimental control. We have no way of monitoring the accuracy of responses and many questions required estimation. Also, for reasons of privacy we did not capture respondents Internet Protocol (IP) addresses, which may have alerted us to fabricated responses. However, the survey was relatively lengthy (it took 20–30 min to complete), required that every question be completed, and there was no monetary incentive for taking part; thus, fabricated responses are unlikely. The survey also attracted a large number of individuals that had used other illegal drugs and frequented drug user websites such as [www.bluelight.org](http://www.bluelight.org) and [www.drugs-forum.com](http://www.drugs-forum.com). As a result, the sample may be biased towards experienced drug users but this may

**Table 5**  
Left three columns: drug use and ranked harms of total sample. Right column: Ranked harms of a filtered sample that included only those that had previous experience with all of the listed illicit drugs.

Drug	Total sample (n = 1506)			Filtered sample (n = 93)
	Ever used (% of total sample)	Typically taken with mephedrone (% of total sample)	Ranked harms. 1 = most harmful.	Ranked harms. 1 = most harmful.
Alcohol	NA	64	2 (3.9)	1 (2.5)
Tobacco	NA	NA	3 (4.4)	2 (3.7)
Mephedrone	100	NA	9 (7.7)	8 (7.4)
Cannabis	98	48	13 (10.6)	12 (10.4)
MDMA	87	11	11 (9.4)	10 (8.9)
Cocaine	82	11	4 (4.7)	4 (4.8)
Amphetamines	74	6	5 (6.1)	5 (5.6)
Magic Mushrooms	68	2	12 (10)	13 (10.9)
Ketamine	59	12	7 (7.2)	9 (7.7)
Benzodiazepines	58	12	8 (7.4)	7 (7)
LSD	56	3	10 (9.2)	11 (9.9)
GHB	24	6	6 (6.4)	6 (6.9)
Heroin	18	4	1 (2.3)	3 (3.8)
Nothing	NA	14	NA	NA

simply mean that respondents were better able to comment on the harms of mephedrone in relation to other drugs. Also, in terms of extent of use, our sample had used mephedrone to a similar extent as the sample described in the Winstock study. A final limitation is that we did not include any questions on other drugs that have a similar 'legal high' history to mephedrone, e.g. the pyrovalerone derivatives (e.g. naphyrone, NRG1) and the aminoindanes (e.g. 5,6-methylenedioxy-2-aminoindane, MDAI).

#### Role of funding source

The Independent Scientific Committee commissioned RCH to implement this study.

#### Contributors

DJN conceived of the study and provided supervisory input with LAK.

RCH implemented the study, analysed the data and wrote the article.

#### Conflict of interest

None declared

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#### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.drugalcdep.2011.02.011](https://doi.org/10.1016/j.drugalcdep.2011.02.011).

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