Addiction (2001) 96, 1139–1148

RESEARCH REPORT

Ecstasy pill testing: harm minimization gone too far?

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Abstract

Harm reduction has become the focus of public health initiatives and therapeutic intervention in the management of dependent drug use over the last 20 years. The last decade has seen such approaches being extended to recreational drug use. Most harm reduction initiatives have aimed to inform users about risks and ways of minimizing risk. The concept of providing illicit drug users with quality assessment of their chosen drug is one possible harm reduction intervention that until recently has received little attention. In response to well-publicized 'ecstasy'-related deaths organizations in some European countries and the United States have chosen to provide a 'pill testing service' for users. There are two broad categories of pill testing offered. Simple colour reagent test kits (Marquis Reagent and colour charts) form the most widely used on-site pill testing method. Less frequently, but more accurately, laboratory personnel with access to sophisticated chromatographic equipment (high performance liquid chromatography (HPLC) or gas chromatography–mass spectrometry (GC-MS)) may provide analysis of a pill. Pill testing kits have been advocated as a 'tool to protect yourself against the polluted XTC market'. We refute this line of reasoning. Of the different tests only techniques such as GC-MS can identify satisfactorily the psychoactive constituents present in ecstasy pills. Colour tests based on an interpretation of a colour response in the presence of a drug are, at best, subjective. Pill testing of any description does not guarantee safety, or protect the consumer against individual responses to pills. At best it gives an artificial 'shine of safety' to a group of diverse drugs that remain both illicit and potentially harmful. Other simpler harm reduction mechanisms are likely to be more effective.

Introduction

Harm reduction has become the focus of public health initiatives and therapeutic interventions in the Addiction field over the last 20 years. With its roots in humanitarianism, harm reduction found its niche in the wake of HIV and its strong association with intravenous drug use. Despite attempts at prohibition, the legal penalties and the psychobiological consequences of illicit drug use, many drug consumers are unable to attain prolonged abstinence. Pragmatists who recognized that demand reduction alone was unable to solve the problem of illicit drug use adopted harm reduction as a complementary approach (Ghodse, 1999). Indeed the guiding principle of harm reduction, and one that has been taken up

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Submitted 22nd May 2000; initial review completed 27th July 2000; final version accepted 29th March 2001.

ISSN 0965–2140 print/ISSN 1360–0443 online/01/081139–10 © Society for the Study of Addiction to Alcohol and Other Drugs

Carfax Publishing, Taylor & Francis Limited
DOI: 10.1080/09652140120060734

by the United Nations, is the 'prevention of the use of drugs and reducing the adverse consequences of drug abuse' (United Nations General Assembly, 1998).

Clearly, when the consequences of illicit drug use carries significant risk of mortality and morbidity for the user as well being a significant public health issue such an approach is laudable. The primary focus for harm reduction interventions has, to date, been one of encouraging behavioural change. The introduction of needle exchange schemes (Lart & Stimpson, 1990) in 1987 in Great Britain, for instance, has significantly reduced the prevalence of HIV among i.v. drug users (Stimson, 1995). Despite fluctuations in the purity of illicit opiates and the significant mortality in opiate users due to overdose (Caplehorn, 1998), no country has sought as yet to provide a purity testing service for its illicit heroin users (or users of other illicit drugs). However, heroin and other drugs distributed as powders are clearly much more susceptible to adulteration than the illicit substances associated with the dance club scene (ecstasy) which are predominantly distributed as tablets. This paper will contest that there is limited utility for the drug testing of 'ecstasy' and that the greatest benefits in terms of harm reduction are to be achieved from encouraging behavioural change, not by variable and inconsistent attempts at quality control.

The last decade has seen a rapid rise in the popularity of the methoxy substituted amphetamines such as 3,4-methylenedioxymethamphetamine (ecstasy, MDMA) and its analogues, the so-called empathogens (enactogens) (Nichols, 1986). Unlike many other commonly abused psychoactive substances, these drugs are typically sold as 'pills' (tablets, capsules), usually marked with a graphical logo—a brand mark that aims to give a suggestion (by 'reputation') of the pill's content. Ecstasy has been the 'catch-all' term for this group of drugs, although studies in Great Britain (Wolff *et al.*, 1996; Winstock & King, 1996) and Europe (Korf, Bullington & Riper, 1999) show that ecstasy pills do not always contain MDMA and for the individual consumer the effect (and by inference the content) can only be assessed after intake.

It could be argued that such uncertainty about purity and content applies equally to other illicit psychoactive drugs of abuse supplied as powders, such as heroin and cocaine. However, anecdotally, experienced users of these substances report being able to identify the presence of their preferred drug by taste, smell or physiological effect (e.g. local anaesthesia with cocaine hydrochloride). Using these means to assess the quality of an illicit pill purchase is clearly of limited value. Drugs supplied as pills cannot easily be adulterated after manufacture (prior to distribution to the user), as is the case with amphetamine powder, heroin and cocaine. Consequently, tablets are likely to contain the same amount of active ingredient, excipents and impurities when consumed as they did when they left the tableting machine. This is not true for hard gelatine cap and body capsules, which may be opened and reclosed.

MDMA has been associated with perhaps 60–100 deaths in Great Britain over the last decade (Milroy, Clark & Forrest, 1996, Henry, 1992) and several other adverse psychiatric (Winstock, 1991; McGuire, Cope & Fahy, 1994) and physical consequences (Willimas *et al.*, 1998). In response to the adverse medical complications that have been reported in association with MDMA use some European countries such as the Netherlands, Austria, France, Switzerland and local groups in the Great Britain such as the charity 'Release' and the Green Party provide a pill-testing service or 'do-it-yourself' testing kits to users.

Factors that contribute to the wide variation in pill content and the associated difficulties inherent in pill testing will be examined. We will also discuss the potential consequences for the user who inadvertently consumes an 'ecstasy tablet' that contains other compounds believing it to be MDMA before concluding with a consideration of the benefits and disadvantages of pill testing for both society and the individual consumer.

Why pill testing came about

Since illicit drug manufacture has no quality of control, it is odd that consumer rights and national concerns were sufficiently moved to the extent that pill testing was even contemplated. No vocal parties have called for testing for purity of heroin or cocaine on behalf of the consumer. Although it is true that some recreational psychoactive drugs such as alcohol and cigarettes do come with some guarantee of quality and purity, as a rule purchasers of illicit drugs do not share

the same consumer rights as purchasers of legal drugs.

However, the majority of ecstasy users were not socially marginalized, occupied all strata of society, had parents who were concerned at reports of sudden death, brain damage and pill contamination, and who benefited from sharing a vocal and articulate youth culture (Kort & Cramer, 1999). Information indicating wide variability in pill composition and a number of widely publicized deaths across Europe but particularly in Great Britain led to widespread popular media coverage alleging contaminated pills. In keeping with the Dutch policy of harm reduction, pill testing first came about formally in 1992 as part of the Drug Information Monitoring System (DIMS) project, an initiative supported by the Dutch Ministry of Public Health (DIMS, 1998). Its aim was to serve public health by minimizing the adverse consequences of the use of drugs at an individual and societal level. Its foundations lay in information exchange between users and monitoring authorities.

Pill composition

Manufacturing process

Unlike cocaine and heroin derived from natural sources, phenethylamines are produced from a wide range of precursor chemicals via numerous synthetic pathways (Shulgin & Shulgin, 1991). Since bulky raw plant materials are not required, the production of these drugs may be located near to the site of distribution or where they are least likely to be detected. It is also possible for the supply of precursor chemicals, the synthesis (of the active ingredients) and the production of the tablets to be conducted separately.

For MDMA and MDA (3,4-methylenedioxyamphetamine) the simplest method of manufacture is through 3,4-methylenedioxyphenyl-2-propanone (PMK) a commercially available ketone. Other common precursors include saffrol, isosaffrol and piperonal. The more clandestine routes tend to involve safrole (often from sassafras oil), which is used to prepare PMK. Different starting materials and reaction schemes will result in different reaction by-products, which may contaminate or alter the final product if it is not adequately purified. It is therefore likely that the manufacturing process is a determinant of the final pill composition.

The previous compounds are specifically targeted by International Narcotic Agencies such as Europol and the Unit for Synthetic Drugs based in the Netherlands as a means of curtailing production. However, the recreational use of methoxy substituted amphetamines is a worldwide issue (WHO, 1997), with the United Nations reaffirming the urgency of combating amphetamine-type stimulants in a special assembly in 1998 (United Nations General Assembly, 1998). In the United Kingdom precursor chemicals are regulated under article 12 of the United Nations convention 1988, Section 13 Criminal Justice (International Cooperation) Act 1990 and Modification Order 1992.m.

Just what the impact of restricting precursor availability has been upon the illicit manufacture of drugs such as MDMA is difficult to assess. Restriction, in theory, may have led to the production of other substituted compounds such as MDEA (methylenedioxyethyl amphetamine, eve), MBDB (N-methyl-1-(3,4-methylenedioxyphenyl)-2-butanamine) (Korf, Bullington & Riper, 1999) and 4-MTA (4-methylthio amphetamine, flatliners) (Huang, Marona-Lewicka & Nichols, 1992).

The proliferation of novel compounds of unknown toxicity is not without dangers, as was observed with the outbreak of a parkinsonian-like syndrome following the accidental production of MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) in the early 1980s by a chemist attempting to synthesize the opioid pethidine (Langston *et al.*, 1983). This happened again, when 3-methylfentanyl or 'China white', a very potent opioid agonist, and other fentanyl analogues were introduced onto the illegal market in the United States between 1991–1992 (Smialek *et al.*, 1993).

Stereochemistry

Most of the amphetamine family are racemic compounds and exist as a mixture of the levorotatory (l, (+)-S enantiomer) and the dextrorotatory (d, (−)-R enantiomer) isomeric forms. This is true of the methoxy-substituted amphetamines (Quinn, Wodak & Day, 1997). The synthetic routes for the manufacture of these compounds usually produce a racemic mixture in fairly high yields but the ratios of the isomers differ depend-

ing on the precise synthetic process (Nichols & Oberlender, 1989). The difference in potency of the two isomers may vary 3–10-fold (Nichols & Glennon, 1984). Individual responses to 'ecstasy' pills may therefore be related to different isomeric ratios of the active ingredient.

Importantly, the different isomers can have vastly different psychoactive effects (either hallucinogenic, stimulant or empathatic). As a general rule of thumb the S-isomer is the more active of the empathogens (MDMA), and the R- for the phenlalkylamine hallucinogens (i.e. DOM, 1-[2,5-dimethoxy-4-methylphenyl]-2-amino propane) (Shulgin & Shulgin, 1991). MDA, the primary metabolite of MDMA, is the only phenalalkylamine to demonstrate both DOM-like and amphetamine-like effects (Glennon, 1991). There is some evidence that those who produce illegal compounds take stereochemistry into account. Certainly the manufacture of methamphetamine by reduction of ephedrine (producing a relatively pure product of the more active S-isomer) rather than synthesis via phenylacetone (that produces a racemic mixture high in contaminants) is evidence of this (Quinn, Wodak & Day, 1997). However, stereochemical information is not made available to consumers.

Although the composition of tablets vary, in most cases the constituents are either analogues of MDMA, combinations of stimulant drugs (ephedrine, amphetamine) or hallucinogens such as LSD or the dissociative anaesthetic ketamine (Bowdle, Radant & Cowley, 1998), that would hope to mimic the sought-after effects of MDMA (Shulgin & Shulgin, 1991). In recent times some batches of pills marketed as MDMA have been found to contain other substituted compounds. These include the hallucinogen DOM or its 4-bromo analogue DOB (2,5-dimethyl oxy-4-bromoamphetamine) or 2C-B (4-bromo-2, 5-dimethoxyphenethyl amine), which produce effects that are pharmacodynamically distinct from MDMA and may cause unexpected hallucinations (Kort & Cramer, 1999). DOB is reported to have a duration of action of 18–30 hours at a dose of 12–24 mg (Shulgin & Shulgin, 1991).

Other more unusual compounds detected in pills have included atropine (Korf, Bullington & Riper, 1999), with the potential for serious adverse effects. There has also been a report in the Netherlands of a single tablet containing a dangerous amount (8 mg) of strychnine. On the West Coast of America (San Francisco area), there have been reports of deaths thought to be related to batches of pills containing dextromethorphan, a common constituent of cold remedies (TICTAC, 2000), while in Australia there have been reports of 'ecstasy' pills found to contain paramethoxymethamphetamine or PMA (White, Bochner & Irvine, 1997; Byard *et al.*, 1999a, 1999b). Additionally gammahydroxybutyrate (GHB) is sometimes marketed as 'liquid ecstasy' and has also been found in pills (Galloway *et al.*, 1997).

After pill consumption there is an expectation of effect in terms of speed of onset and psychoactive characteristics. Therefore, unexpected consequences may lead users to alter their subsequent drug consumption pattern to modify or enhance the effect of the initial pill. Often this will involve the additional use of other stimulants such as amphetamine or cocaine (Pennings, Konijn & de Wolff, 1998). The concurrent use of multiple stimulant drugs increases the risk of dose-dependent problems such as sympathetic overdrive, possibly with dehydration, hyperthermia (Schmidt, Black & Taylor, 1991; Dar & McBrien, 1996) and the risk of over-heating and acute cardiovascular and cerebrovascular events. A rise in extracellular dopamine levels seen following cocaine use may pose a double threat of physiological and neurochemical complications (Stone *et al.*, 1988).

Alternatively, a tablet that has a delayed onset of action may lead users to take additional pills in the belief they have consumed a 'weak' or 'fake' pill. This has probably been the case with 4-MTA, a monoamine oxidase inhibitor and potent releaser of 5HT, which has a delayed onset of effect and has been associated with serious physical complications (EMCDDA, 1999) and associated with at least four deaths in the United Kingdom (London Toxicology Group Website).

The process of pill testing

There are several different ways that pill testing has been applied and the quality of information available from the different methods varies widely depending upon the sophistication of the analytical technique used (Table 1). As for most analytical procedures there is a trade-off between speed, cost, proximity of the test to the test-site and the reliability of the information delivered.

Table 1. *Pill testing methods compared*

Compound	On-site DIY colour test	Commercial colour test + chart comparison	On site HPLC	GC-MS
MDMA	+	+ +	+ + +	+ + +
2C-B	−	−	+ +	+ + +
4 MTA, atropine	−	−	+ + +	+ + +
DOB	+	+	+ +	+ + +
Other potential contaminants	−	−	+ +	+ + +
Accuracy for users	−/+	+	+ + +	+ + +
Dosage information	−	−	+ +	+ + +
Immediate results	+ + +	+ + +	+ + +	−
Risk of abuse by dealers	+ + +	+ + +	+ +	−
Monitoring of drug trends	−	−	+ +	+ + +
Allows early warning	−	−	+ +	+ + +

Key: − ineffective; + poor; + + some benefit: + + + effective.

Broadly speaking there are four methods available for pill testing.

The on-site do-it-yourself pill test kit (purchased at the venue or via the internet) is based on a colour reaction, which occurs when a reagent made from formaldehyde, and sulphuric acid (1:9, Marquis test), a very unpleasant, potentially carcinogenic and highly corrosive mixture is applied to a drug substance. The Marquis test produces a wide range of colours which change over time, representing the whole of the visible spectrum (Table 2). It is not possible to describe the colours with any degree of certainty since any description is open to the vagaries of subjective assessment (Stevens, 1986). Hence colour tests are non-specific and although both MDMA and MDA give a violet-purple→ blue/black colour, so do a large number of other substances (Table 2). Basing consumption upon highly subjective measures such as shade of colour may lead the consumer to find themselves under the influence of any one of a large number of psychoactively distinct drugs.

Such simple colour reagents form the basis of commercially available tests such as the EZ test, which purports to 'distinguish fakes from XTC like substances' and 'can be your tool to protect yourself against the polluted XTC market'. The kits are widely available in the Netherlands and retail for about £2.50. Similar kits are available in the United Kingdom by mail order (£15) and via the internet at a typical cost of $25. When more than one drug is present (as with illicit pills) the colour obtained in the test may be a combination of colours. Many substances also give colours with sulphuric acid alone. Since this is the predominant ingredient in the Marquis test many laboratories repeat the test using sulphuric acid alone in order to ascertain that the colour seen is due to the reagent. Clubbers do not have this opportunity to validate their test.

It is probably the case that at some level colour tests do give a limited ability to differentiate between the different substituted amphetamines (although the common sedative antihistamine diphenhydramine gives the same colour as 2C-B). However, commercially available tests do not detect the presence of potentially more dangerous substitute compounds such as 4-MTA. Another difficulty is that the colour reaction for some compounds (i.e. PMA) may be unknown. The manufacturers sensibly attach a disclaimer stating that the test result does not indicate safety in any way.

In the Netherlands analysis of a more rigorous nature is performed by the DIMS project which tests about 80–100 tablets per week (DIMS, 1998). Every week, 23 centres throughout the Netherlands collect samples of ecstasy dose forms (tablets, capsules, powders) and sends them to a central laboratory for analysis where the physical characteristics (colour, dimemsions, appearance, etc.) are recorded.

Preliminary analysis is by thin layer chromatography (TLC) followed by gas chromatography (GC) with nitrogen–phosphorus detection for quantification and GC–mass spectrometry (GC-MS) for identification of any unknown compounds. Any worrying findings (unusually high-dose pills or the presence of unusual com-

Table 2. *Examples of some drugs that respond to the Marquis test (Moffat* et al.*, 1986)*

Compound	Colour response to the Marquis test
Phenylephrine	Red
Fentanyl	Orange
Mescaline	Orange
Pethadine	Orange
Phenethylamine	Orange
Phentermine	Orange
Psilocybin	Orange
Trimethoxyamphetamine	Orange
Amitriptyline	Brown-Orange
Chlordiazepoxide	Yellow
Cyclizine	Yellow
DOM	Yellow
Lorazepam	Yellow
Amphetamine	Yellow-Orange → brown
Dexamphetamine	Yellow-Orange → brown
Methylamphetamine	Yellow-Orange → brown
2,5-dimethoxy-4-methamphetamine (STP)	Yellow → Green
2-CB	Yellow → Green
Diphenhydramine	Yellow → Green
DOB (2,5-dimethoxy-4-bromo-amphetamine)	Yellow → Blue-green
Verapamil	Yellow → Grey
Buprenorphine	Violet
Chlorpromazine	Violet
Codeine	Violet
Diamorphine	Violet
Dihydrocodeine	Violet
Morphine	Violet
MDMA	Violet-Purple → Blue-Black
MDEA	Violet-Purple → Blue-Black
MDA	Blue-black (sulphuric acid alone—violet)
Thioridazine	Violet-red → Blue-green

pounds) are made the subject of warning notices which are distributed to the relevant venues. Pill testing initiatives in Holland (DIMS) and by Europol (Logo system in 1996) have seen the development of extensive databases of pill composition, the only British equivalent being 'TICTAC', run by the Toxicology Unit at St George's Hospital Medical School, London (TICTAC, 2000).

A more recent innovation in Austria has been the use of high performance liquid chromatography (HPLC) equipment with diode array detection. This has been transported on site to large rave parties where accurate and rapid testing (15–30 minutes) has been performed with the aid of extensive technical support. The machines probably cost in the order of £35 000 each and require experienced laboratory personnel to operate them and interpret the results. The results are posted anonymously on a board and the individual consumer is able to identify his/her pill by means of a code. Although providing extensive information, this is a costly and time-consuming process that would be impractical to operate in a widespread manner.

The large number of logos that adorn 'ecstasy' tablets adds further confusion to the pill composition issue. Examples from the last decade include 'love doves', 'diamonds', 'crowns' and more recently 'teletubbies' and 'Mitsubishi', the latter (a car manufacturer's insignia) providing evidence for the use of logos as marketing devices. These earlier batches (Mitsubishi) led to a good 'brand' reputation among users because they contained a modest but unusually constant amount (80 mg) of MDMA. To date there are now over 40 different pills in circulation carrying the 'Mitsubishi' logo. Trademark infringements extend even into the illicit drug market.

Table 3. *Comparison of the Marquis Test and GC-MS for the detection of different compounds in ecstasy pills (Murphy, 1999)*

Marquis vs. GC-MS	Mass spectrometry result				
Marquis result	Negative	MDMA-like	Amphetamines	2C-B	Opiates
Negative no colour	**44**	0	0	0	0
MDMA-like purple/blue/black	0	**53**	0	0	0
Amphetamine orange/brown	**21**	0	**47**	0	0
2C-B yellow/green	**8**	0	0	0	0
Opiates purple/violet	**14**	0	0	0	0

Comparison of the Marquis test with GC-MS analysis

In order to assess the validity of the Marquis test samples were obtained from an amnesty bin located at a large London dance venue. The samples ($n = 156$) were anonymously deposited in the 'bin' by 'clubbers'. The contents of the bin were subsequently emptied by police and sent to a toxicology laboratory situated at St George's Hospital Medical School. After assessment of physical characteristics ('ballistic description') the Marquis test was performed on all pills before GC-MS analysis by laboratory staff who were blind to the initial results. Active drug was identified in 75% of the pills analysed. The Marquis test performed well for the detection of MDMA and MDEA (Table 3). It also gave 21 presumptive positive results for amphetamine, eight for 2C-B and 14 for codeine/dihydrocodeine products that disagreed with the GC-MS findings. The 2C-B findings were explained by the detection using GC-MS of diphenhydramine (which gives a similar yellow/green colour as 2C-B) in all samples (Murphay, 1999).

The usefulness of pill testing

Although the introduction of pill testing was seen initially as a means of monitoring pill composition and encouraging information exchange, for the user the primary concern was presumably to confirm the presence of MDMA in pills. It is possible that many users see such affirmation to imply quality and even 'purity'.

There are three issues that need clarification for the user. First, colour-testing methods give no indication that many harmful substances may be present in the pill. Secondly, the user, even with the knowledge that a pill contains MDMA, is unable to gauge until after consumption what the true psychoactive effect of the tablet will be. Confirming that MDMA is present in a pill will not reduce the risk of idiosyncratic adverse effects (responsible for many of the MDMA associated fatalities, e.g. from liver failure). Thirdly, colour tests give no information regarding the strength of a pill and cannot differentiate between optical isomers and unless chiral chromatography is available, neither can HPLC or GC-MS. Precise isomeric composition of pills reflects the availability of the precursors and remains largely unknown.

Furthermore, factors such as variations in metabolism caused by genetic differences cannot be identified through pill testing and such variation may contribute to individual vulnerability to adverse events (Tucker *et al.*, 1994; Kreth *et al.*, 2000). False reassurance through misinterpretation of the information that MDMA has been identified in a pill meaning it is a 'safe' pill is a particular worry.

For harm reduction purposes

The belief that pill testing may be viewed as a harm reduction approach is based upon the assumption that the knowledge made available to users from testing will in some way influence

their drug-taking and lead to behavioural change. However, evidence for this is not substantiated. In a recent study of over 1000 UK clubbers, subjects were asked how the quality of ecstasy pills would influence the amount of drug they consumed. Subjects indicated that if the quality of pills was considered to have become worse over 20% would take more, just over a third would take less, with 40% reporting no impact upon their ecstasy use. Conversely, and perhaps more worrying, if pills were thought to improve, 40% reported they would take more, just over 10% would take less, with nearly half reporting that it would make no difference to their use (Winstock, Griffiths & Stewart, 2000). Wijngaart *et al.* (1997) found the presence of testing facilities to be unrelated to participants' drug use and the consumption of ecstasy. In terms of harm reduction this finding could be interpreted as a failing of pill testing, since it suggests that the results have little impact upon reducing subsequent use.

Viewed in the broader context of harm reduction, a pill testing service may be regarded as a pragmatic attempt at minimizing or avoiding consumption of potentially more harmful substances than MDMA. However, specific knowledge of this kind can only be achieved a priori with sophisticated laboratory techniques (HPLC or GC-MS) and not colour tests. There is paradox in prevention in that the potential for harm associated with use of dance drugs is mediated through the pattern and context of their use. Accepting this, the most significant harm reduction impact upon dance drug users could be achieved through detailed information on minimizing harm associated with use.

Indeed, more successful harm-reduction efforts are already commonplace among attendees at clubs who use ecstasy, with 'flyers' and magazine articles advising on the importance of rest, rehydration and reducing body temperature; such knowledge is common among users. In terms of context of use, continued distribution to users of information notifying them of safe dance drug practice limits the harmful consequences of overheating, dehydration and exertion without rest and may reduce both the acute risk of hyperthermia and degree of serotonergic neurotoxicity and other drug use. Concurrent alcohol consumption by stimulant users as part of 'party use' or to combat insomnia is also problematic, with stimulant drugs tending to reduce users' perceptions of their state of alcohol intoxication, increasing the risk of accidents while driving.

Legal issues

Since MDMA and many of the other drugs found within pills sold as ecstasy are controlled under the Misuse of Drugs Act in Class A, possession and supply are serious criminal offences carrying the risk of custodial sentence. It is difficult to see how onsite testing could be carried out without infringing the law. Merely handling a tablet to a third party for analysis could constitute supply, the law not recognizing a lower limit on how many drugs are required before an offence is committed. Laboratories carrying out this work in the United Kingdom are thus required to have licenses issued by the Home Office and these are unlikely to be granted for consumer-orientated testing. Those supporting testing suggest that law enforcement agencies could benefit from the information obtained by the regular analysis of new pills as they appear on the market; that is, as a means of profiling (fingerprinting) the chemical composition of a pill in a similar fashion to the forensic work of amphetamine profiling in the 1980s (Jonson & Stromberg, 1993; Rashed, Anderson & King, 2000). Such information is clearly useful, but we feel that it could be equally attainable by a more rigorous routine analysis of confiscated pills or those deposited in an amnesty bin.

Consumer rights

For many it would be unthinkable to legitimatize a service that allowed users to check the quality of their cocaine or heroin. However, consumers of pills and advocates of pill testing argue that they have the same consumer rights as users of licit psychoactive substances. Advocates suggest that consumers should be able to make an informed decision regarding the consumption of drugs other than MDMA, which may have longer or different psychoactive effects from that which is desired on a particular occasion (such as DOB), that they may inadvertently consume within a tablet.

Moral protagonists, however, suggest that provision of such a service may be perceived as condoning illicit drug use. Dealers and producers alike could also manipulate the same information that would provide quality control for

purchasers. Interestingly, there are anecdotal reports that drug users are purchasing pill-testing kits to assess whether cocaine purchased on the black market has been adulterated with amphetamine type substances. In the Netherlands, in order to go some way to reduce this potential problem, testing points will not test pills from known dealers nor will they test more than two tablets from a single individual. There is also the moral dilemma of colluding in some way with illicit drug use, although this is a problem common to many forms of harm reduction most controversially the provision of injecting equipment to i.v. drug users.

Conclusion

In summary, pill-testing methods are not standardized. Although full laboratory analysis may have a role in the early identification of novel psychostimulant compounds infiltrating the dance drug scene, rapid on-site methods utilizing the Marquis test do not. At best, on-site colour reagent pill tests may reassure the user about the word of his dealer (or fellow clubber) and may occasionally allow users to avoid certain tablets, but can confirm neither dose nor precise chemical composition. Simple colour tests can give only very limited information of drug purity, which is in any case only one of many factors influencing an individual's response to a drug. The assumption that obtaining a purple/blue/black colour with Marquis reagent indicates that the pill contains MDMA is incorrect. Attempts at confirmation of a pill's content to address concerns about pill contamination and the risk of fatality are also misguided. Knowledge does not always lead to the anticipated behavioural change. In terms of harm reduction, less controversial measures are likely to receive a wider audience with their impact probably exceeding that of pill testing.

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