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"Legal highs": safe and legal "heavens"? A study on the diffusion, knowledge and risk awareness of novel psychoactive drugs among students in the UK

"Legal highs": paradisi sicuri e legali? Uno studio sulla diffusione, conoscenza e consapevolezza del rischio delle nuove droghe psicoattive tra gli studenti del Regno Unito

ORNELLA CORAZZA, PIERLUIGI SIMONATO, JOHN CORKERY, GIUSEPPINA TRINCAS, FABRIZIO SCHIFANO
E-mail: o.corazza@herts.ac.uk

University of Hertfordshire, School of Pharmacy, College Lane Campus, Hatfield, United Kingdom

SUMMARY. Background. The recent emergence of new recreational drugs, combined with the ability of the Internet to disseminate information quickly, have raised a number of concerns in the fields of drug policy, substance use research, and public health. **Methods.** A semi-structured questionnaire was advertised on The Study Room's website from November to December 2010 to explore the awareness, the use and the perception of risks of "legal highs" among student population in the UK. **Results.** One-third (31.40%) of the 446 participants reported use of these kinds of drugs. Respondents were more likely to have taken were: mephedrone (41.4%), *Salvia divinorum* (20%), "Spice drugs" (10.7%), methylone (1.4%), naphyrone (NRG) (2.1%) and benzylpiperazine (BZP) (2.1%), while 15.7% did not know what compounds they had ever consumed. The large majority (78.9%) considered these as legal substances, while 74.2% did not consider these safer than illicit drugs. Half (50.8%) of the respondents were aware of the presence of illegal agents in the products they had consumed. **Conclusions.** The study contributes to an initial assessment of the use and the risks awareness of novel psychoactive compounds among students in the UK. Further research is required, especially in terms of personality and lifestyle attitudes to better profile these new forms of abuse also in non-recreational settings.

KEY WORDS: legal highs, mephedrone, *Salvia divinorum*, spice drugs, novel compounds, students.

RIASSUNTO. Introduzione. La recente comparsa delle nuove sostanze ricreazionali, combinata alla possibilità offerta da Internet di diffondere le informazioni velocemente, ha sollevato numerose nuove preoccupazioni nel campo legislativo, nel campo della ricerca sulle nuove sostanze e per quanto riguarda la salute pubblica. **Metodi.** È stato utilizzato un questionario semistrutturato pubblicizzato sul sito di Study Room da novembre a dicembre 2010 per esplorare la consapevolezza, l'uso e la percezione di rischio delle "legal highs" tra la popolazione studentesca nel Regno Unito. **Risultati.** Un terzo (31,40%) dei 446 partecipanti ha riferito l'uso di queste sostanze. Gli intervistati hanno riferito soprattutto l'uso di: mefedrone (41,4%), *Salvia divinorum* (20%), "spice drugs" (10,7%), metilone (1,4%), nafirone (NRG) (2,1%) e benzilpiperazina (BZP) (2,1%), mentre il 15,7% non sapeva che tipo di composto avesse assunto. La maggioranza (78,9%) considerava queste sostanze "legali", mentre il 74,2% non le considerava più sicure di composti illegali. Metà del campione (50,8%) era consapevole della presenza di componenti illegali nei prodotti consumati. **Conclusioni.** Lo studio contribuisce al tentativo di stimare l'uso e la consapevolezza del rischio in merito alle nuove sostanze psicoattive tra gli studenti del Regno Unito. Si ritengono necessari ulteriori studi, soprattutto in termini di personalità e stili di vita, al fine di inquadrare meglio queste nuove forme di abuso, anche in setting non propriamente ricreazionali.

PAROLE CHIAVE: legal highs, mephedrone, *Salvia divinorum*, spice drugs, nuovi composti, studenti.

INTRODUCTION

An increasing number of unregulated websites are dedicated to the dissemination of new psychoactive substances, which include plant-based compounds, synthetic derivatives of well-established drugs, as well as "designer medicines"[1-3]. For instance, during 2010, 41 new psychoactive substances were officially notified for the first time in the European Union[4]. These are not controlled by the United Nations Single Convention on Narcotic Drugs (1961) or the United Nations Convention on Psychotropic Substances (1971), but which may pose a health threat comparable to that posed by substances listed in the above conventions[5]. More specifically, these are: a) not approved for human consumption and might well have unknown effects and adverse reactions on users[6-9]; b) often sold as something else, like "mystical incenses"[6], "plant chemicals"[10] and "bath salts"[11]; c) unknown to health and other professionals[6,12]; d) not mentioned in the

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scientific literature; e) advertised as "legal' and 'safe' products and thus increasingly accepted as part of a lifestyle rather than being considered substances of misuse especially among adolescents[13]. In this respect, we aimed here to assess the use of these new psychoactive compounds among a sample of students in the UK.

METHODS

Between 9th November to 6th December 2010, 446 students in the UK aged between 13 and 30 completed an online survey, which explored their experience and perception of risks associated with novel psychoactive compounds. This was advertised on The Student Room's website[14], the major advertising platform for higher education in the UK. Responses were kept anonymous.

The survey questions were designed by The Student Room's staff, which has expertise in providing consultation and advice on subjects ranging from education to health related issues to young people aged 13-26 years. The Student Room is the world's largest student web community, with 30 million page views and 4.5 million unique users each month. This was considered a credible vehicle to use for opportunistic research that provided inexpensive, rapid and targeted access to a relatively large student sample in a short period of time.

Chi-square analysis was used to compare who had a lifetime use of these drugs with others by gender, awareness of controlled compounds, while means and ANOVA tests were also used to evaluate age in the sample. Data was processed with SPSS for Windows™ version 14.

The study was carried out in accordance with The Student Room's regulations and ethical code of practice. The study was carried out in accordance with The Student Room's regulations and ethical code of practice and reviewed by the ReDNet Ethics Advisory Board at University of Hertfordshire in accordance with the International Conference on Harmonisation (ICH)/WHO Good Clinical Practice standards and with the recommendation guiding physicians in biomedical research of the Declaration of Helsinki on human subjects testing and the Convention of the Council of Europe on Human Rights and Biomedicine, Oviedo (1997).

RESULTS

Demographic information

Half (49.6%) were male and 50.4% were female. The mean age of the sample was 18.75±3.2 years, with a range of 13 to 30, and a mode of 17 years (Table 1). No data about ethnicity and disability were collected. All the respondents were based in schools and universities across the UK.

Use of "legal highs": consumption, frequency, motivations, substances and combinations

Consumption

About one-third (31.4% of our sample) (Table 1) confirmed having used "legal highs" at least once in their life.

Table 1. Basic, demographic data and use of 'legal highs' among the 446 participants (n=446)

Gender	49.6% male, 50.4% female	
Age	Mean = 18.75±3.2	Range 13-30 yo; Mode=17 yo; Median=18 yo
Lifetime use of 'legal highs'	31.4% (n=140)	38.9% of male vs. 24% female (df=1, χ^2=11.51, p=.000)
		"Only used once" 35%, "Once a month" 13.3%, "Weekly" 9.2%, "More than once a week" 2.5%
		Age mean=19.21±3.0
		(vs. who not used legal highs, m= 18.54±3.2; df=1, F=4.22, p=.040)
Reasons for taking 'legal highs'	"Enjoyable effects" (55.7%), "Availability" (45.7%), "Have a good night with friends" (35%), "Affordability" (28.6%), "Because they are legal " (28.6%), "Safe to use" (11.4%), "Emulate friends" (11.4%).	
Most used 'legal highs' amongst students	Mephedrone (41.4%), *Salvia divinorum* (20%), 'Spice drugs' (10.7%), Methylone (1.4%), NRG (2.1%), BZP (2.1%), Don't know (15.70%), Missing answer (8.60%).	
Use of 'legal highs' with	Alcohol (60%) ; Other drugs (37.9%).	

Male respondents were significantly more likely to have taken these than female (38.9% compared to 24%). The mean age of those who consumed these substances was 19.21±3 years with a statistical significance (F=4.22 p=.040) towards those who did not used them (m=18.5±3.2), as shown in Table 1.

Frequency

One third (35%) of those who consumed these substances admitted to have "only used them once", 13.3% "once a month", 9.2% "weekly" and 2.5% "more than once a week" (Table 1).

Motivations

Those who tried 'legal highs' were most likely to do so because of their: "enjoyable effects" (55.7%), "easy availability" (45.7%), "enhanced sociability" (35%),"affordability" (28.6%), "legality" (28.6%), "safety" (11.4%) and finally in order to "emulate friends" (11.4%), as shown in Table 1.

Use of specific drugs

Among those who have tried "legal highs", the drugs which respondents were more likely to have taken were: mephedrone (41.4%), *Salvia divinorum* (20%), "spice drugs" (10.7%), methylone (1.4%), naphyrone (NRG) (2.1%) and benzylpiperazine (BZP) (2.1%), while 15.7% did not know what compound they had ingested (Table 1).

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Combination with other drugs

"Legal highs" were often mixed with alcohol (60%) and "other drugs" (37.9%), as shown in Table 1.

"Legal highs": knowledge, risk awareness and general attitudes

Knowledge

Four-fifths (81.8%) of the student sample had heard of a substance "referred to as a 'legal high'" (Table 2), while 352 students (78.9%) defined them as a "legal compound", underlining their legal status. One-tenth (9.4%) had no idea of what a 'legal high' was and 5.4% gave a completely incorrect definition of these types of substance ("cigarettes", "cigars", "weed", "medically prescribed marijuana", etc.).

Risk awareness

A high percentage (74.2%) did not consider 'legal highs' safer than illicit drugs; this group in our sample seemed to be significantly older (mean=18.95±3.3, F=4.69 p=.032) than those who answered the opposite to this item (mean=18.20±2.8). Half of the sample (50.8%) knew that some legal highs contain illegal or other components (Table 2).

General attitudes towards drugs use and regulation

Respondents were split in terms of their attitudes towards drugs (Table 2). While just more than half of those who had taken recreational drugs (52.9%) claimed that their legal status "made no difference" to their attitudes towards them, a smaller portion (25%) of respondents agreed that they are less likely to consume a substance when it is illegal, with 4.3% who, on the contrary, are more likely to take it. Only a few (3.6%) did not have an opinion ("Don't know").

Table 2. Awareness, knowledge and general attitudes towards "legal highs" (n=446)

Have you ever heard of 'legal highs'?	81.8% yes	
Definition of 'legal highs'	"A legal compound" (78.9%), "No idea" (9.4%), "Incorrect definition" (5.4%).	
Do you consider 'legal highs' safer than illicit drugs?	74.2% no (vs. 25.8% yes)	Age mean 18.95±3.3 (df=1, F=4.62, p=.032)
Did you know that some 'legal highs' contain illegal or controlled components?	50.8% yes (vs. 49.2% no)	
If a drug was made illegal, would you be less likely to take it?	*[within those who have taken "legal highs"]* "It makes no difference" (52.9%), "it makes me less likely to take it" (25%), "it makes me more likely to take it" (4.3%), "Don't know" (3.6%), Missing (14.3%).	

DISCUSSION

To the best of our knowledge, this study constitutes one of the first attempts aimed to assess the use and the awareness of new psychoactive compounds, conducted among students in the UK. The mean age of the group was 18.75 years with the most represented age being 17 years old. From a psychopathological point of view, this age is generally considered a high risk group for the onsets of several psychiatric disorders, which could be triggered by substances of abuse in predisposed subjects[10,15-19].

Because of the method of recruitment our sample had a good level of education and the gender split was very even (male 49.6%; female 50.4%).

Interestingly, 140 subjects (31.4% of the total sample, Figure 1) had tried a wide range of new psychoactive compounds with a higher prevalence amongst male students (38.9% vs. 24%) (Table 1). Such findings have also been supported by a previous survey carried out among young people in UK, where male respondents were significantly more likely than female users to have taken recreational drugs (72% compared with 56%).

Those who tried these products were also significantly older than students who did not use them, with a mean age of 19.21 years. The majority of respondents used these drugs only once (35%), while 13.3% used them once a month and 9.2% reported more regular (weekly) consumptions.

The study also evaluated the different reasons behind the use of these drugs (Figure 2). The respondent sample emphasised first of all the "enjoyable effects" (55.7%) and the "easy availability" (45.70%) of these substances, especially over the Internet (1,20). Intriguingly, few subjects chose "legal highs" because of their presumed safety (11.4%), and they considered the "low price" (28.6%) and their "legality" (28.6%) more appealing.

The drug which respondents were most likely to use was mephedrone (41.4%), as shown in Figure 3. These data confirmed the popularity of mephedrone[8,10,21] and other stimulants drugs in the UK, which has doubled over the period 2005-8[4].

Other drugs of preference were *Salvia divinorum* (20%), a well-known compound[22,23], which can induce derealisa-

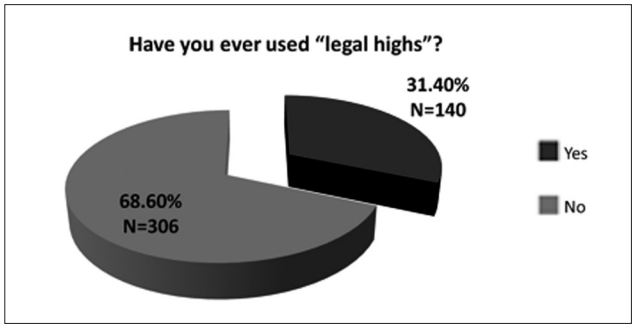

Figure 1. Lifetime use of 'legal highs'.

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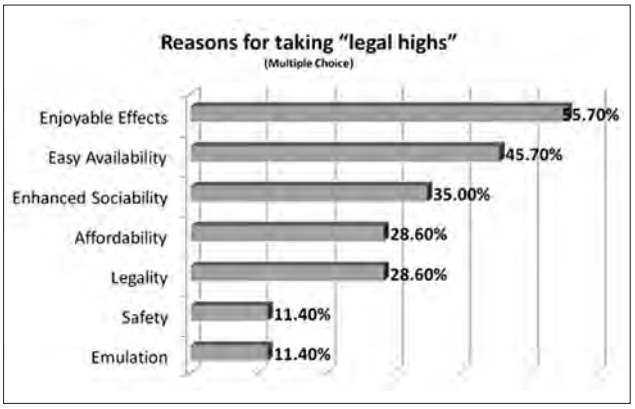

Figure 2. Reasons for taking 'legal highs'.

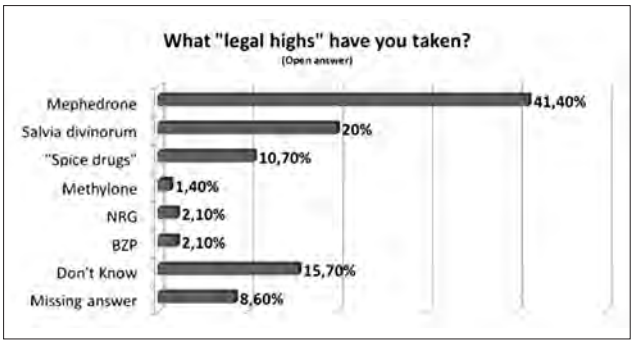

Figure 3. What 'legal highs' have you taken?

tion[24] and lead to a number of medical and psychopathological risks[19]; 'Spice drugs' (10.7%), a brand name for a 'herbal smoking blend', which was found to contain synthetic cannabinoids[9,25,26]; and other novel compounds such methylone, NRG, BZP, which have been briefly described in the scientific literature[27,28].

It is interesting to observe that 15.7% of respondents did not know what drug they had taken. It could be speculated that these products: a) were unknown to users because are often sold as "bath salts", "incenses", "fertilisers", or with nicknames (e.g. "meow meow", "spice", etc.) and this might generate confusion about their 'real' content[3,11,20]; b) were considered to be of a different/non recreational nature such as cognitive enhancers, sleeping pills, drugs to reduce body weight and/or enhance sexual performances, etc. which are also widely sold on the internet by illegal on-line pharmacies[10] and might be a fertile topic of study for future investigation.

The consumption of these novel compounds in the majority of the cases (60%) was combined with alcohol (60%) and "other drugs" (37.9%). In these cases, higher health risks might also be expected[10,29,30].

"Legal highs2 a misleading term?

Although a high number of the young respondents were aware of the existence of 'legal highs' (81.8%), the large majority (78.9%) (Figure 4) defined them in an open answer as "legal compounds" (e.g. "legal drugs", "not illegal drugs", "legal substances", "legal recreational drugs") although these might not always be case. This clearly shows how the "legal highs" term, largely used by the media, can be easily misconceived and understood as something completely legal, especially by young people[31]. In addition, the term is hard to translate into different languages such as German, Polish and Italian[12], mainly because of its 'positive' connotation. Terms such as "designer drugs", initially coined by Gary Henderson at the University of California in the mid 1980s[32] , "designer medicines"[33] for what are simply new psychoactive compounds might be more appropriate for educational use.

In addition (Figure 5), half of respondents (52.9%) reported that "it made no difference" to their choice whether the product was legal or not. They would have taken it anyway.

Risk awareness

According to the large and older (mean=18.95±3.3 years;) majority of the sample (74.2%), legal highs' were not considered safer than other common illicit drugs. This could indicate a good level of awareness of the risks associated with their consumption. It is worth mentioning here that in the

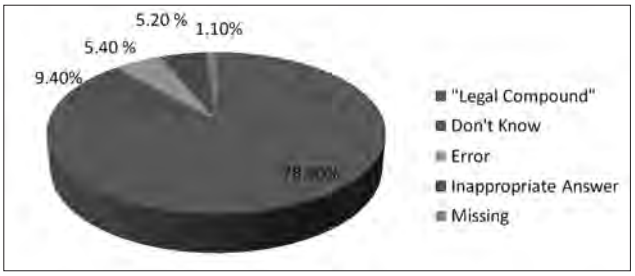

Figure 4. What do you think a 'legal high' is?

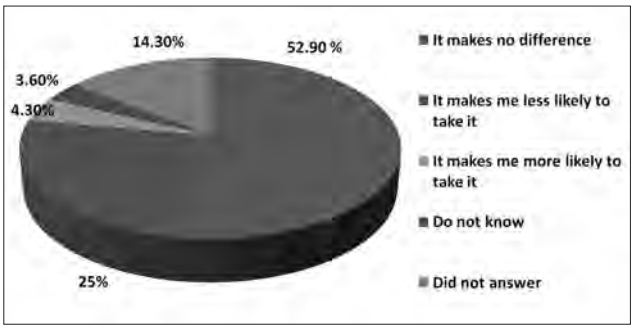

Figure 5. If a drug was made illegal would you be less likely to take it?

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UK extensive media attention is given to various fatalities in the country[34-36]. However, even if these data seem to be encouraging, only half of the sample knew about the presence of contaminants in these substances (50.8%).

LIMITATIONS

Results described in this study were elicited from a self-selected, non randomized, limited online sample and findings identified may not allow their generalizability. However, present approach may have increased a better understanding of the abuse of novel psychoactive compounds among students population the UK. All subjects recruited for this survey were visitors The Student Room's website. This was considered a credible vehicle for the study, which allowed a rapid, targeted and inexpensive collection of data. Further biases may have arisen in relation to the lack of detailed, closed-ended questions on the nature of the abuse, which might have caused inappropriate answers and unwanted errors. On the other hand, open-ended questions encourage the respondents to come up with their own answers and thus could be considered better suited for this novel field of investigation. Finally, more research work should be carried out in larger sample of students, and results could be systematically compared with those emerging from similar studies on novel psychoactive compounds in recreational settings ("club scene").

CONCLUSIONS

In summary, this study highlights the need to provide more reliable information on novel psychoactive compounds to students and young people in general. The modalities are also equally important[12,37,38]. For instance, the involvement of young people in the design of the prevention messages as well as the use of interactive technologies such as social networking for their dissemination might be considered with success[32]. The popular myth of 'legal highs' as enjoyable, safe and legal 'heavens', needs to demythised very urgently with scientifically-based information and synergetic/synchronised international action.

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