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Harms associated with psychoactive substances: findings of the UK National Drug Survey

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Abstract

Nutt and colleagues' 'rational' scale to assess the harms of commonly used drugs was based on ratings by a panel of experts. This survey aimed to assess drug users' views of the harms of drugs using the same scale. As users' drug choices are not solely based on harms, we additionally assessed perceived benefits. The survey was hosted at <http://www.nationaldrugsurvey.org>. UK residents reported their experience of 20 commonly used substances; those with direct experience of a substance rated its physical, dependence-related and social harms as well as benefits. A total of 1501 users completed the survey. There was no correlation between the classification of the 20 drugs under the Misuse of Drugs Act and ranking of harms by users. Despite being unclassified substances, alcohol, solvents and tobacco were rated within the top ten most harmful drugs. There was a remarkably high correlation ($r=0.896$) overall between rankings by users' and by experts. Ecstasy, cannabis and LSD were ranked highest by users on both acute and chronic benefits. These findings imply that users are relatively well informed about the harms associated with the drugs they use. They also suggest that the current UK legal classification system is not acting to inform users of the harms of psychoactive substances.

Keywords

alcohol, benefits, cannabis, drug abuse, ecstasy, harms, legal status

Introduction

Worldwide, there are an estimated two billion alcohol users, 1.3 billion smokers and 185 million users of other drugs. Tobacco, alcohol and illicit drugs are thought to be a factor in approximately 12.4% of all deaths (World Health Organisation, 2008), and in the UK alone the health, social and crime-related costs of drug misuse are approximately £10–16 billion per year (Foresight, 2005). Despite public health promotion drives, levels of substance misuse continue to rise. One of the reasons for this may be the public's confusion about the actual risks of different drugs as they often receive conflicting messages from the legal system, the media and health education initiatives.

Most countries and international agencies, such as the United Nations and WHO, rate drugs based on a classification system which aims to classify how dangerous a drug is. In the UK, the *Misuse of Drugs Act* (1971) and subsequent amendments classify psychoactive drugs as A, B or C and this determines the penalties for possessing and trafficking each drug. It is claimed the Act is a deterrent against drug use and a signal of how hazardous each drug is for users. The ABC classification system was initially designed to make it possible to control particular drugs according to their comparative harmfulness either to individuals or to society at large. Recently, Nutt et al. (2007) challenged this classification as being based on social, historical and political concerns rather than scientific evidence. They reported the development of a 'rational' scale to assess the harms of drugs of

potential misuse. Using this scale, two groups of experts – one composed of 29 consultant psychiatrists with a specialization in addiction and one a group of 8–16 professionals in various aspects of addiction – classified drugs on the basis of their own views of associated physical, dependence-related and social harms. This approach utilized a framework within which both currently used and new psychoactive substances might be more objectively compared to each other on the basis of experts' ratings of their harms. The 'rational scale' clearly touched a public nerve as it stimulated considerable debate within government and the media.

The framework proposed by Nutt and colleagues was developed by a process of consensus among the group of experts whose views on some substances (e.g. alcohol) may reflect personal as well as clinical experience but on many other substances relies on clinical and scientific knowledge. One group was not consulted in this process: drug users themselves. These

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individuals have a special perspective on the harms associated with drugs which can potentially inform this ongoing debate. Further, drug users' opinions offer a way of gauging how successfully future health education campaigns impact upon public awareness of harms. Therefore, for this study we conducted a survey of users of psychoactive drugs to elicit their beliefs about the harms of the same 20 substances rated by Nutt and colleague's (2007) experts using the same assessment matrix. From a users' perspective, the potential harms of drugs are just one side of the issue – the potential benefits are also key to their choice of whether to use or not. We therefore added these to the existing matrix in order to document the perceived 'benefits' of each drug.

Method

Sample and Assessment

A website was designed with Web II software. Participants initially provided informed consent and confirmed they were over 18 years old before entering the survey. They were informed that if they clicked the 'Withdraw' button at the bottom of the page their data would not be saved. Demographic data was collected from participants first and then their use of psychoactive substances recorded. We included each drug's street names (collected in our pilot work) as well as their actual name for easier identification. Only individuals who were either regular users of a particular drug, had personally used it or knew someone who used it were then able to then rate its harms/benefits. For the exact phrasing used in the survey see additional materials (<http://www.nationaldrugsurvey.org>).

The assessment matrix used was that designed by Nutt et al. (2007) based on nine parameters of risk, created by dividing each of the three major categories of harm into three subgroups:

Physical

- Acute – harms following a single dose (e.g. the danger of overdose or permanent physical damage).
- Chronic – harms due to long-term or regular use of the drug.
- Risk of injecting – the likelihood of intravenous use of the drug.

Dependence related

- Intensity of pleasure – the immediate pleasure associated with an acute dose of the drug (thought to relate to its dependence forming properties).
- Psychological dependence – e.g. craving.
- Physical dependence – e.g. withdrawal symptoms, tolerance.

Social

- Intoxication – harm/damage to property and others associated with a single dose.

- Social harms – damage to the individual's social network and achievement.
- Health service cost – overall cost; costs of alcohol and tobacco were rated separately, we asked users to take into account the amount of tax revenue from these drugs and to calculate the overall cost to the economy.

Detailed definitions of these nine categories are given in Nutt et al. (2007). In addition to the harms, participants were also asked to rate the benefits associated with each psychoactive substance: (i) acutely (i.e. the degree to which it helped one relax, stay awake, socialize or had medical benefits); and (ii) chronically (i.e. if the drugs had long-term benefits socially or to one's health or changed their perspective on the world positively).

In the assessment of harms section of the survey, participants were asked to score each substance for each of these nine parameters, using a four-point scale, with 0: no risk, 1: some risk, 2: moderate risk, and 3: extreme risk. The scores for the three parameters for each category were averaged to give a mean score for that category. For comparison with Nutt et al., an overall harm rating was calculated as the mean of all nine scores. For the benefits section of the survey, the respondents were again asked to rate on a four-point scale with 0: no benefit, 1: some benefit, 2: moderate benefit and 3: extreme benefit.

The survey was piloted with 50 psychoactive substance users from varied demographic backgrounds, and then refined on the basis of their feedback. The website was then launched on July 21st 2007 and advertized on various internet and drug user websites, the BBC 'Horizon' website and through a 'snowballing' e-mail method.

Results

Participants

1501 individuals, all UK residents, completed to the survey. Their demographic data are given in Table 1. Numbers of participants having experience of the different drugs and rating their associated harms and benefits are reported in Table 2.

The data for the overall mean harm ratings are presented in Figure 1. As with Nutt et al., the discrepancies between the rankings and the legal status of the drugs are clearly visible. This is evidenced in the lack of correlation between classification under the Misuse of Drugs Act and ranking of harms by users (Kendall's rank correlation 0.234; $p=0.18$, Spearman's rank correlation 0.301; $p=0.19$). Despite being unclassified drugs; alcohol, solvents and tobacco were all rated within the top ten most harmful drugs.

Overall agreement between experts and users across all drugs was very high ($r=0.896$, $p<0.001$) as seen in Figure 2. The alpha level for correlations was Bonferroni corrected to 0.005. There were highly significant correlations between experts' and users' overall ratings across all drugs for physical harms: acute ($r=0.757$, $p<0.001$), chronic ($r=0.658$, $p=0.001$) and intravenous ($r=0.716$, $p<0.001$). Dependence-related harms showed significant agreement in

Table 1. Demographic data for the sample: percentage in each category

Age						
18–24	25–30	31–40	41–50	51–60		
34.9%	24.8%	22.7%	12.5%	5.1%		
Education (%)						
No qualification	GCSE (16 years)	AS/A level (18 years)	Degree	Post-graduate degree	Prefer not to say	
2.4	12.5	25.3	42.1	18.1	0.01	
Employment (%)						
Unemployed	Employed	Studying		Retired	Prefer not to say	
7.1	69.6	21.9		1.2	0.2	
Ethnicity (%)						
White	Mixed Black/Asian	Black	Asian	Chinese/Other	Prefer not to say	
93.7	2.9	0.9	1.7	0.7	0.3	
Sexual orientation (%)						
Heterosexual	Homosexual		Bisexual		Prefer not to say	
90.1	4.8		4.7		0.5	
Location (%)						
London	South	East Anglia/ Midlands	North	Scotland/ Wales/ Northern Ireland	Prefer not to say	
29.4	18.5	16.1	17.1	13.6	5.3	

Table 2. Numbers of participants and their experience of different psychoactive substances across the sample

	Regular user	Have used it	Know someone who has used it	Total able to rate harms	No direct experience or Not heard of it
Alcohol	1180	194	7	1381	4
Alkyl Nitrates	63	800	199	1062	322
Amphetamines	85	682	339	1106	278
Anabolic steroids	14	25	287	326	1058
Barbiturates	12	109	170	291	1093
Benzodiazepines	42	417	354	813	571
Buprenorphine	10	22	108	140	1244
Cannabis	508	722	100	1330	55
Cocaine	194	678	339	1211	173
Crack	17	143	428	588	796
Ecstasy	342	541	305	1188	196
GHB	33	114	314	461	923
Heroin	18	118	467	603	781
LSD	62	516	446	1024	360
Ketamine	103	326	464	893	491
Khat	10	51	117	178	1206
4-MTA	9	21	59	89	1295
Methylphenidate	19	62	203	284	1100
Solvents	14	215	357	586	798
Street methadone	17	46	195	258	1126
Tobacco	581	642	121	1344	41

the psychological ($r=0.929$, $p<0.001$) and physical ($r=0.824$, $p<0.001$) dependence harms but not associated pleasure ($r=0.559$, $p=0.008$). In terms of social harms, the correlations were significant for harms to the user ($r=0.891$, $p<0.001$) and costs to society ($r=0.880$, $p<0.001$) but not intoxication ($r=0.508$, $p=0.019$). The means for each of the nine individual harm ratings are presented in Table 3 along with the intra-class correlations as an index of agreement between experts' and users'

ratings across each of the nine harm sub-scales. There was significant agreement for alcohol, amphetamines, cannabis, ecstasy, GHB, heroin, LSD, khat, street methadone and tobacco.

Some drugs had consistently high ratings across all categories particularly heroin, cocaine and alcohol; some drugs had consistently low ratings (e.g. alkyl nitrates, cannabis, khat and methylphenidate). Tobacco had a high ranking overall but this appeared to be driven by particularly high

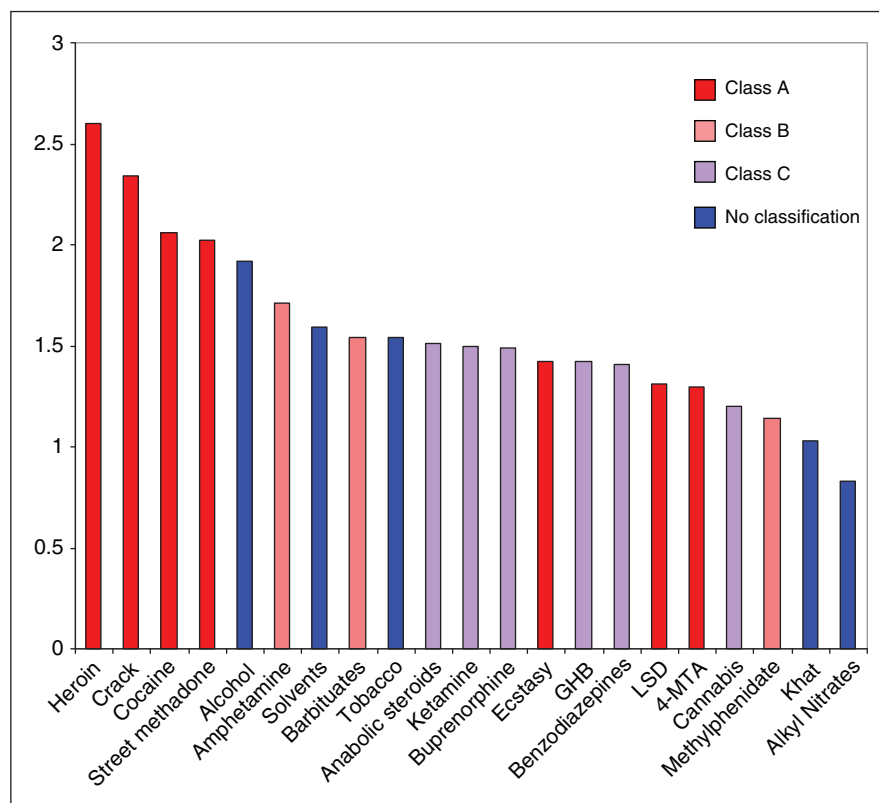


Figure 1. Mean harm rating for each substance. Classification under the *Misuse of Drugs Act* is shown by the colour of each bar.

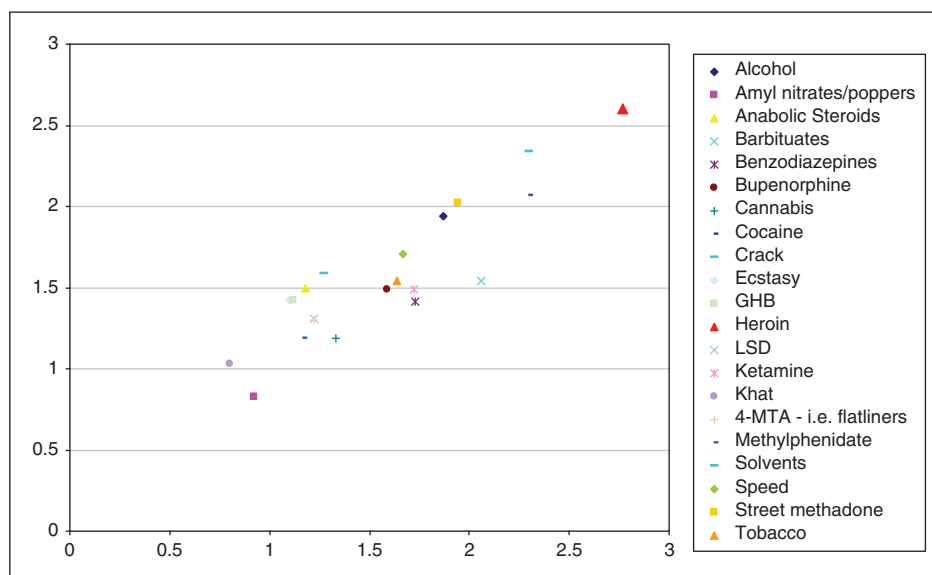


Figure 2. Users' and experts' ratings overall for each of the 20 substances – experts ratings taken from Table 3. Source: Nutt *et al.*, 2007.

ratings for dependence-related and chronic physical harms. Ratings of some drugs appeared somewhat anomalous in their position in the overall ranking, in particular ecstasy, which had the highest rating on pleasure associated with acute use, and LSD (rated the fifth most pleasurable) but both of these drugs were rated as relatively low on harms. Solvents scored particularly highly on physical dangers of

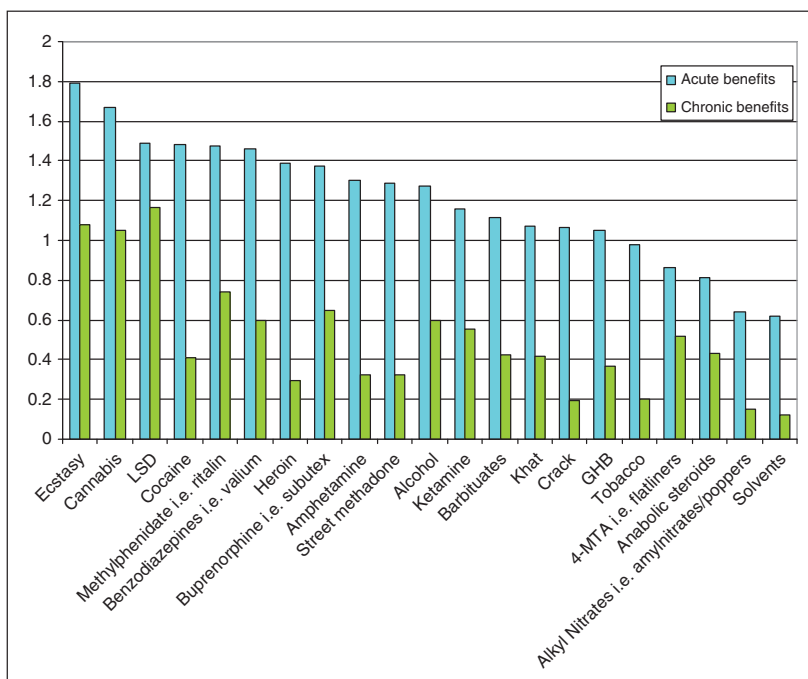
acute and chronic use. GHB was rated as having considerable physical harms associated with acute use.

Data on the users' ratings of benefits of the drugs are presented in Figure 3. Unsurprisingly, acute benefits were rated higher than long-term benefits for all substances. Ecstasy, cannabis and LSD were rated highest on both acute and long-term benefits.

Table 3. Mean ratings for each sub-scale across users, ranked in overall harm rating with intra-class correlations (ICC) of agreement between experts and users for each drug. I.V. = intravenous, see method for breakdown of sub-scales

	Acute	Chronic	I.V.	Pleasure	Psychological dependence	Physical dependence	Intoxication	Social harms	Healthcare costs	ICC	<i>p</i>
Heroin	2.4	2.7	2.8	2.6	2.9	2.9	1.8	2.8	2.5	0.769	0.002
Crack	2	2.7	1.1	2.4	2.8	2.8	2.3	2.7	2.3	-0.453	0.864
Cocaine	1.5	2.4	1	2.4	2.6	2.6	1.8	2.4	1.9	-0.208	0.708
Street methadone	1.9	2.3	1.6	1.7	2.5	2.5	1.4	2.2	2.1	0.611	0.034
Alcohol	1.2	2.2	0.2	1.9	2.3	2.3	2.6	2.5	2.1	0.854	0.001
Amphetamines	1.4	2.1	1.1	1.8	2.1	2	1.5	1.9	1.5	0.574	0.03
Solvents	2.1	2.5	0.2	1.4	1.7	1.6	1.3	1.9	1.6	-0.291	0.759
Barbiturates	1.3	2.1	1.1	1.3	2	2.2	1	1.6	1.3	-0.322	0.988
Tobacco	1	2.5	0.1	1.2	2.9	2.8	0.4	0.9	2.1	0.85	0.001
Anabolic steroids	1.2	2.2	2.2	0.4	1.5	1.7	1.4	1.7	1.2	0.408	0.086
Buprenorphine	1.2	1.8	1.2	1.3	2	2.1	0.9	1.5	1.4	-0.35	0.809
Ketamine	1.6	2	1	1.8	1.6	1.5	1.1	1.6	1.2	-0.172	0.699
Ecstasy	1.3	1.8	0.4	2.8	1.6	1.3	0.9	1.5	1.2	0.588	0.02
GHB	1.7	2	0.6	1.9	1.4	1.3	1.1	1.5	1.3	0.605	0.008
Benzodiazepines	1	1.9	0.7	1.3	2.1	2.3	0.7	1.4	1.3	0.103	0.37
LSD	1.4	1.8	0.4	2.2	1.1	1	1.3	1.5	1.1	0.848	0.001
4-MTA	1.4	1.8	0.7	1.6	1.5	1.4	0.9	1.4	1	0.569	0.051
Cannabis	0.7	1.5	0.1	1.9	1.8	1.5	0.7	1.5	1.1	0.699	0.013
Methylphenidate	1	1.5	0.6	1.1	1.5	1.5	0.9	1.2	1.1	-0.434	0.853
Khat	0.8	1.3	0.3	1.5	1.5	1.3	0.8	1	0.8	0.657	0.01
Alkyl nitrates	0.9	1.6	0.1	1.3	0.9	0.8	0.5	0.8	0.6	0.439	0.115

ICC = intra-class correlation, *p* = probability associated.

**Figure 3.** Users' ratings of the acute and chronic benefits of the psychoactive substances.

Discussion

There were two main findings of this study. First, the overall agreement between drug users' ratings of harms and the current classification of drugs under the Misuse of Drugs Act was poor.

Second, there was generally a high agreement between users' and experts' ratings of harms. These findings support the framework of Nutt and colleagues (2007) 'rational scale' in assessing the harms associated with the use of psychoactive substances and demonstrate its utility with the general population.

Implications for the Misuse of Drugs Act

Although there was some accord for several drugs between their current legal status and users' ratings of harms, there were significant discrepancies for other drugs. Overall, there was no significant correlation between the current legal status of the 20 drugs and their perceived harms in this population, in accordance with the findings of expert raters (Nutt et al., 2007). In terms of specific drugs, there was some agreement in that the four most highly rated by users for harms (heroin, crack, cocaine and street methadone) are all Class A. However, two other Class A drugs – LSD and Ecstasy – were considered by users to be of relatively low risk. Further, alcohol, tobacco and solvents – all currently unclassified substances under the Misuse of Drugs Act – were rated as some of the most harmful substances. The three tier classification system (A,B,C) appeared to be even less warranted based on the findings of this study than Nutt et al. (2007) as, with the exception of heroin and cocaine, there were no sharp discontinuities in scores across the 20 substances. Another implication of this finding is that drug users themselves may see the classification system as arbitrary, as it does not reflect their thinking about the relative harms of substances. The prevalence of use of each substance within this sample additionally suggests that the classification of drugs has little bearing on the choice of whether to use substances or not, as ecstasy, a Class A substance, was the fourth most regularly used psychoactive drug. These findings make a significant contribution to the ongoing debate concerning the relevance and usefulness of the existing legal classification system for psychoactive substances.

The relationship between users' and experts' views

The overall close agreement between the ratings of users and experts suggests that users are relatively well informed in relation to the harms of the substances they use. The drugs over which there was highest agreement across all harm rankings were alcohol, LSD, heroin and cannabis respectively. There was also good agreement across the twenty drugs on each of the harm scales.

Scales that did not show agreement between users and experts were the pleasure associated with the acute use and the social harms of intoxication. Whilst the public view of drug-related harms is likely to be influenced by current social attitudes and regulations, this finding suggests that users' views are also affected by their personal experience of a drug. That ecstasy is given a higher immediate pleasure rating than cocaine or heroin by people who have taken these substances suggests that this particular index of harm may be of limited relevance to the overall perceived harm of the substance. Additionally, as suggested by Nutt et al. (2007), some drugs may be harmful in only one area, for example tobacco has extremely damaging effects on health long-term but is unremarkable acutely. The findings of the present study suggest that GHB may have the reverse pattern of effects, being rated as dangerous acutely – supported by clinical evidence of a high potential for overdose

(Couper et al., 2004) – but of much lower long term risk. Future research might consider weighting the rational scale to reflect the impact that each harm associated with the nine sub-scales has on the overall danger associated with consuming the substance, for example acute physical harms may be weighted more highly than pleasure associated with acute use.

In terms of the relative rankings of different drugs, one respect in which these findings and those of the experts differed was that experts rated cannabis as more harmful than ecstasy but the converse was true for users. One reason for this may be the high pleasure ratings associated with ecstasy which may have elevated its harm status on the original matrix in users, as this matrix included the pleasure associated with acute use as an equivalent 'harm' to others such as physical dangers associated with acute use. Other factors may also be important, including recent scientific concerns about elevated psychosis rates in vulnerable, adolescent cannabis users and the prolonged, negative media portrayal of ecstasy.

Perceived benefits of psychoactive substances

Our survey expanded upon the original rational scale by including the perceived benefits of taking the same substances. Ecstasy, LSD and cannabis were all rated as high on both acute and chronic benefits. In considering a drug's appeal, the benefits of taking it are clearly important because the choice to use or not reflects a risk-benefit analysis. That ecstasy was rated as high on acute and long term benefits as well as low on harms by both experts and users, questions its current Class A status. This is further supported by recent scientific findings on the absence of protracted neurochemical changes or cognitive impairments after people stop taking ecstasy (Hoshi et al., 2007; Roiser et al., 2007). The high ratings of the benefits of cannabis also do not mesh with the upgrading of the drug in the UK from Class C to Class B in 2008.

Future work should more fully assess the nature of these perceived benefits and take them into account in health education campaigns where the benefits are often overlooked. By often only citing the harms, such education campaigns likely represent – from a user's perspective – an unbalanced view and this may mean that the overall message is more likely to be ignored. As they stand, the findings of the present study have significant implications for drug educational programmes aimed at reducing the harms associated with drug use and/or preventing initiation of drug use. A more balanced approach could build on the high agreement between experts and users on substance-related harms as well as build discussion about the disparity in their views on substance-related pleasures and social harms.

Weaknesses of the survey

There were inevitable limitations to this internet survey of drug users' views. The sample was clearly self-selecting. Whilst they seemed to broadly reflect the prevalence of use of various psychoactive substances in the UK across age and

gender, it was largely a well-educated sample with 60% having a university degree and this may have contributed to the high agreement between users and experts. This probably is a function of hosting the survey on the internet. Additionally, the young age of the sample has limitations for how well the long-term harms could truly be assessed by this group. Further, minority and drug-dependent groups were not well represented. More detailed data about the participants (e.g. whether they had personally experienced drug-related difficulties) and about levels of drug use and conjoint use of different substances would have been valuable. However, requesting even more details would have compromised the survey in that fewer participants would respond if these required longer periods of time, and some may not wish to divulge more personal data. The format of the web survey did not allow discrimination between responses of groups with differing levels of experience, such as regular users versus 'having tried' a substance, and in future surveys this limitation will be overcome. It may also be argued that rating all harms on an equally weighted scale misrepresents the true impact of each of these different substances, although the current study did so to enable comparison with the Nutt et al. paper.

At the same time, the survey method used here may provide a way of easily monitoring changes in the public's views on the risks associated with different drugs which follow future health promotion campaigns.

Conclusions

In summary, this study has demonstrated a high agreement between experts and drug users but some important differences which should be noted in the future considerations of the harms associated with psychoactive substances. There are some significant discrepancies between drug harm as viewed by the existing classification system scheme, and that as rated by users. At the same time, there was also some agreement in that the top four most harmful drugs, as rated by participants are all class A. The Academy of Medical Sciences (2008) recently recommended that regulation and policy around recreational drugs is informed by the views of the public, as well as by science. It is hoped that this survey will contribute to the ongoing debate on the harms and classifications of psychoactive drugs.

Acknowledgements

We sincerely thank all those who completed the survey. We are now collecting data on a revised version of the survey. If you would like to take part in this study, please go to <http://www.internationaldrugsurvey.org/>

Ethics

This study was approved by UCL Department of Psychology Ethics Committee.

Contributions

HVC & CJAM designed the study; LM, MM, CJAM collected and analysed the data. All authors contributed to, commented on and approved the paper.

Conflict of interest

The authors have no conflicts of interest to declare.

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