

Prevalence study of head shop drug usage in mental health services

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Aims and method To examine the prevalence of head shop drug usage in individuals attending a range of adult mental health services. We examined the effect of head shop drug usage on the mental state of individuals with a range of mental health disorders. Clinical data were obtained from 608 consecutively reviewed individuals attending adult mental health services in relation to their use of head shop and psychoactive drugs and the putative effects of head shop drugs on their mental state.

Results The prevalence of head shop drug use was 13% ($n = 78$), with a higher prevalence of usage noted in individuals younger than 35 years of age (25%). A large proportion of individuals ($n = 41$, 54%) reported adverse effects of these agents on their mental state, with psychotic symptoms being the most prevalent.

Clinical implications Head shop drug usage was associated with a reported deleterious effect on mental state, which was particularly evident for individuals with a history of psychosis.

Declaration of interest None.

The first 'head shops' opened in Ireland in 2000.¹ Head shops were retail outlets that sold legal recreational drugs, herbal mixtures and/or paraphernalia used for the growth and consumption of certain plants with psychoactive effects (changes to legislation in 2010 has resulted in their closure).¹ There was a significant proliferation in the use of head shop drugs in Ireland between 2008 and 2010 (the time of this study).

A number of case reports of head shop drug (product) ingestion have demonstrated an association with psychiatric symptoms. These include the acute onset of (and rapid recovery from) psychotic symptoms following the use of a 3,4-methylenedioxy-*N*-methylcathinone (methylone)² and the psychostimulant 'Whack',³ and the development of delirium secondary to benzylpiperazine use.⁴ Furthermore, of emergency department presentations secondary to 4-methylcathinone (mephedrone) usage, high rates of psychosis (40%) and severe agitation have been demonstrated.⁵ Case studies have also highlighted physical complications secondary to the ingestion of head shop drugs, with mephedrone associated with both sympathomimetic features⁶ and myocardial damage,⁷ and two amphetamine-like products (methylenedioxypropylvalerone (MPDV) and butylone) associated with acute liver failure.⁸ Four deaths in the UK have been related to mephedrone intoxication.⁹

There is a dearth of information on the prevalence of head shop drug usage in Ireland. The EuroBarometer survey conducted in May 2011 suggested that among 15- to 24-year-olds in Ireland, the prior use of 'legal highs' was more than three times the European Union average.¹⁰ Most other

research examining the use of head shop products in Ireland have ascertained usage in individuals with a history of substance misuse or dependence, thereby making the results invalid when examining the population as a whole.¹⁰ These studies demonstrated high rates of psychostimulant (71%) (details available from the author on request), and in particular mephedrone (14%) usage in these populations.¹¹ In the UK, the British Crime Survey demonstrated rates of mephedrone usage of 1.4% in adults aged 16–59, which were comparable to that of ecstasy use.¹²

To our knowledge, the prevalence of the use of head shop drugs is unknown in individuals attending mental health services. As a result of their putative adverse effects on individuals' mental health, we undertook a prevalence study to evaluate the use of head shop drugs in individuals attending both the West Galway and South Roscommon adult mental health services. Furthermore, we wanted to ascertain what effects head shop drugs had on individuals' mental health and whether the use of these drugs was associated with an alteration in the use of other psychoactive substances.

Method

Participants

Participants included 608 consecutively reviewed individuals over a 4-week period (May 2010) in two out-patient clinic settings (Roscommon and Galway city), two day hospitals (Roscommon and Galway city) and two in-patient psychiatric units (Roscommon County Hospital and University College

Hospital, Galway) from the adult mental health services of South Roscommon and West Galway. These general adult psychiatric services provide acute in-patient psychiatric care and continuing psychiatric care in the community. No specialist input such as substance misuse or first-episode psychosis services were available in any of the described settings during the course of this study.

We designed a novel questionnaire (see online supplement) to gather the demographic and clinical data pertaining to the study. Each individual's primary diagnosis was ascertained following a review of the clinical notes and was based on a diagnosis that had been made using ICD-10¹³ diagnostic criteria by their treating consultant psychiatrist. We did not consider comorbid diagnoses and used the primary psychiatric diagnosis alone for the purposes of this study.

No individuals refused to participate in this study. In addition, demographic data including age, gender and address (rural or urban) were collected from each individual, however we did not examine other demographic variables. For each individual, we ascertained their use of head shop and illicit (psychoactive) drugs, including the types of agents, the frequency of their use and the self-reported effect of these drugs on their mental state over the previous 6 months. Each individual was also asked whether specific adverse effects had occurred secondary to head shop drug use. Where uncertainty was present in relation to the effect of head shop drugs on participants' mental state, additional data were attained from clinical notes, in order to ascertain whether there was documented deterioration in an individual's mental state concomitant with head shop drug use.

Individuals who reported the utilisation of head shop drugs were compared with individuals who denied such use over the previous 12-month period. All individuals who admitted to using head shop drugs over the previous 12 months were queried about any discernible alteration in their use of illicit drugs over the same time period. Informed consent was attained from each individual, and ethical approval was attained from both the Galway University hospitals and Roscommon County Hospital ethical committees.

Statistical analysis

Statistical analysis was performed using SPSS 15.0 for Windows. We utilised the student *t*-test for parametric data and the chi-squared (χ^2) test and Fisher's exact test for non-parametric data where appropriate.

Results

Demographic and diagnostic data are detailed in Table 1. There were approximately equal numbers of males and females in this study and both genders were of similar age (the median age of females was 44 years and the median age of males was 42 years). Most individuals were recruited at out-patient clinics ($n=430$) and approximately equal numbers of individuals were recruited from both West Galway and South Roscommon mental health services. More individuals were from a rural (56.3%) than an urban background ($P=0.001$). Eleven individuals had no psychiatric disorder and a further 75 individuals had no discernible

mental illness other than a substance or alcohol misuse or dependence disorder. Diagnoses of psychosis (22.2%), mood disorder (41.9%) and substance misuse (12.4%) were most frequently noted.

Approximately 13% of individuals studied had utilised head shop drugs, with the most common frequency of usage being weekly. Cannabinoid-like (74%) and stimulant-type (58%) agents were the most commonly used head shop

Table 1 Demographic and clinical data

Variable	Total <i>n</i>	<i>n</i> (%)
Gender	608	
Male		286 (47.0)
Female		322 (53.0)
Principal diagnosis	608	
Intellectual disability/organic disorder		12 (2.0)
Substance misuse/dependence		75 (12.4)
Psychotic disorder		135 (22.2)
Mood disorder		255 (41.9)
Neurotic disorder		77 (12.6)
Other behavioural disorder ^a		13 (2.1)
Personality disorder		30 (4.9)
No psychiatric disorder		11 (1.8)
Location of interview	608	
Out-patient clinic		430 (70.7)
Day hospital		59 (9.7)
In-patient psychiatry unit		119 (19.6)
Site	608	
Roscommon		326 (53.6)
West Galway		282 (46.4)
Patient location	608	
Urban		266 (43.8)
Rural		342 (56.3)
Head shop drug usage	78	
Yes		78 (12.8)
No		530 (87.2)
Head shop drugs usage by age group	78	
≤ 35 years		54 (24.8)
> 35 years		24 (6.2)
Frequency of head shop drug usage	78	
Daily		14 (17.9)
Weekly		36 (46.2)
Monthly		12 (15.4)
Less than monthly		16 (20.5)
Type of head shop drug ingested	78	
Cannabinoid		58 (74.4)
Stimulant		45 (57.7)
Hallucinogen		4 (5.1)
Opiate		1 (1.3)
Psychoactive (illicit) substance misuse	608	
Yes		75 (12.3)
No		537 (87.7)
Frequency of illicit substance usage	75	
Daily		31 (41.3)
Weekly		20 (26.7)
Monthly		15 (20.0)
Less than monthly		9 (12.0)
Type of illicit substance ingested	75	
Cannabinoid		63 (84)
Cocaine		15 (20)
Ecstasy		17 (23)
Opiate		3 (4)
Amphetamine		6 (8)

a. Includes eating disorders and autism spectrum disorders.

drugs. In Table 2, we present the associations of demographic and clinical data with head shop drug usage. A significantly greater proportion of males (20%) compared with females (6%) attending the mental health services were utilising head shop drugs ($P < 0.001$). In-patients had a greater likelihood than day hospital or out-patients of having utilised head shop products ($P < 0.001$). The average age of individuals using head shop drugs was 32 years (s.d. = 15) compared with 45 years (s.d. = 15) for individuals not using these products ($P < 0.001$). A significantly greater number of individuals ≤ 35 years of age used head shop drugs (24.8%) compared with those > 35 years of age (6.2%) ($\chi^2 = 43.34$, d.f. = 1, $P < 0.001$). Individuals from an urban setting ($P < 0.001$) and from West Galway (independent of an urban or rural setting) had a greater likelihood of ingesting head shop drugs ($P < 0.001$). The use of head shop products was not associated with a change in usage of other illicit substances.

Head shop products had a self-reported deleterious effect on individuals' mental health in 41 (54%) individuals, with head shop-related symptoms of psychosis and depression particularly common (Table 3). Individuals with psychotic disorders had particularly high rates of head shop drug usage (17% (with the rate in in-patients being 20%)). The most common sequelae for individuals with a psychosis was the exacerbation or development of psychotic symptoms (65%); all in-patients with psychosis,

who had ingested head shop drugs, reported a deleterious effect, with a worsening of psychosis (67%) the most common finding.

Discussion

Main findings

In this study, 13% of all individuals and 25% of individuals ≤ 35 years of age attending the adult mental health services in West Galway and South Roscommon admitted to utilising head shop products, with cannabinoid-like and stimulant-like agents most frequently ingested. Psychoactive substances that were identified in our study population included synthetic cannabinoids (those contained in 'Spice' and 'Smoke XXX' among others), benzylpiperazine and piperazine derivatives, mephedrone, methylone, methedrone, methcathinone and fluorotropacocaine. The use of these drugs was associated with a deleterious effect on mental state in over half of the individual's studied. Psychotic symptoms in individuals with a previous diagnosis of a psychotic disorder were particularly evident secondary to ingestion of head shop drugs, although many other adverse effects across a broad range of psychiatric disorders were also found.

The use of head shop drugs was found to be higher than the use of other psychoactive substances during the period of this study. As there are limited prevalence figures

Table 2 Associations with head shop drug usage

	Total <i>n</i>	Head shop usage, <i>n</i> (%)	χ^2	d.f.	<i>P</i>	<i>P</i> ^a
Gender			24.350	1	<0.001	<0.001
Male	286	57 (19.9)				
Female	322	21 (6.5)				
Location of review			17.765	2	<0.001	<0.001
Out-patient clinic	430	44 (10.2)				
Day hospital	59	5 (8.5)				
In-patient unit	119	29 (24.4)				
Site			18.785	1	<0.001	<0.001
Roscommon	326	24 (7.4)				
West Galway	282	54 (19.1)				
Patient setting			19.095	1	<0.001	<0.001
Urban	266	52 (19.5)				
Rural	342	26 (7.6)				
Principal diagnosis			91.717	7	<0.001	<0.001
Organic/intellectual disability	12	0 (0.0)				
Substance misuse/dependence	75	33 (44.0)				
Psychotic disorder	135	23 (17.0)				
Mood disorder	255	12 (4.7)				
Neurotic disorder	77	3 (3.9)				
Behavioural disorder ^b	13	2 (15.4)				
Personality disorder	30	5 (16.7)				
No psychiatric disorder	11	0 (0.0)				
Illicit drug use	78		287.366	1	<0.001	<0.001
Yes		54 (69.2)				
No		24 (30.8)				
Effect on illicit drug usage	78		0.278	2	0.870	1.000
Increased use		7 (9.0)				
Decreased use		10 (13.0)				
No change		61 (78.0)				

a. Fisher's exact test.

b. Includes individuals with an autism spectrum disorder and eating disorders.

Table 3 Head shop drug sequelae in different clinical groups

	Total <i>n</i>	Symptom secondary to head shop drug usage, <i>n</i> (%)					
		Depression	Mania	Suicidal ideation	Psychosis	Anxiety	Other ^a
Substance misuse/dependence	33	7 (21.2)	0 (0.0)	4 (12.1)	10 (30.3)	12 (36.4)	2 (6.1)
Psychotic disorder	23	1 (4.3)	3 (13.0)	0 (0.0)	15 (65.2)	2 (8.7)	0 (0.0)
Mood disorder	12	3 (25.0)	1 (8.3)	0 (0.0)	1 (8.3)	2 (16.7)	0 (0.0)
Neurotic disorder	3	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Other behavioural disorder ^b	2	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)
Personality disorder	5	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
All individuals	78	12 (15.4)	5 (6.4)	4 (5.1)	27 (34.6)	16 (20.5)	2 (2.6)

a. Includes violent ideation.

b. Includes eating disorders and autism spectrum disorders.

reported to date for the general population, we cannot state that the rates of head shop drug usage in our population is higher or lower than rates for the general population, although our rates in young adults are higher than those found in the EuroBarometer study.¹⁰ We found particularly high rates of head shop drugs usage among individuals with psychotic disorders, and perhaps this is comparable with the reported increased rate of other psychoactive drugs, especially cannabis, in this population.¹⁴

Of interest, the use of head shop drugs was not associated with an alteration (increase or reduction) in the use of illegal drugs in the majority of individuals. It therefore appears that head shops drugs were used as additional agents to other illicit drugs and were not, for the majority of participants, associated with a different pattern of drug usage, i.e. head shop drug use rather than illicit drug (cannabis) use. Indeed, a significant percentage of individuals who used head shop drugs did not admit to the use of other illicit drugs, suggesting that the availability of head shop drugs attracted a group of otherwise drug-naïve individuals to utilise these agents. It is possible that as these agents were legal and easy to attain, individuals were attracted to the utilisation of these agents who otherwise did not, or would not, ingest other illicit psychoactive substances. An alternative suggestion is that those individuals were using head shop drugs and in doing so were avoiding more harmful illicit drug use.

A sociocultural factor of interest is the possible effects of the views of local community leaders or elected representatives in relation to substance misuse; this area merits further study

Changes in legislation

Given the reported deleterious effect on mental state noted from head shop drug ingestion in this study and the usage of these agents by individuals who did not ingest other psychoactive agents, the criminalisation of the sale of these drugs will hopefully be associated with a reduction in psychiatric symptoms in some individuals. In May 2010, the Irish government made an Order under the Misuse of Drugs Acts 1977 and 1984, controlling a broad range of psychoactive substances including benzylpiperazine derivatives, synthetic cannabinoids and a number of named cathinones. This was followed by the Criminal Justice

(Psychoactive Substances) Act 2010 (No.22 of 2010) that came into operation on 23 August 2010. The intention of this Act was to prevent the misuse of dangerous or otherwise harmful psychoactive substances by making it an offence to sell, import, export or advertise such psychoactive substances.¹⁵ This has led to the closure of head shops in Ireland and a cessation of the legal sale of these psychoactive substances. However, it is possible that head shop drugs are still being attained by a subset of individuals from drug dealers or other sources. Also, it is possible that individuals are attaining alternative 'legal highs' particularly from online suppliers. Similar legislation in Europe has led to the increased purchasing of these or other 'head shop' drugs on the internet¹⁶ and it could be anticipated that a similar pattern will develop in Ireland. Therefore, although the closure of head shops in Ireland is intuitively associated with a reduction in the use of head shop drugs, further studies are required to establish whether there is an actual alteration in their use, and in the use of other illicit psychoactive substances. The use of head shop products in otherwise drug-naïve individuals may also potentially have introduced a gateway to the use of illegal drugs.

Limitations

A significant limitation of this study is our lack of data relating to psychosocial factors such as alcohol usage (other than dependence/misuse that we report under substance misuse or dependence), employment and socioeconomic status that could potentially confound some of the findings. As this is a self-report study, it is possible that the rate of both head shop drug and illicit substance usage is under-reported. Due to the absence of toxicology screening for these drugs, we had to rely on self-reporting. In this study, we relied in part on a subjective reporting of deleterious effects on individuals' mental state associated with head shop drug use. We were unable to accurately differentiate any such deleterious effect on mental state from adverse effects as a result of active mental illness or other illicit drug use. This, consequently, has an impact on the study's ability to make inferences about the effect of head shop drug use on individuals' mental state. A sampling bias has been introduced into this prevalence study by our recruitment policy of taking all presentations (rather than new cases),

thereby introducing a bias in the sample towards those with more chronic enduring mental illnesses and more active serious illnesses who were more likely to access services during this particular study time period. Furthermore, we do not have accurate information in relation to the quantity of head shop drug ingestion (many individuals were unclear on this and therefore we could not reliably collect this information), although there are data on the frequency of head shop drug use. The lack of a longitudinal assessment limits our ability to establish causation of dysfunctional mental states with the use of head shop drugs.

In conclusion, we report a high rate of head shop drug usage, particularly in young adults attending mental health services in both rural and urban regions. The use of these drugs was associated with significant reported deleterious psychiatric effects and in particular the production of psychotic symptoms in individuals with psychotic disorders.

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