Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Abstract

Objective To produce an evidence based hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / **participants** 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Summary

Article focus

- expert assessment of the relative harms caused by 19 commonly used / misused substances.
- compare relative harm of legal and illegal substances
- match findings to the Misuse of Drugs Act, and existing policy and relevant literature

Key messages

- No categorical distinction in harm caused by different legal and illegal substances.
- Expert harm rankings do not correlate the A, B, C classification in the Misuse of Drugs Act.
- Heroin was rated the most harmful, and cannabis the least harmful of all substances studied.

Strengths & limitations of this study

- Largest ever expert panel rating harm from substance misuse in this way - 292 multidisciplinary experts from differing regions.
- No relative weighting is applied to individual harm scores.
- No account of the availability of a substance influencing the harm it causes is made.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (copy of scale used available from MT) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews but on some occasions by email survey. Guidance notes on how to complete the questionnaire were also issued .Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
SHO/Staff Grade	23	7.9
General Practitioner	6	2.1
Addiction Community Psychiatric Nurse	133	133
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %.
10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal Harm score	Societal Harm score	Total / combined harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98
Buprenorphine	2.04	1.83	1.96
LSD	2.04	1.87	1.95
Ecstasy/ MDTA	2.07	1.74	1.92
Methylphenidate/Ritalin	1.86	1.62	1.74
Magic Mushrooms	1.88	1.60	1.74
Cannabis	1.86	1.61	1.73

Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A
Purple – Class B
White – Class C
Light blue – Not classified

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Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may

not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place. It is also recognised that caution must be taken in making comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Another explanation may be that despite cannabis being commonly used in Scotland, individuals present less frequently requesting help than with other drugs of abuse.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Data Sharing

The authors approve data sharing, but there is no additional unpublished data.

Contributorship

MT and JM conceived and designed the study. All authors except AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

Competing Interests

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted

work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

Re: **Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.**

Taylor et al, submitted Dec 2011

	Item No	Recommendation
Title and abstract	1 Done, p1 & p2	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2 Done – p3	Explain the scientific background and rationale for the investigation being reported
Objectives	3 Done – p3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4 Done	Present key elements of study design early in the paper
Setting	5 Done	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6 Done	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7 Done	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8* Done	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9 In method & discussion	Describe any efforts to address potential sources of bias
Study size	10 NA	Explain how the study size was arrived at
Quantitative variables	11 Done	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12 Done	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13* Done	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage

		(c) Consider use of a flow diagram
Descriptive data	14* Done	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
Outcome data	15* NA	Report numbers of outcome events or summary measures
Main results	16 Done where applicable	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17 NA	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18 Done	Summarise key results with reference to study objectives
Limitations	19 Done	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20 Done	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21 Commented on	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22 Done	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (copy of scale used available from MT) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

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Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews but on some occasions by email survey. Personal interviews were arranged via local regional addictions teams across the country; whereas email responses were from the Royal College of Psychiatrists in Scotland database of specialist psychiatrists. All experts personally approached agreed to participate after explanation of the task and outcomes but less than ten psychiatrists submitted a completed response on-line (illustrating the lengthy nature of the ratings). Guidance notes on how to complete the questionnaire were also issued .Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age.

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Addiction Community Psychiatric Nurse (CPN)	133	45.5~~133~~
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %.

10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age. Addiction CPNs were easily the biggest single professional discipline, reflecting the composition of a typical community addictions team, and the CPNs on average had over 5 years clinical experience in the field.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal Harm score	Societal Harm score	Total / combined harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98
Buprenorphine	2.04	1.83	1.96
LSD	2.04	1.87	1.95
Ecstasy/ MDTA	2.07	1.74	1.92
Methylphenidate/Ritalin	1.86	1.62	1.74

Magic Mushrooms	1.88	1.60	1.74
Cannabis	1.86	1.61	1.73

Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

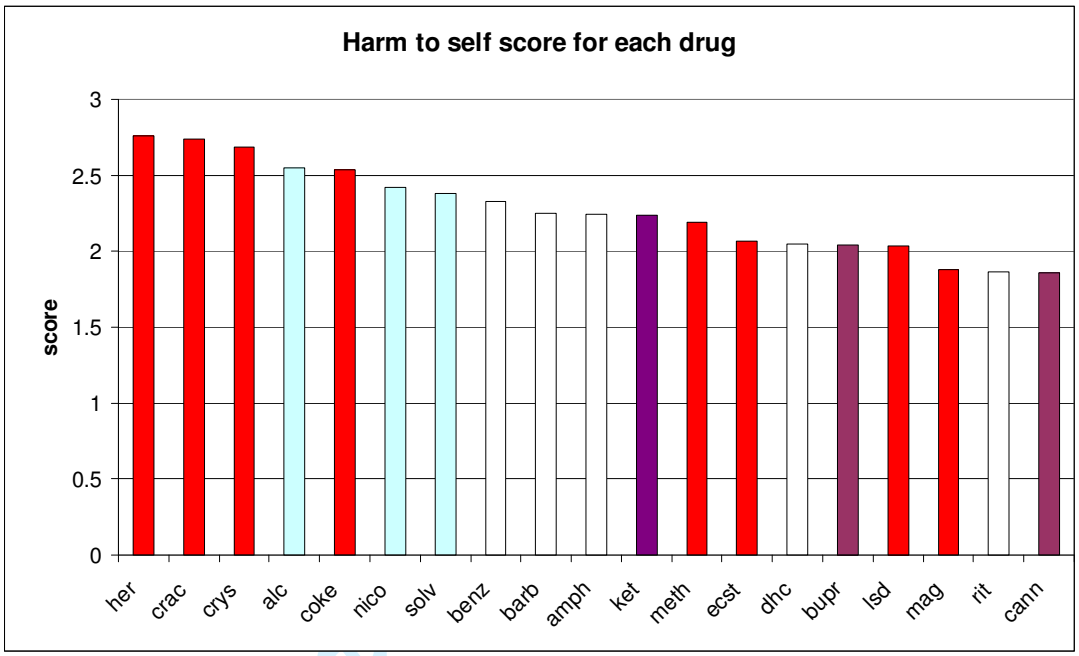
LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

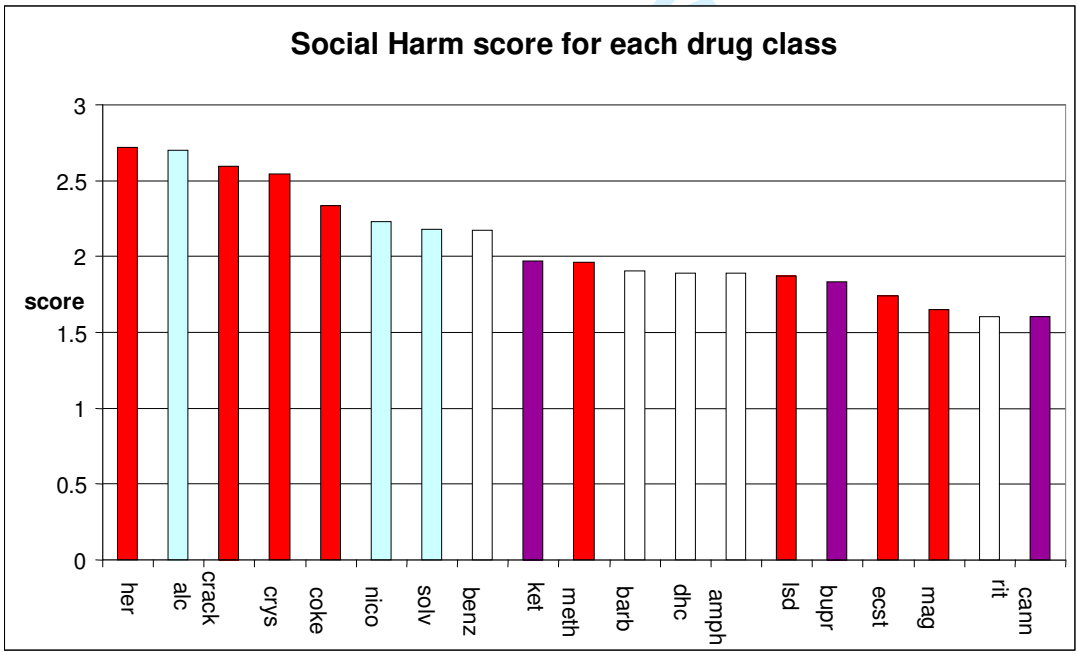
The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A White – Class C
Purple – Class B Light blue – Not classified
.

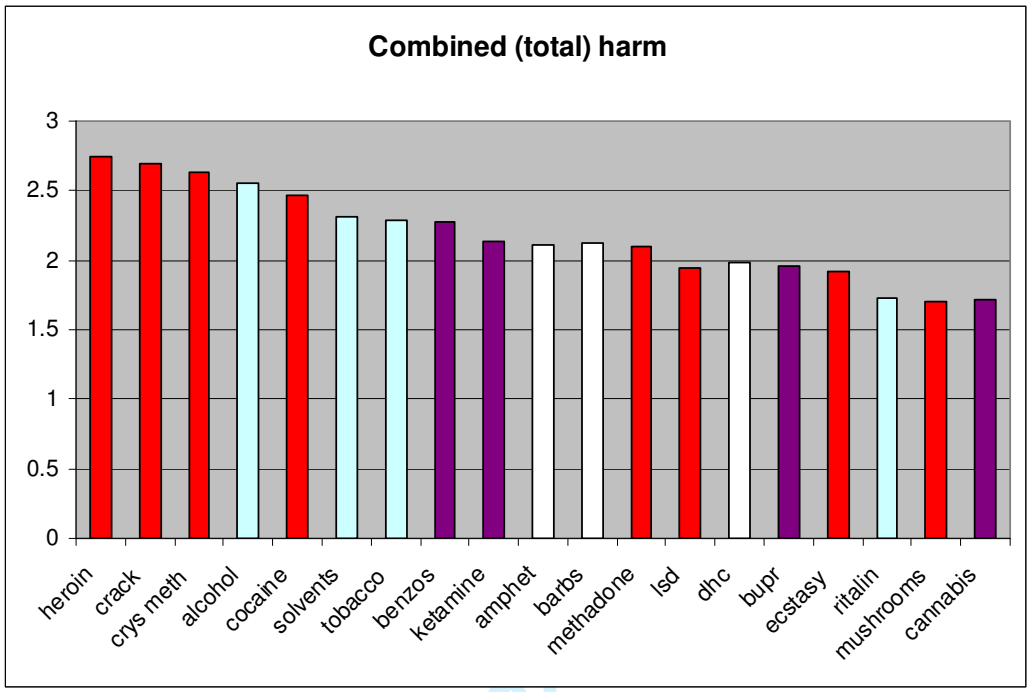
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system

could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place. It is also recognised that caution must be taken in making comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to

the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the high potency cannabis was not yet widespread in Scotland.. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. ~~Another~~Other explanations may be that despite cannabis being commonly used in Scotland, individuals present less frequently requesting help than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how one exacerbates the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Contributors: MT and JM conceived and designed the study. All authors except AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

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All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and

declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

Ethical approval was not required for this study.

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

Re: **Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.**

Taylor et al, submitted Dec 2011

	Item No	Recommendation
Title and abstract	1 Done, p1 & p2	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2 Done – p3	Explain the scientific background and rationale for the investigation being reported
Objectives	3 Done – p3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4 Done	Present key elements of study design early in the paper
Setting	5 Done	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6 Done	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7 Done	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8* Done	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9 In method & discussion	Describe any efforts to address potential sources of bias
Study size	10 NA	Explain how the study size was arrived at
Quantitative variables	11 Done	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12 Done	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13* Done	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage

		(c) Consider use of a flow diagram
Descriptive data	14* Done	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
Outcome data	15* NA	Report numbers of outcome events or summary measures
Main results	16 Done where applicable	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17 NA	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18 Done	Summarise key results with reference to study objectives
Limitations	19 Done	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20 Done	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21 Commented on	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22 Done	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ open

Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Primary Subject Heading:	Addiction
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Keywords:	MENTAL HEALTH, PUBLIC HEALTH, Substance misuse < PSYCHIATRY

Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Abstract

Objective To produce an expert consensus hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / participants 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews but on some occasions by email survey. Personal interviews were arranged via local regional

addictions teams across the country; whereas email responses were from the Royal College of Psychiatrists in Scotland database of specialist psychiatrists. Less than ten psychiatrists submitted a completed response on-line. Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age. All but eight individuals approached to undertake face-to-face interviews agreed to participate (ie response rate of >90%) whereas the response rate to email requests for questionnaire completion was <5%, perhaps reflecting that on average, 25-30 minutes was required to complete each questionnaire. No financial or other incentive was offered to respondents.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
SHO/Staff Grade	23	7.9
General Practitioner	6	2.1
Addiction Community Psychiatric Nurse (CPN)	133	45.5
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %. 10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age. Addiction CPNs were easily the biggest single professional discipline, reflecting the composition of a typical community addictions team, and the CPNs on average had over 5 years clinical experience in the field.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

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Assessment score tables

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Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
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Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98

Buprenorphine	2.04	1.83	1.96
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LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A
Purple – Class B
White – Class C
Light blue – Not classified

.

Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. This large number of expert respondents might also help reduce any selection and observer bias in the sample. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making

comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and to homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the high potency cannabis was not yet widespread in Scotland. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Other explanations may be that despite cannabis being commonly used in Scotland, individuals present less frequently requesting help than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how one exacerbates the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to

both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Contributors: MT and JM conceived and designed the study. All authors except AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

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All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

Ethical approval was not required for this study.

Appendix

Substances and Associated Harm Questionnaire

What is your psychiatric / medical specialty?.....
What is your grade / seniority?.....
In which region of Scotland do you work?.....
What is your age? Please circle. 20-30 31-40 41-50 51-60 >60
Please use the scores below for all sections of the table.

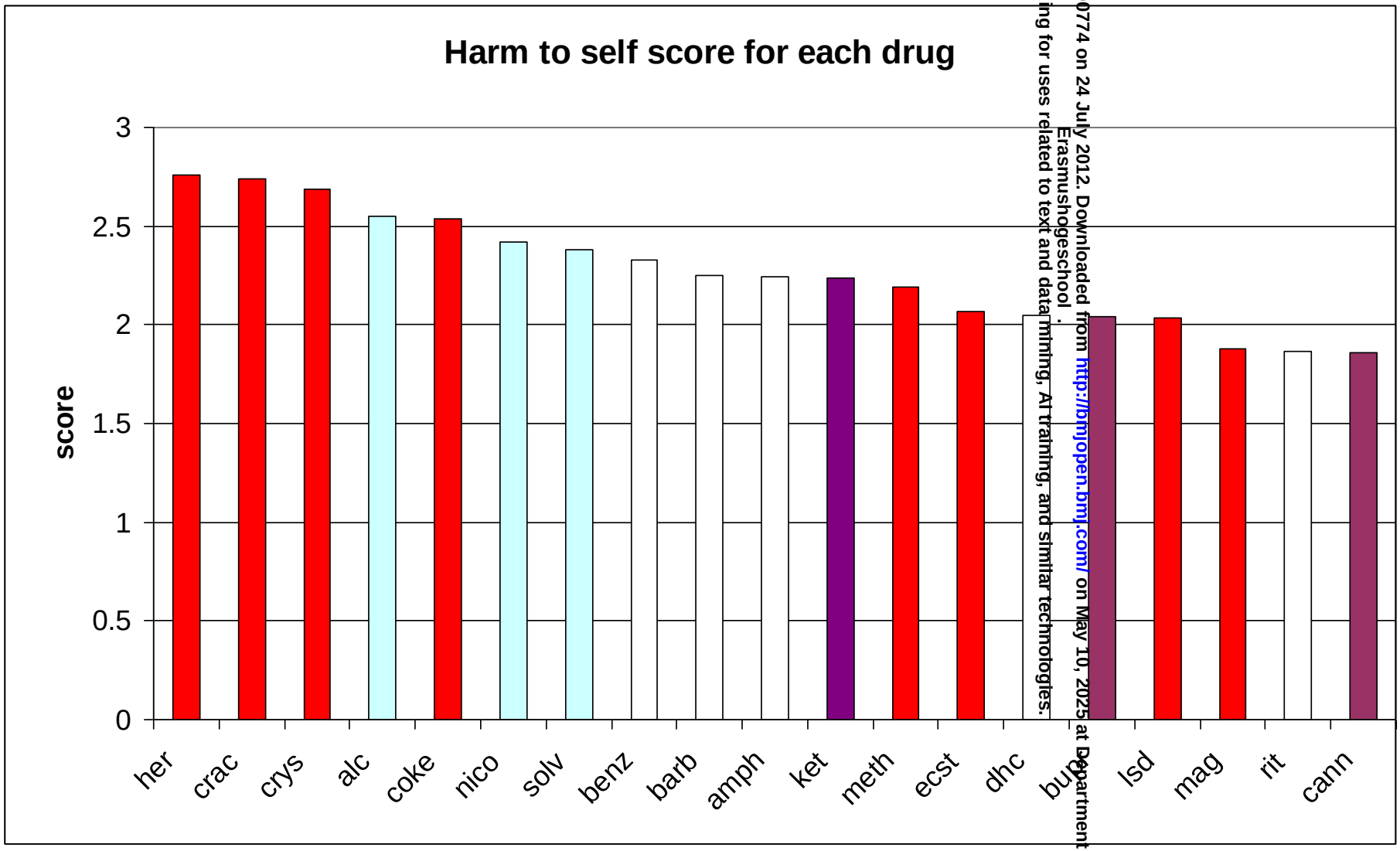
0 = no risk, 1 = some risk, 2 = moderate risk, 3 = extreme risk.

NA = not applicable

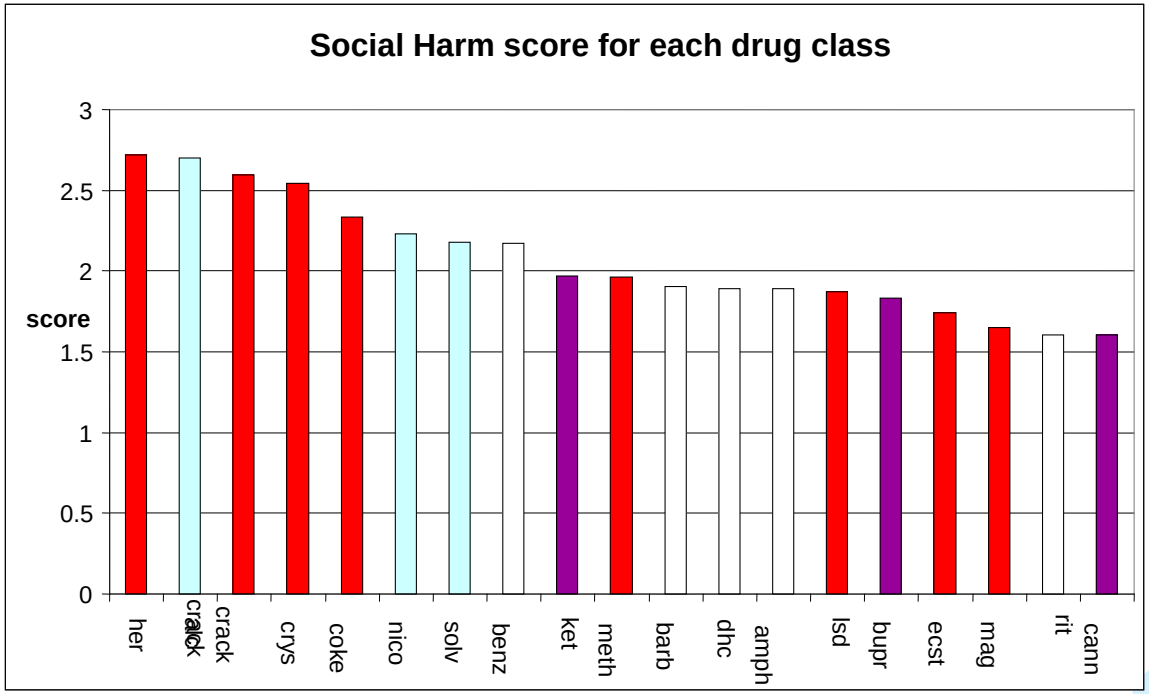
Substance	Area of Harm								
	Physical Harm			***Dependence***			***Social Harms***		
	Acute	Chronic	IV	Intensity of pleasure	Psycho-logical	Physical	Intoxic-ation	Other social harms	Health costs
Alcohol									
Amphetamines									
Barbiturates									
Benzodiazepines									
Buprenorphine / temgesic									
Caffeine									
Crystal meth									

Cocaine									
Crack cocaine									
Dihydrocodeine/ Codeine/Tramadol									
Ecstasy /MDTA									
Heroin									
Ketamine									
LSD									
Magic mushrooms									
Methadone									
Nicotine/ Tobacco									
Methylphenidate / Ritalin									
Inhaled Solvents									

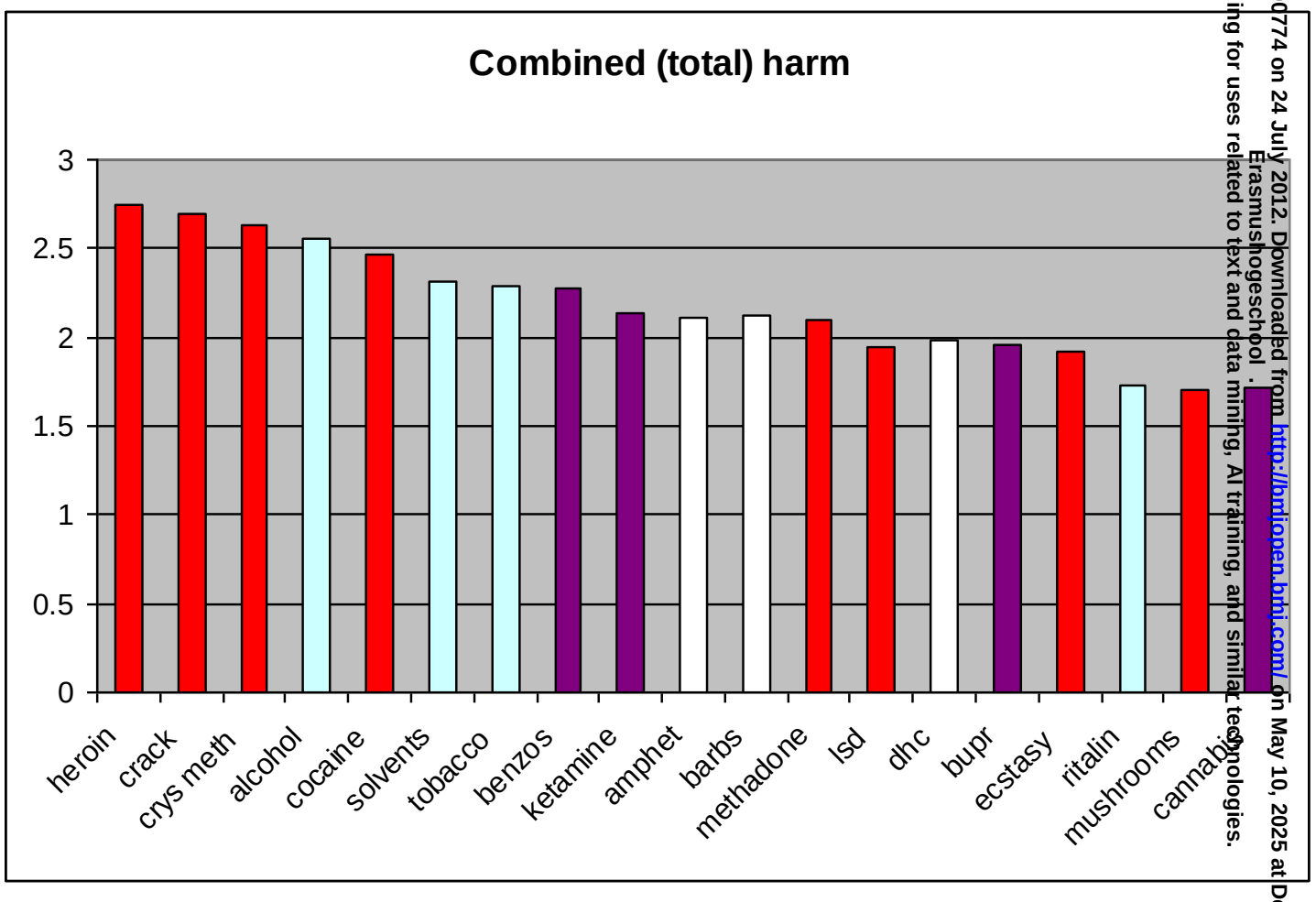
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Secondary Subject Heading:	Public health, Mental health
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Abstract

Objective To produce an expert consensus hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / **participants** 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews, with ~~but on some occasions by email survey. P~~ personal interviews ~~were~~being arranged via local regional addictions teams across the country (details in Results); ~~whereas email responses were from t~~The Royal College of Psychiatrists in Scotland database of ~~specialist~~ psychiatrists who have a special interest in addictions (approximately 200 individuals in total) was also used to elicit completed responses via email.

~~Less than ten psychiatrists submitted a completed response on-line.~~ Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age. ~~All but eight individuals approached to undertake face-to-face interviews agreed to participate (ie response rate of >90%) whereas the response rate to email requests for questionnaire completion was <5%, perhaps reflecting that on average, 25-30 minutes was required to complete each questionnaire.~~ No financial or other incentive was offered to respondents.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region.

Fewer than ten psychiatrists from the Royal College of Psychiatrists in Scotland database submitted a completed response on-line. Approximately 300 individuals working in multi-disciplinary addiction teams across Scotland were approached to undertake face-to-face

interviews, for completion of the questionnaire. Over 90% of those directly approached for face-to-face inteviews agreed to participate whereas the response rate to email requests for questionnaire completion was less than 5%, perhaps reflecting that on average 30 minutes was required to complete each questionnaire.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
SHO/Staff Grade	23	7.9
General Practitioner	6	2.1
Addiction Community Psychiatric Nurse (CPN)	133	45.5
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %. 10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age. Addiction CPNs were easily the biggest single professional discipline, reflecting the composition of a typical community addictions team, and the CPNs on average had over 5 years clinical experience in the field.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal	Societal	Total / combined

	Harm score	Harm score	harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98
Buprenorphine	2.04	1.83	1.96
LSD	2.04	1.87	1.95
Ecstasy/ MDTA	2.07	1.74	1.92
Methylphenidate/Ritalin	1.86	1.62	1.74
Magic Mushrooms	1.88	1.60	1.74
Cannabis	1.86	1.61	1.73

Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A

Purple – Class B

White – Class C

Light blue – Not classified

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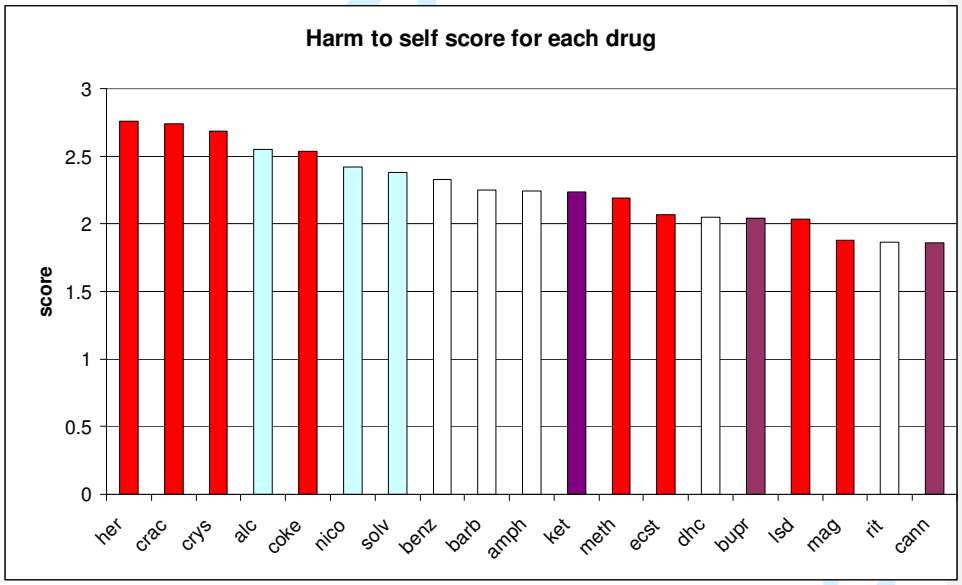
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



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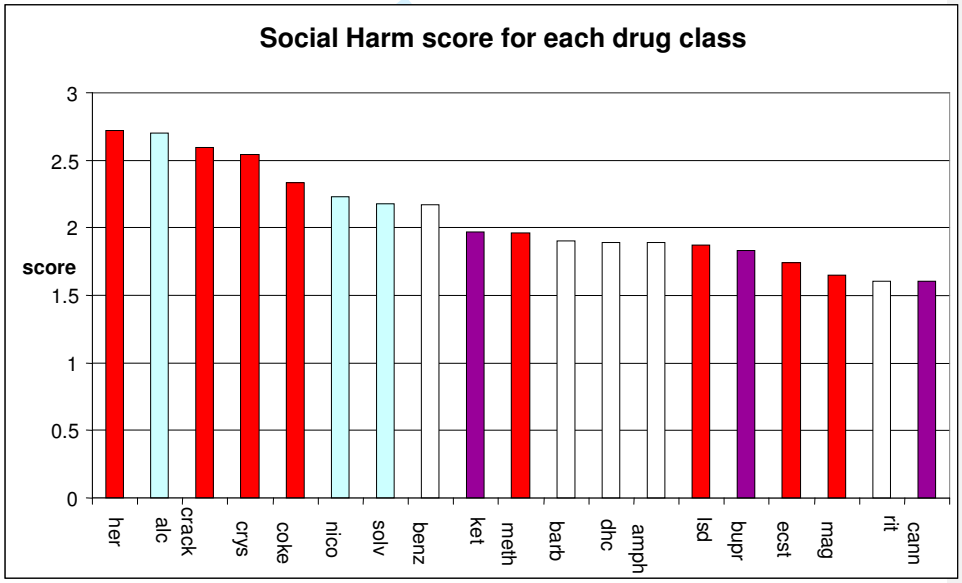

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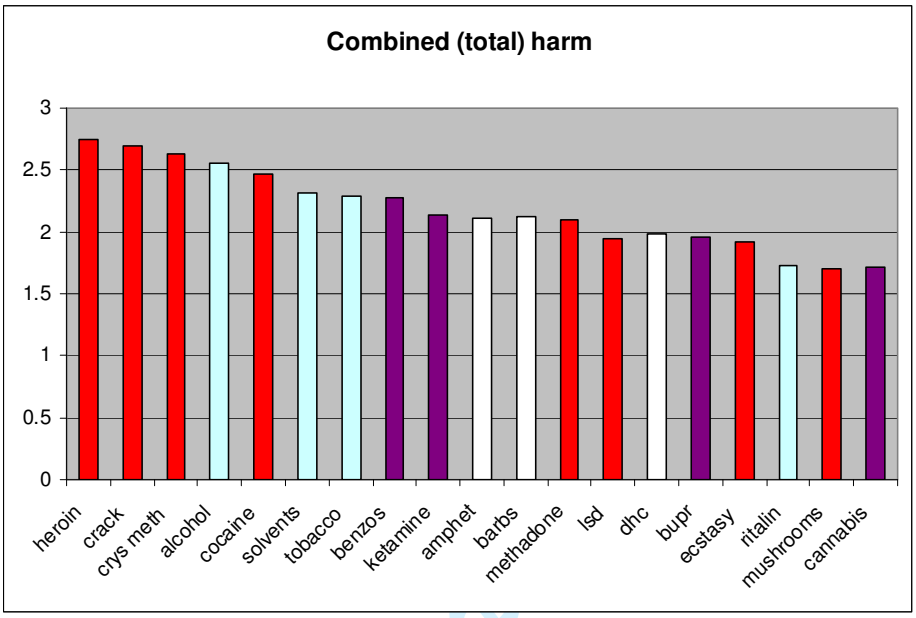

Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

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be involved in this type of study. This large number of expert respondents might also help reduce any selection and observer bias in the sample. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

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Contributors: MT and JM conceived and designed the study. All authors except KM and AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

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All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

Ethical approval was not required for this study.

Appendix

Substances and Associated Harm Questionnaire

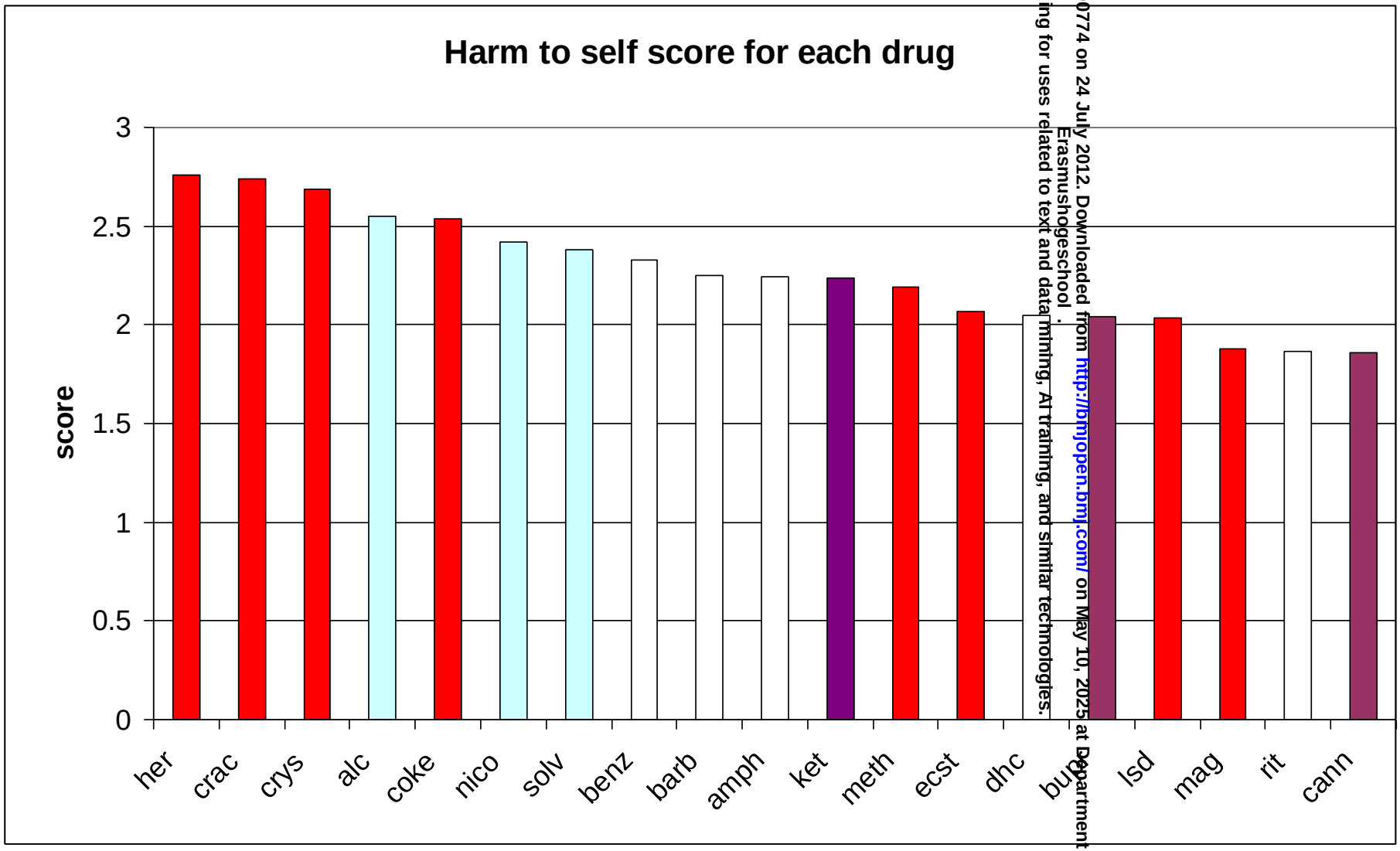
What is your psychiatric / medical specialty?.....
What is your grade / seniority?.....
In which region of Scotland do you work?.....
What is your age? Please circle. 20-30 31-40 41-50 51-60 >60
Please use the scores below for all sections of the table.

0 = no risk, 1 = some risk, 2 = moderate risk, 3 = extreme risk.
NA = not applicable

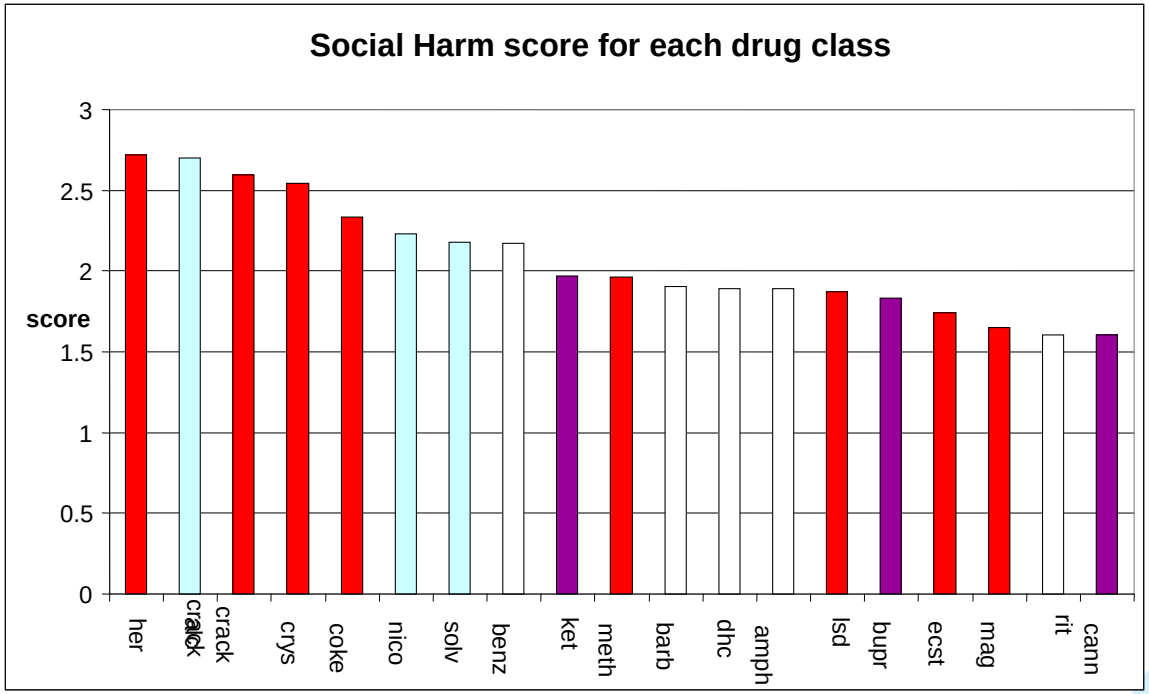
Substance	Area of Harm								
	Physical Harm			***Dependence***			***Social Harms***		
	Acute	Chronic	IV	Intensity of pleasure	Psycho-logical	Physical	Intoxic-ation	Other social harms	Health costs
Alcohol									
Amphetamines									
Barbiturates									
Benzodiazepines									
Buprenorphine / temgesic									
Caffeine									
Crystal meth									
Cocaine									

Crack cocaine									
Dihydrocodeine/ Codeine/Tramadol									
Ecstasy /MDTA									
Heroin									
Ketamine									
LSD									
Magic mushrooms									
Methadone									
Nicotine/ Tobacco									
Methylphenidate / Ritalin									
Inhaled Solvents									

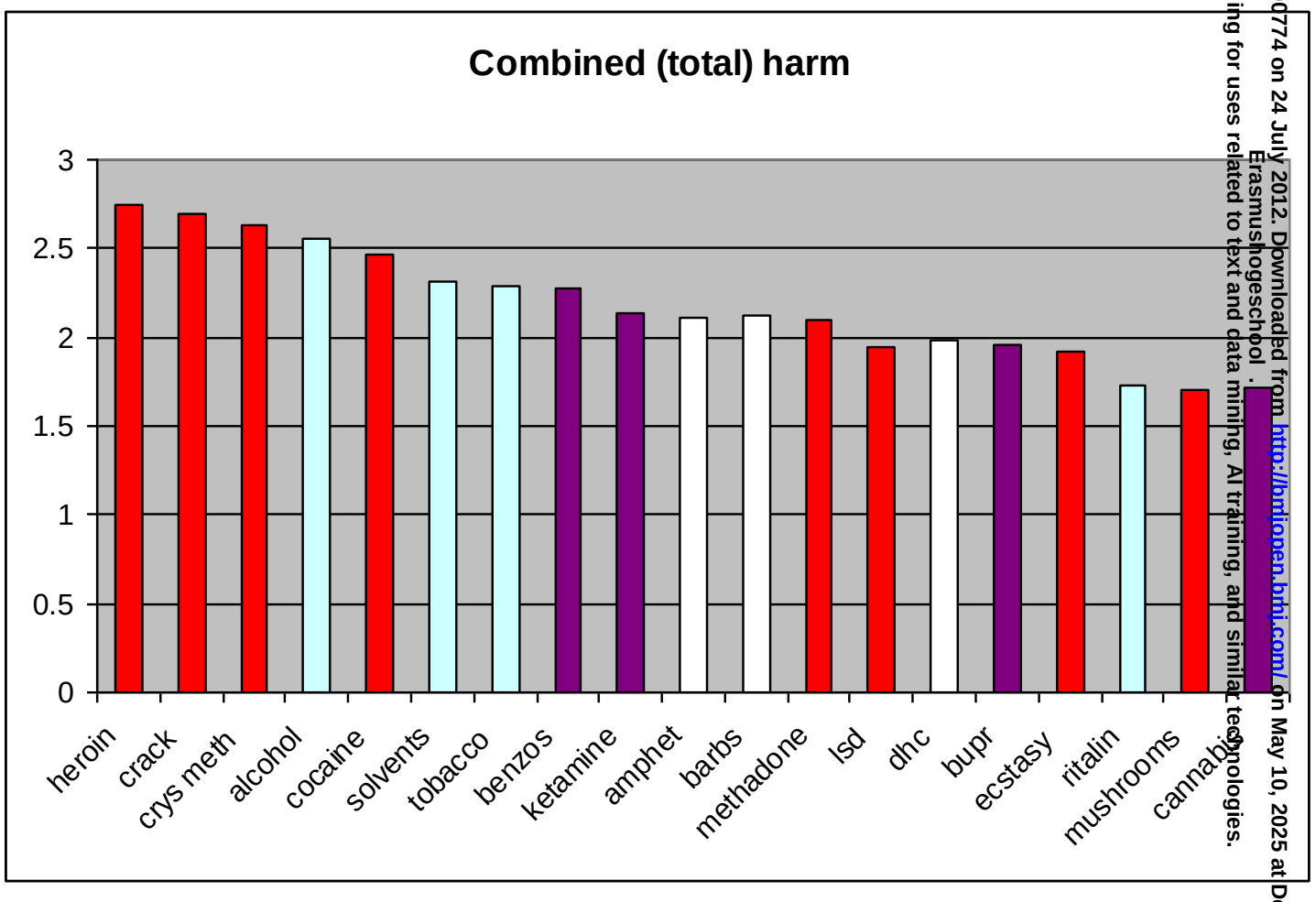
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Abstract

Objective To produce an expert consensus hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / participants 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews but on some occasions by email survey. Personal interviews were arranged via local regional

addictions teams across the country; whereas email responses were from the Royal College of Psychiatrists in Scotland database of specialist psychiatrists. Less than ten psychiatrists submitted a completed response on-line. Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age. All but eight individuals approached to undertake face-to-face interviews agreed to participate (ie response rate of >90%) whereas the response rate to email requests for questionnaire completion was <5%, perhaps reflecting that on average, 25-30 minutes was required to complete each questionnaire. No financial or other incentive was offered to respondents.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
SHO/Staff Grade	23	7.9
General Practitioner	6	2.1
Addiction Community Psychiatric Nurse (CPN)	133	45.5
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %. 10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age. Addiction CPNs were easily the biggest single professional discipline, reflecting the composition of a typical community addictions team, and the CPNs on average had over 5 years clinical experience in the field.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal Harm score	Societal Harm score	Total / combined harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98

Buprenorphine	2.04	1.83	1.96
LSD	2.04	1.87	1.95
Ecstasy/ MDTA	2.07	1.74	1.92
Methylphenidate/Ritalin	1.86	1.62	1.74
Magic Mushrooms	1.88	1.60	1.74
Cannabis	1.86	1.61	1.73

Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A
Purple – Class B
White – Class C
Light blue – Not classified

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Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. This large number of expert respondents might also help reduce any selection and observer bias in the sample. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making

comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and to homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the high potency cannabis was not yet widespread in Scotland. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Other explanations may be that despite cannabis being commonly used in Scotland, individuals present less frequently requesting help than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how one exacerbates the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to

both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Inhaled Solvents									

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It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire, on the basis of their clinical experience and expertise. This was mainly by face to face interviews, with personal interviews being arranged via local regional addictions teams across the country (details in Results). Approximately 300

individuals working in multi-disciplinary addiction teams across Scotland were approached to undertake face-to-face interviews, for completion of the questionnaire, and were chosen via the authors' knowledge of and contact with local addiction services. The Royal College of Psychiatrists in Scotland database of psychiatrists who have a special interest in addictions (approximately 200 individuals in total) was also used to elicit completed responses via email. The number of experts approached was not prospectively determined beyond seeking as large a sample size as possible - no *a priori* sample size was chosen.

Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age. No financial or other incentive was offered to respondents.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region. Fewer than ten psychiatrists from the Royal College of Psychiatrists in Scotland database submitted a completed response on-line. Over 90% of those directly approached for face-to-face interviews agreed to participate whereas the response rate to email requests for questionnaire completion was less than 5%, perhaps reflecting that on average 30 minutes was required to complete each questionnaire.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in

Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
SHO/Staff Grade	23	7.9
General Practitioner	6	2.1
Addiction Community Psychiatric Nurse (CPN)	133	45.5
Addiction Worker	39	13.4
Social Worker	52	17.8
Total	292	100

The age of respondents ranged from 20 years to over 60 years of age. The largest groups were the 31-40 yrs with 38.5 % and the 41 -50 yrs with 38 %. 10% of responses came from workers aged 20 -30 yrs and 9% from those aged 51-60 yrs. 4% of respondents were aged over 60 yrs and 0.5 had not recorded their age. Addiction CPNs were easily the biggest single professional discipline, reflecting the composition of a typical community addictions team, and the CPNs on average had over 5 years clinical experience in the field.

Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal Harm score	Societal Harm score	Total / combined harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13

Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98
Buprenorphine	2.04	1.83	1.96
LSD	2.04	1.87	1.95
Ecstasy/ MDTA	2.07	1.74	1.92
Methylphenidate/Ritalin	1.86	1.62	1.74
Magic Mushrooms	1.88	1.60	1.74
Cannabis	1.86	1.61	1.73

Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A
Purple – Class B
White – Class C
Light blue – Not classified

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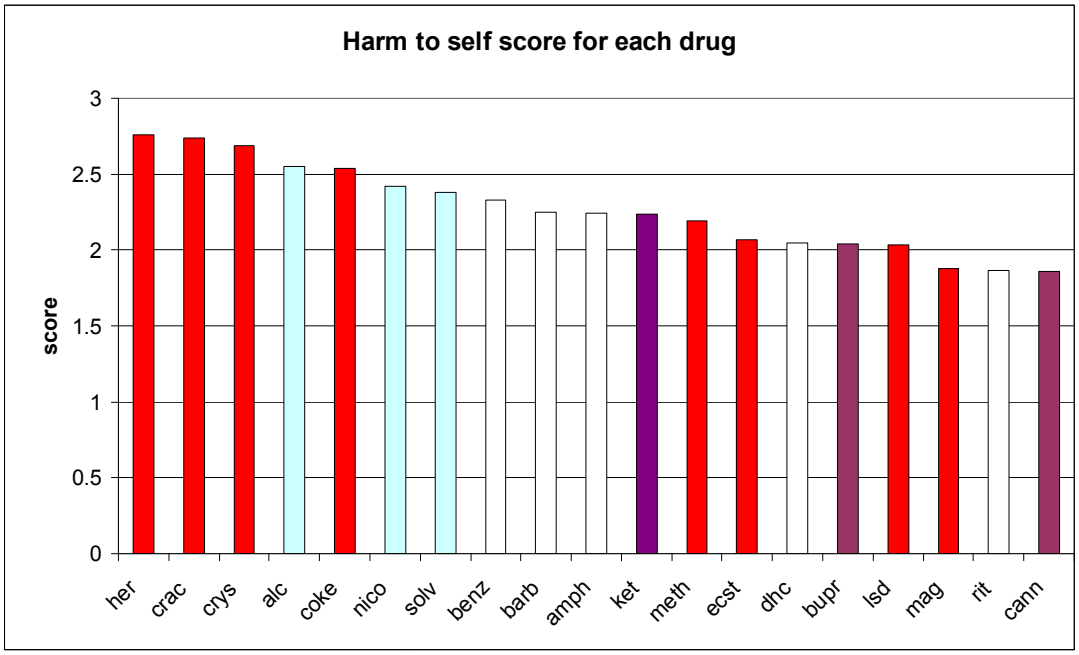
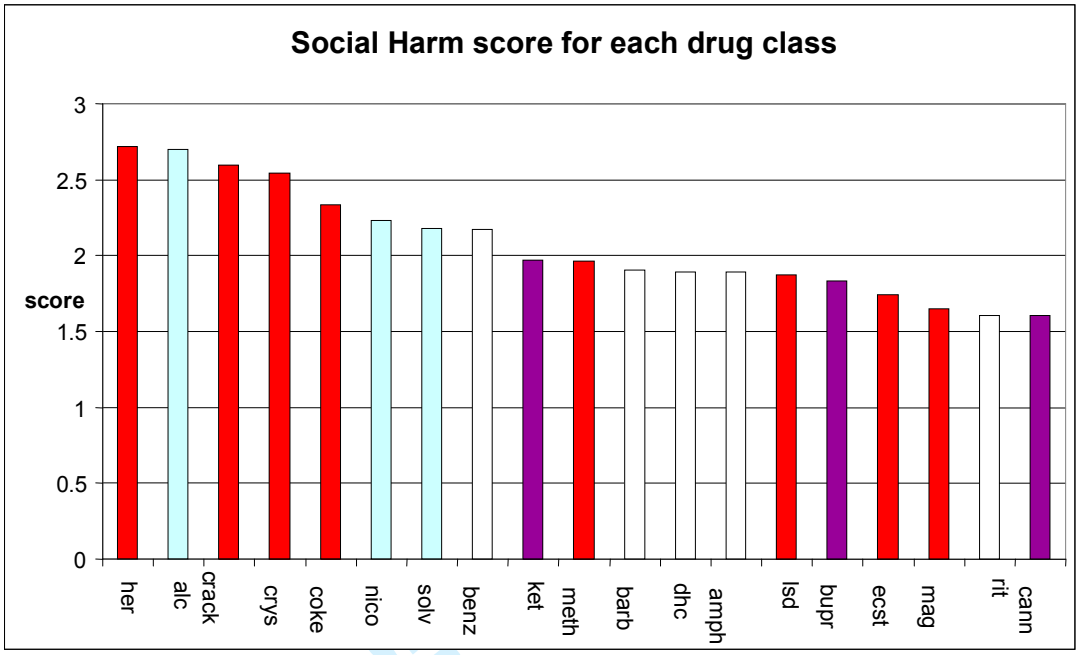
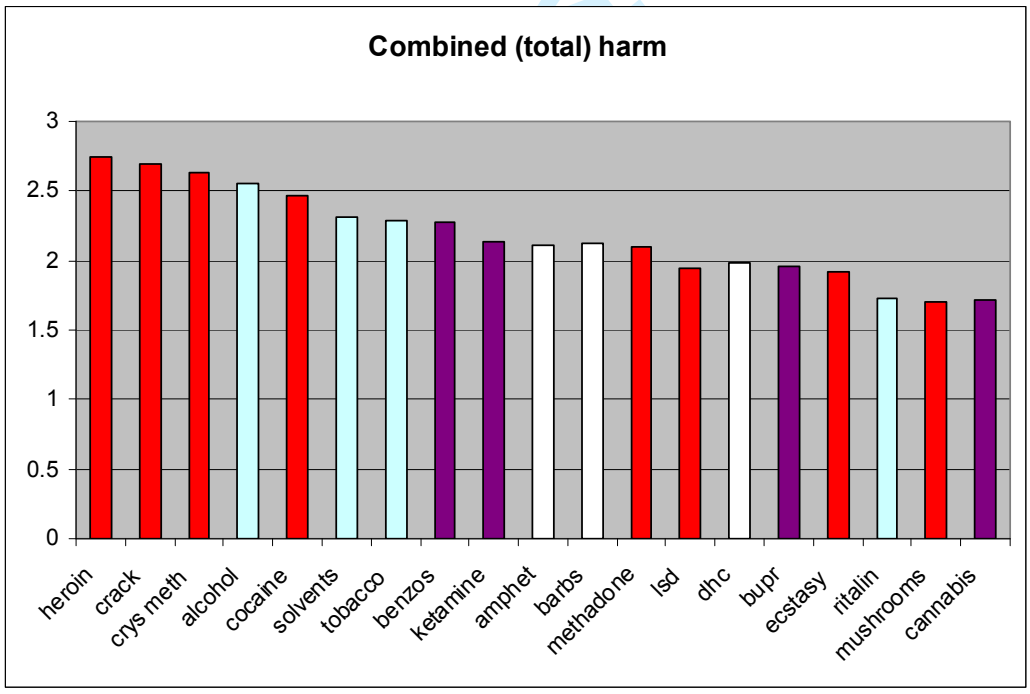
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. This large number of multi-disciplinary expert respondents might also help reduce any selection and observer bias in the sample, although it is acknowledged that the expert clinician respondents were chosen on an *ad hoc* rather than systematic basis. We obtained a high response rate for this survey but it is possible that addiction specialists from geographic areas that were not approached (eg NHS Fife) might have reported different results, and thus response bias cannot be excluded despite the sample size. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is

that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and to homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the use of high potency cannabis was not yet widespread in Scotland. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Other explanations may be that despite cannabis being commonly used in Scotland, individuals who misuse cannabis present less frequently requesting help to addiction services than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how can one exacerbate the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Contributors: MT and JM conceived and designed the study. All authors except KM and AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

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All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

Ethical approval was not required for this study.

Appendix

Substances and Associated Harm Questionnaire

What is your psychiatric / medical specialty?.....
What is your grade / seniority?.....
In which region of Scotland do you work?.....
What is your age? Please circle. 20-30 31-40 41-50 51-60 >60
Please use the scores below for all sections of the table.

0 = no risk, 1 = some risk, 2 = moderate risk, 3 = extreme risk.
NA = not applicable

Substance	Area of Harm								
	Physical Harm			***Dependence***			***Social Harms***		
	Acute	Chronic	IV	Intensity of pleasure	Psycho-logical	Physical	Intoxic-ation	Other social harms	Health costs
Alcohol									
Amphetamines									
Barbiturates									
Benzodiazepines									
Buprenorphine / temgesic									
Caffeine									
Crystal meth									
Cocaine									
Crack cocaine									
Dihydrocodeine/ Codeine/Tramadol									
Ecstasy /MDTA									
Heroin									
Ketamine									
LSD									
Magic mushrooms									
Methadone									
Nicotine/ Tobacco									
Methylphenidate / Ritalin									
Inhaled Solvents									

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

Re: **Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.**

Taylor et al, submitted Dec 2011

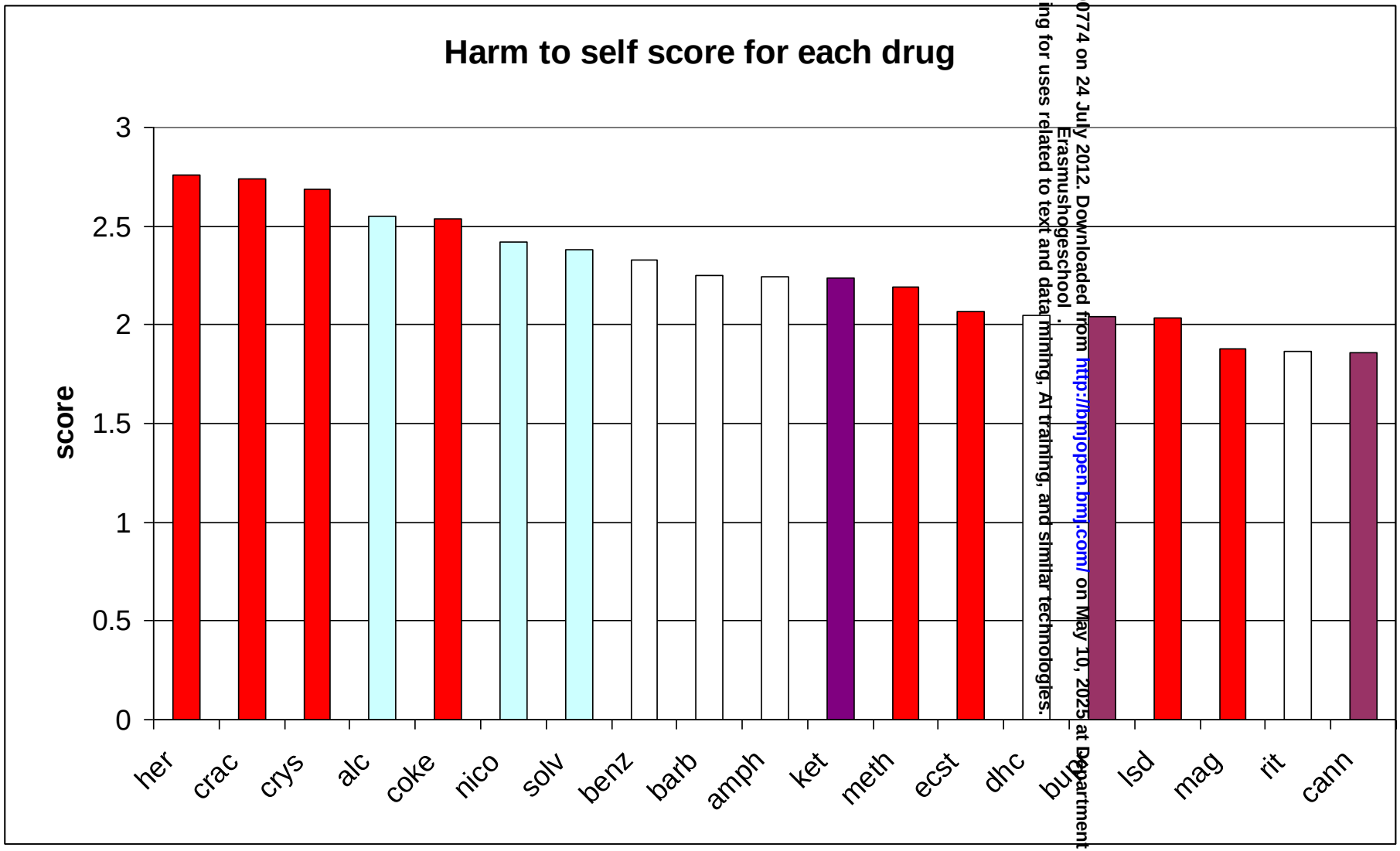
	Item No	Recommendation
Title and abstract	1 Done, p1 & p2	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2 Done – p3	Explain the scientific background and rationale for the investigation being reported
Objectives	3 Done – p3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4 Done	Present key elements of study design early in the paper
Setting	5 Done	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6 Done	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7 Done	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8* Done	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9 In method & discussion	Describe any efforts to address potential sources of bias
Study size	10 In method	Explain how the study size was arrived at
Quantitative variables	11 Done	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12 Done	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13* Done	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage

		(c) Consider use of a flow diagram
Descriptive data	14* Done	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
Outcome data	15* NA	Report numbers of outcome events or summary measures
Main results	16 Done where applicable	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17 NA	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18 Done	Summarise key results with reference to study objectives
Limitations	19 Done	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20 Done	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21 Commented on	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22 Done	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

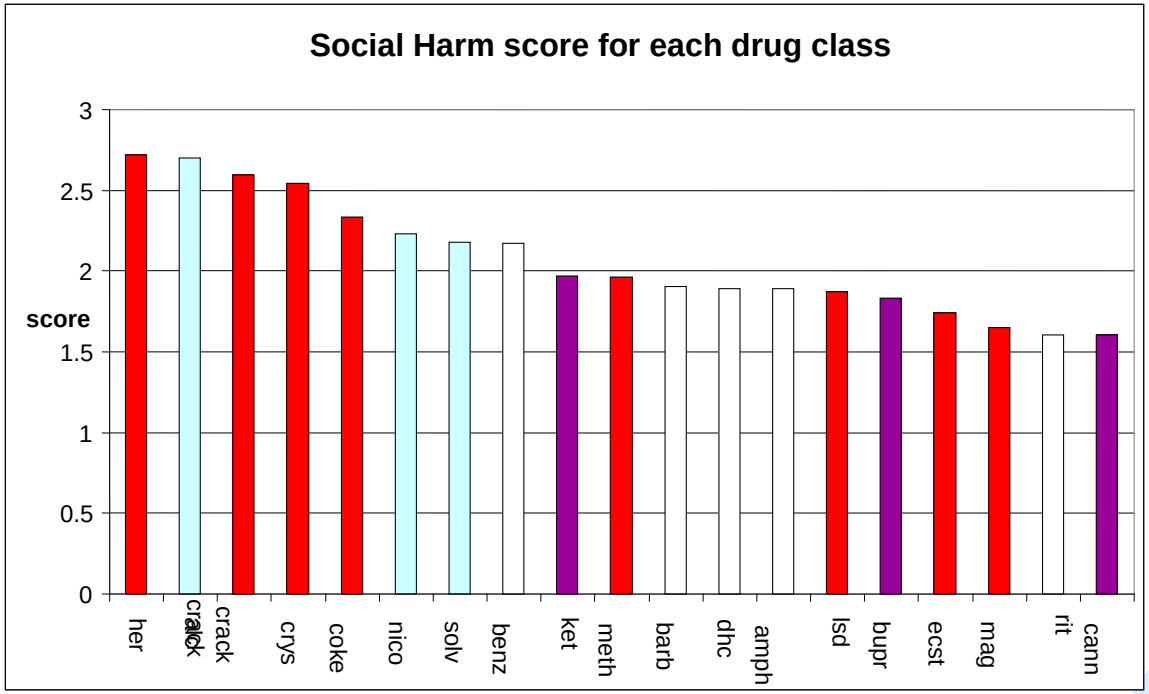
*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

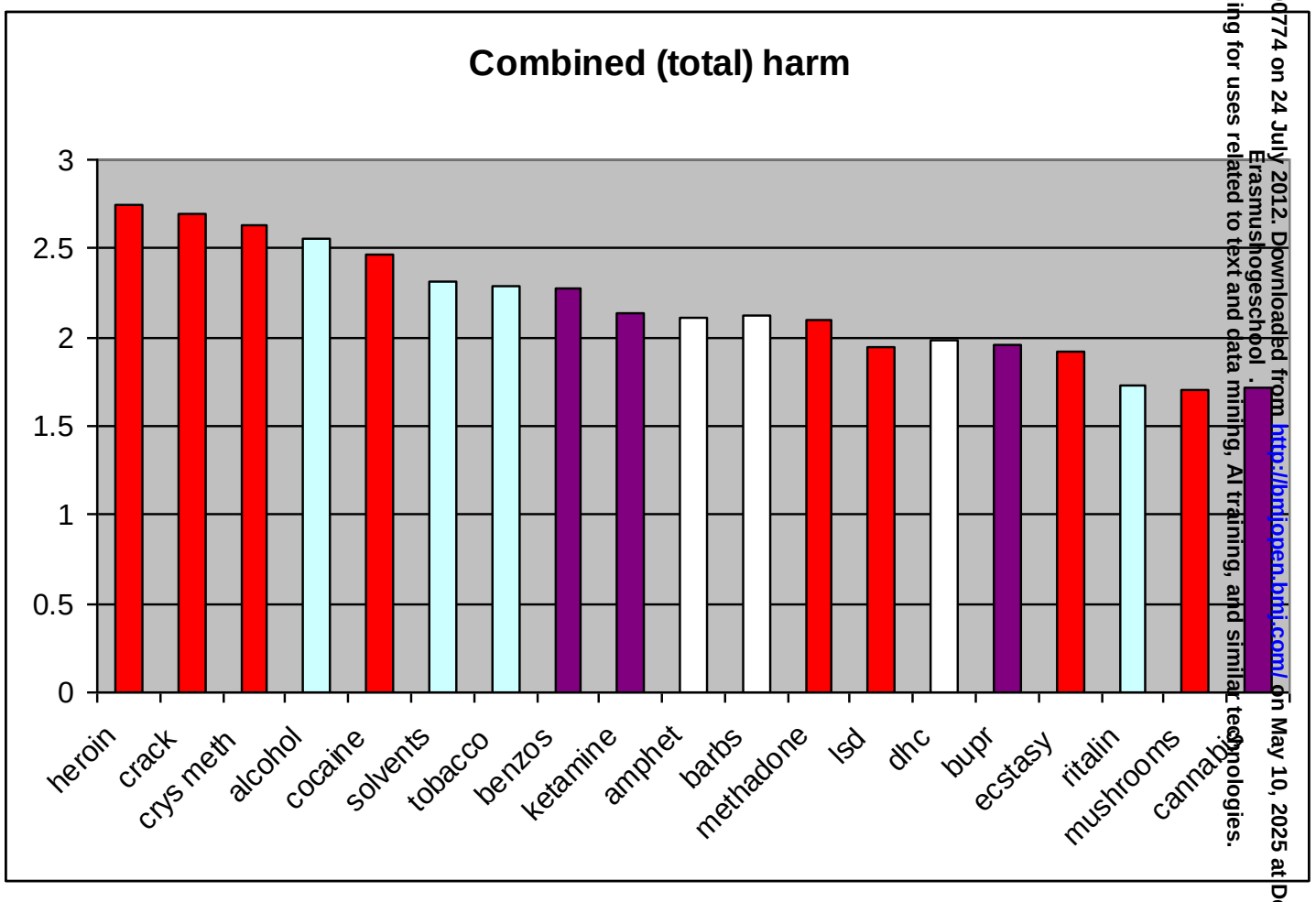
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

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Abstract

Objective To produce an expert consensus hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / **participants** 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

Addiction specialists and psychiatrists working with substance misuse across Scotland were approached to complete the questionnaire. This was mainly by face to face interviews, with ~~but on some occasions by email survey. P~~ personal interviews ~~were~~being arranged via local regional addictions teams across the country (details in Results); ~~whereas email responses were from t~~The Royal College of Psychiatrists in Scotland database of ~~specialist~~ psychiatrists who have a special interest in addictions (approximately 200 individuals in total) was also used to elicit completed responses via email.

~~Less than ten psychiatrists submitted a completed response on-line.~~ Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

Basic demographic information about the respondents was also recorded including region of Scotland where they worked, specialty area of work, job title and age. ~~All but eight individuals approached to undertake face-to-face interviews agreed to participate (ie response rate of >90%) whereas the response rate to email requests for questionnaire completion was <5%, perhaps reflecting that on average, 25-30 minutes was required to complete each questionnaire.~~ No financial or other incentive was offered to respondents.

Analysis

Scores were averaged for each parameter. For some analyses the scores for the three parameters for each category were averaged to give a mean score for that category i.e. an overall score for harm to self and overall score for harm to others. An overall harm rating was obtained by taking the mean of all nine scores.

Results

Demographics of Respondents

292 completed responses were obtained from seven different regions in Scotland. 50% of respondents worked in the Glasgow region with 15% working in Tayside, 13% in Grampian, 11% in Forth Valley and 9% in Lothian and Borders. 1% worked in Lanarkshire and 1% of responses had not recorded their region.

Fewer than ten psychiatrists from the Royal College of Psychiatrists in Scotland database submitted a completed response on-line. Approximately 300 individuals working in multi-disciplinary addiction teams across Scotland were approached to undertake face-to-face

interviews, for completion of the questionnaire. Over 90% of those directly approached for face-to-face inteviews agreed to participate whereas the response rate to email requests for questionnaire completion was less than 5%, perhaps reflecting that on average 30 minutes was required to complete each questionnaire.

Respondents were from a range of professional backgrounds in health and social work. They worked across a variety of specialities with addictions being most represented with 64 % of respondents. 18.5 % worked in the General Adult Psychiatry setting and 0.5% worked in Forensic Psychiatry. 16 % worked in other areas such as General Practice and 1% of respondents had not recorded their specialty.

Table 2

Job Title	Frequency	Percent
Consultant Psychiatrist	24	8.2
Specialist Registrar	15	5.1
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Harm rankings

The mean scores for the substances assessed are shown ranked in the table 3 below.

Table 3

Assessment score tables

Substance	Personal	Societal	Total / combined

	Harm score	Harm score	harm score
Heroin	2.76	2.72	2.74
Crack Cocaine	2.74	2.60	2.69
Crystal Meth	2.69	2.54	2.63
Alcohol	2.55	2.70	2.56
Cocaine	2.54	2.33	2.46
Inhaled Solvents	2.38	2.18	2.31
Nicotine	2.42	2.23	2.29
Benzodiazepines	2.33	2.17	2.27
Ketamine	2.24	1.97	2.13
Barbiturates	2.25	1.91	2.12
Amphetamine	2.24	1.89	2.11
Methadone	2.19	1.96	2.10
Dihydrocodeine/Codeine/Tramadol	2.05	1.89	1.98
Buprenorphine	2.04	1.83	1.96
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Table 3 lists the results for each of the three subcategories of harm. The scores in each category were averaged across all scorers and the substances are listed in rank order of harm based on their overall score. Many of the drugs were consistent in their ranking across the three categories.

Heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm.

LSD, ecstasy, methylphenidate, magic mushrooms and cannabis were in the bottom five places for all categories of harm. Cannabis was rated as the least harmful drug

Alcohol was the only drug that rated more highly on the societal harm score than on personal harm. Alcohol was rated fourth and Nicotine was seventh across all categories of harm ranking higher than some controlled drugs.

The following graphs are a diagrammatic representation of the scores for each drug across the harm categories. The colour coding equates to the drug's status under the Misuse of Drugs Act at the time of data collection.

Red – Class A
Purple – Class B
White – Class C
Light blue – Not classified

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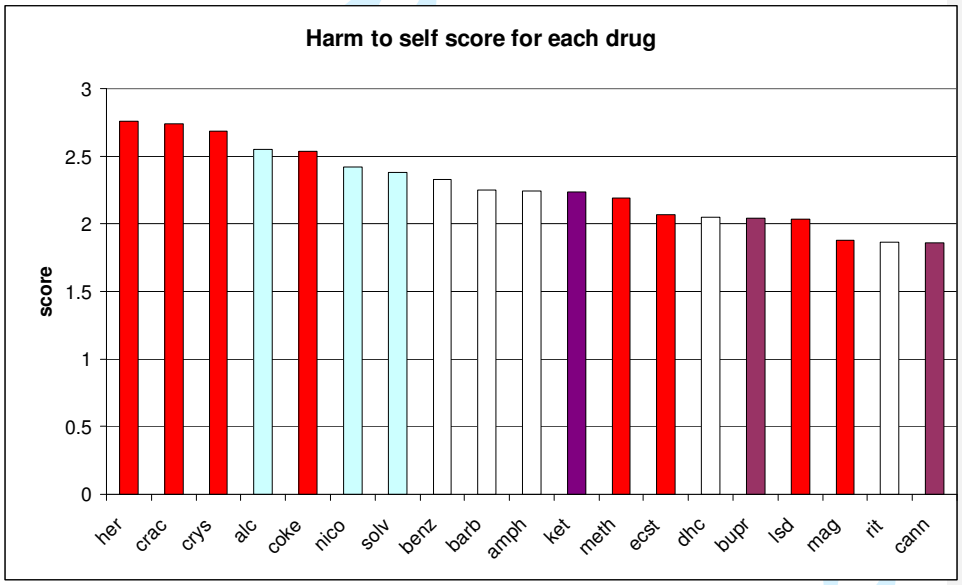
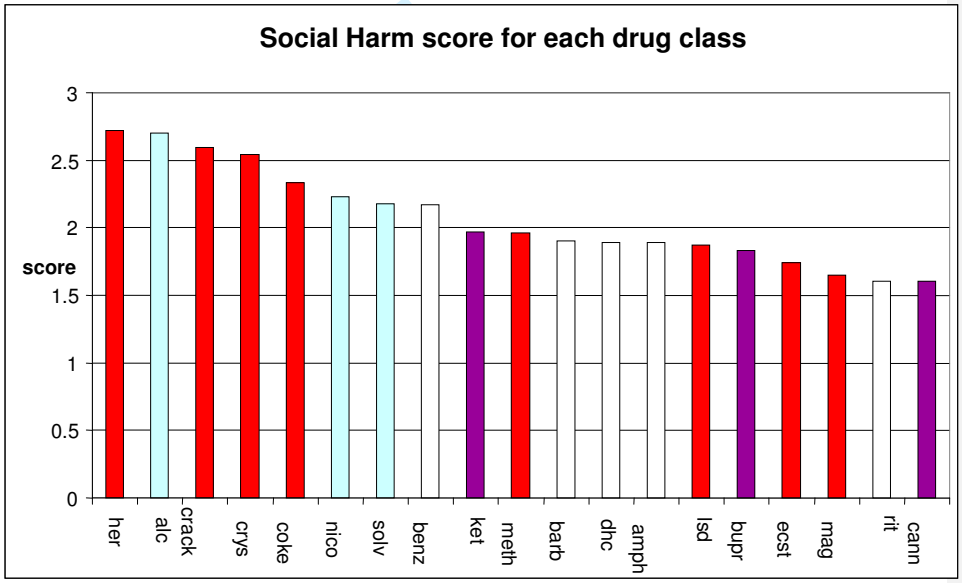
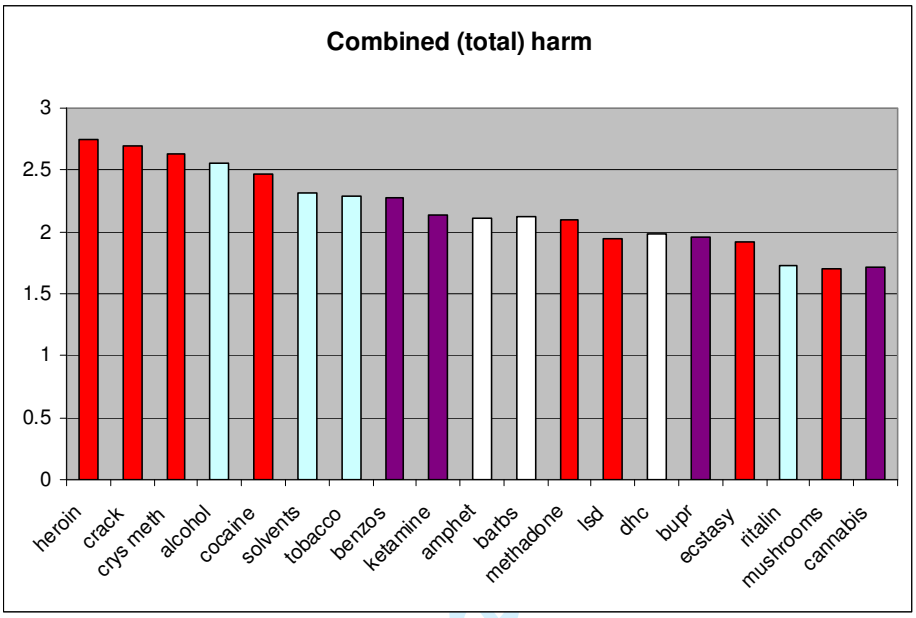
Graph 1 shows a diagrammatic representation of ranking of personal harm scores for each drug.



Graph 2 shows a diagrammatic representation of ranking of social harm scores for each drug



Graph 3 shows a diagrammatic representation of the ranking of combined scores for harm.



Discussion

The main outcome of this study is a ranking by Scottish addiction experts of 19 recreational drugs according to their mean harm score. The main result is that heroin, crack cocaine, crystal meth, alcohol and cocaine were in the top five places for all categories of harm with LSD, ecstasy, methylphenidate, magic mushrooms and cannabis in the bottom five places for all categories of harm. Notably legal substances such as alcohol, nicotine and volatile agents ranked as more harmful than some class A drugs, although these drugs are more socially and culturally embedded in Scotland than the prohibited ones. The hierarchy of harm when judged by the experts did not correlate to the hierarchy used currently by the Misuse of Drugs Act. There is no indication of a stepwise reduction in harm as would be supposed by the current A, B, C classification and no clear delineation of scores to allow logical cut off points for such a categorisation. These results are similar to Nutt's original work and to a more recent Dutch study[5] which used the same scoring system although different methodology to this study. Nutt et al[4] confirmed that the sharp A, B or C division of the current classification in the UK Misuse of Drugs Act did not correlate to the rankings of harm by the experts and the experts showed reasonable levels of agreement in their rankings, leading to a proposal that their rating system could be developed by regulatory bodies to provide an evidence based approach to drug classification.

One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to

be involved in this type of study. This large number of expert respondents might also help reduce any selection and observer bias in the sample. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and to homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to

the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the use of high potency cannabis was not yet widespread in Scotland. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Other explanations may be that despite cannabis being commonly used in Scotland, individuals who misuse cannabis present less frequently requesting help to addiction services than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how can one exacerbates the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Contributors: MT and JM conceived and designed the study. All authors except KM and AM collected the data. AM helped analyse the results. All authors were involved in interpreting the results, drafting the paper and approving the final manuscript. All authors had full access to all data and can take responsibility for the accuracy and integrity of the data. MT is the guarantor of the study.

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All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that no support for the submitted work; no financial relationships with companies that might have an interest in the submitted work in the previous 3 years; and their spouses, partners, or children have no financial relationships that may be relevant to the submitted work; and have no non-financial interests that may be relevant to the submitted work beyond working in the fields of mental health and addictions.

Ethical approval was not required for this study.

Appendix

Substances and Associated Harm Questionnaire

What is your psychiatric / medical specialty?.....
What is your grade / seniority?.....
In which region of Scotland do you work?.....
What is your age? Please circle. 20-30 31-40 41-50 51-60 >60
Please use the scores below for all sections of the table.

0 = no risk, 1 = some risk, 2 = moderate risk, 3 = extreme risk.
NA = not applicable

Substance	Area of Harm								
	Physical Harm			***Dependence***			***Social Harms***		
	Acute	Chronic	IV	Intensity of pleasure	Psycho-logical	Physical	Intoxic-ation	Other social harms	Health costs
Alcohol									
Amphetamines									
Barbiturates									
Benzodiazepines									
Buprenorphine / temgesic									
Caffeine									
Crystal meth									
Cocaine									

Crack cocaine									
Dihydrocodeine/ Codeine/Tramadol									
Ecstasy /MDTA									
Heroin									
Ketamine									
LSD									
Magic mushrooms									
Methadone									
Nicotine/ Tobacco									
Methylphenidate / Ritalin									
Inhaled Solvents									

Quantifying the relative risk of harm to self and others from substance misuse – results from a national survey of experts.

Mark Taylor *consultant psychiatrist*[1], Kirsty Mackay *consultant psychiatrist*[2], Jennifer Murphy *consultant psychiatrist*[3], Andrew McIntosh *professor*[4], Claire McIntosh *consultant psychiatrist*[5], Seonaid Anderson *consultant psychiatrist*[6], and Killian Welch *consultant psychiatrist*[4].

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3. Maori Mental Health, Otahuhu, New Zealand
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6. NHS Grampian, Aberdeen AB25 2ZH.

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Abstract

Objective To produce an expert consensus hierarchy of harm to self and others from legal and illegal substance use.

Design Structured questionnaire with 9 scored categories of harm for 19 different commonly used substances.

Setting / participants 292 clinical experts from across Scotland.

Results There was no stepped categorical distinction in harm between the different legal and illegal substances. Heroin was viewed as the most harmful, and cannabis the least harmful of the substances studied. Alcohol was ranked as the 4th most harmful substance, with alcohol, nicotine, and volatile solvents being viewed as more harmful than some class A drugs.

Conclusions The harm rankings of 19 commonly used substances did not match the A, B, C classification under the Misuse of Drugs Act. The legality of a substance of misuse is not correlated with its perceived harm. Evidence from experts such as this could inform any legal review of drug misuse, and help shape public health policy and practice.

Introduction

Drug and alcohol misuse is a significant and growing problem in Scotland. The levels of problematic drug misuse are double that of England and alcohol dependency is a third higher than other parts of the UK. Drug and alcohol related deaths are amongst the highest in Europe and have doubled over the past 15 years[1]. In 2007 it was estimated that the alcohol industry was worth around £ 3.5 billion[2], and that the largest part of the informal Scottish economy was made up from the trade of illicit drugs. In the UK as a whole the total cost burden of drug misuse is estimated to be between £10 billion and £16 billion per year[3].

The laws regulating drug use are complicated. The Misuse of Drugs Act 1971 defines what are termed 'controlled drugs', dividing illicit drugs into three categories - A, B, and C - which were designed to reflect the harm caused to both the individual and to society generally by these drugs (see table 1 below). Drugs classified as causing the most severe harm are designated Class A and include heroin, cocaine and ecstasy. The law thus implies that class A drugs are the most dangerous of all. Class B is thought to be less harmful than class A but more harmful than class C, and contains amphetamines and barbiturates. Class C includes cannabis and benzodiazepine tranquillisers. This categorical classification system does not include two commonly used and powerful psychoactive drugs, tobacco and alcohol, which are legal to use for those over 18 years old in the UK.

It has been argued over recent years that this classification has become outdated and only modestly correlates with expert ratings of harm caused by the various substances. In 2007, Nutt et al attempted to reassess the system of drug classification and produce a more contemporary hierarchy of harm[4]. UK experts in psychiatry, addictions and pharmacology were asked to rate drugs on three major dimensions of harm: physical harm, potential for dependence and social harms. Under the physical harm dimension they were asked to score three different components: the acute effects and harm to health; the chronic harm to health; and the harm to physical health caused by IV drug use. Under the dependence dimension three further components were rated, namely the intensity of pleasure produced by the drug; the psychological dependence; and the potential physical symptoms of dependence related to the specific substance. In the final dimension of social harm the components rated were harms to others caused by intoxication; health costs directly resulting from the drug use including the costs to healthcare and social care systems; and finally other social harms such as violent behaviour, neglect of children and financial problems caused by drug use. The aim of this study was to obtain a comprehensive consensus from addiction experts in Scotland on the relative harms of drug misuse, both legal and legal using the ranking system developed by Nutt et al[4].

Method

Nutt et al[4] designed a matrix which included three major categories of harm with each category being subdivided into three groups, producing nine parameters of risk. This nine parameter scale was adapted (see appendix) to produce a questionnaire to assess physical and psychological harm to self and others for 19 commonly used legal and illegal substances. The nine parameters were a) physical harm caused by acute; chronic; and parenteral use; (b) psychological harm; physical harm; and intensity of pleasure linked to dependence; and (c) social harm from intoxication; other social harms; and associated healthcare costs.

The 19 substances chosen for assessment are shown in table 1, below, along with their status under the Misuse of Drugs act at the time of this study.

Table 1.

Substance	**Class in Misuse of Drugs Act at time of data collection**
Alcohol	Not controlled if over 18 years
Amphetamines	B
Barbiturates	B
Benzodiazepine	C
Buprenorphine/ temgesic	C
Cannabis	B
Cocaine	A
Crack Cocaine	A
Crystal Meth	A
Dihydrocodeine/ Codeine/ Tramadol	Not controlled
Ecstacy/MDTA	A
Heroin	A
Ketamine	C
LSD	A
Magic Mushrooms	A
Methadone	A
Nicotine/ Tobacco	Not controlled if over 18 years
Methylphenidate/ Ritalin	B
Inhaled solvents	Not controlled

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addictions teams across the country; whereas email responses were from the Royal College of Psychiatrists in Scotland database of specialist psychiatrists. Less than ten psychiatrists submitted a completed response on-line. Guidance notes on how to complete the questionnaire were also issued, and during the face-to-face interviews there was explicit guidance provided emphasising that the harm rankings should be based on the experts' global clinical experience of the population seen in addictions services (ie not based on an understanding of 'milder' wider society use patterns). Participants were asked to score each substance for each of the nine parameters, using a four-point scale, with 0 being no risk, 1 some risk, 2 moderate risk and 3 extreme risk.

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One of the strengths of this study is the large number of experts involved. 292 addiction multidisciplinary experts across Scotland were involved making it the largest national panel to be involved in this type of study. This large number of expert respondents might also help reduce any selection and observer bias in the sample. A recognised weakness is that the scale used to obtain the harm scores is not ideal as it does not examine all the conceivable ways in which a substance may cause harm and is limited to nine criteria. Also although the physical harm of drugs tends to be well defined i.e. acute and chronic toxicity and addictive potency, in contrast the spectrum of social harm tends to be rather less so which may hamper the objective rating of the social harms for drugs. Some of the social harms which are applicable to one drug may not necessarily be transferrable to another drug which has different properties e.g. sedative versus stimulant. There is no method of applying a differential weighting to each parameter of harm and it is clear that some criteria are more important expressions of harm than others. Nutt et al[6] attempted to address these issues using multi-criterion decision analysis, with 16 criteria for rating harm and a weighting score out of 100 for each criterion. This approach increased the differentiation between the most and least harmful drugs, and here alcohol rated as the most harmful with heroin second and tobacco sixth. A problem with this format of harm ratings is that it does not take account of availability of the substance in question, eg that alcohol might be highly ranked due to its low cost and widespread availability. It is also recognised that caution must be taken in making

comparisons between legal substances as compared to illegal ones as substances such as alcohol, nicotine and volatile agents are far more widely available, arguably particularly affecting social harm. Another limitation of the present study is that our scale measures only harm, and does not look at perceived or actual benefits to the user which motivated the use in the first place.

The high rankings of alcohol and tobacco in this study reflect the common recognition that chronic use of alcohol and tobacco cause illness and death, contributing to 90% of drug related deaths in the UK. Every year in the UK, tobacco smoking causes around 100 000 premature deaths, reducing average life expectancy in regular smokers by 10 years[7], with population based studies suggest that smoked tobacco is the most addictive commonly used drug. Alcohol is a growing problem in Scotland where there is one of the fastest growing rates of liver cirrhosis in the world, having doubled since 1990 and being twice that of England and Wales[8]. Alcohol misuse is also known to be a risk factor for suicide, and the National Confidential Inquiry[9] into suicides indicated that 58% of individuals dying by suicide in Scotland had a history of alcohol misuse and in 17% alcohol dependence was the primary diagnosis. The report also shows that there is a substantially higher rate of homicides and suicides in Scotland as compared with England and Wales which can be largely attributed to high levels of alcohol and drug misuse, both in the general population and among people with mental health problems. Cause and effect cannot be attributed here though, as the pathways to suicide and to homicide are complex and multiple. In this study alcohol was the only drug to rate higher on societal harm that personal harm reflecting not only the enormous burden to the healthcare system posed by alcohol but also the negative effects on rates of crime, work place absences, and on family life including domestic violence.

Interestingly cannabis was ranked as the least harmful drug by the Scottish addiction experts. This differs from both Nutt's work and the Dutch study where it was ranked as 11th and 12th respectively. It is not clear why there would be such a variation in scores for cannabis, although at the time of survey the high potency cannabis was not yet widespread in Scotland. One reason may be the differences in the panel of experts. Our study examined the views of clinicians and addiction workers whereas the other panels included toxicologists, pharmacists and experts from a legal background who would have a different experience of working with cannabis. Other explanations may be that despite cannabis being commonly used in Scotland, individuals present less frequently requesting help than with other drugs of abuse, and that addictions specialists do not usually see cannabis addiction with comorbid psychotic illness and how one exacerbates the other.

Alcohol and drug misuse is an immense and highly complex challenge for policy makers in Scotland. Historically illicit drug misuse has been linked with the criminal justice system and the system of classification currently in use reflects this. This study demonstrates, similarly to

both of Nutt's studies, that the legality of a substance does not reflect its potential for harm. Just because a substance is legal it does not mean that it is safe to use. This has been highlighted recently with the reclassification of some of the so called 'legal highs'. Recent work looking a mephedrone in particular have shown that it has a considerable harm profile both to physical[10] and mental health[11], and that making a substance illegal does not necessarily reduce its usage and may only act to drive up the price[12]. The burgeoning evidence of the harm caused by tobacco and alcohol would also suggest that from a scientific perspective these drugs are currently misclassified, and that a new method for ranking drug harm which could guide policies and public health strategies is required, with many in the scientific and medical community feeling this should be separated from the criminal justice system and associated penalties. Any new system would also have to address the issue of personal choice and responsibility in using substances and examine the context in which they are being used. Increasing public awareness of the potential for harm of all the drugs examined whether legal or illegal and finding ways of reducing the demand for psychoactive substances should be the focus rather than imposing harsh penalties for their use.

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Ethical approval was not required for this study.

Appendix

Substances and Associated Harm Questionnaire

What is your psychiatric / medical specialty?.....
What is your grade / seniority?.....
In which region of Scotland do you work?.....
What is your age? Please circle. 20-30 31-40 41-50 51-60 >60
Please use the scores below for all sections of the table.

0 = no risk, 1 = some risk, 2 = moderate risk, 3 = extreme risk.

NA = not applicable

Substance	Area of Harm								
	Physical Harm			***Dependence***			***Social Harms***		
	Acute	Chronic	IV	Intensity of pleasure	Psycho-logical	Physical	Intoxic-ation	Other social harms	Health costs
Alcohol									
Amphetamines									
Barbiturates									
Benzodiazepines									
Buprenorphine / temgesic									
Caffeine									
Crystal meth									

Cocaine									
Crack cocaine									
Dihydrocodeine/ Codeine/Tramadol									
Ecstasy /MDTA									
Heroin									
Ketamine									
LSD									
Magic mushrooms									
Methadone									
Nicotine/ Tobacco									
Methylphenidate / Ritalin									
Inhaled Solvents									