

Users' perceptions of the risks and effects of taking ecstasy (MDMA): a questionnaire study

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Philip N. Murphy *Department of Social and Psychological Sciences, Edge Hill College of Higher Education, Ormskirk, UK.*

Michelle Wareing *Department of Social and Psychological Sciences, Edge Hill College of Higher Education, Ormskirk, UK.*

John E. Fisk *School of Psychology, Liverpool John Moores University, Liverpool, UK.*

Abstract

This self-report questionnaire study examined ecstasy users' perceptions of the risks associated with their use of ecstasy, their precautions against such risks, and its perceived effects on their lives. Gender differences in these areas were also explored. The sample comprised 328 ecstasy users (139 female, 187 male, one transsexual) with a mean age of 22.5 years ($SD = 4.9$ years). Questionnaires were completed either in hard copy or through a website concerned with ecstasy use. The results showed that friends were the most common source of information about ecstasy for the sample overall, although females were more likely to utilize this source than males. None of the five categories of perceived risk (e.g. psychiatric, physical) showed a significant gender difference. Males were more likely to take rest breaks whilst females were more likely to limit consumption as a precaution against harm. Three factors

emerged from a principal components analysis concerning perceived personal change since initiation of ecstasy use. Factor 1 (23.8% of the variance) concerned negative experiences (e.g. depression). Factor 2 (22.0% of the variance) concerned positive personal qualities (e.g. caring). Factor 3 (10.5% of the variance) concerned selective aspects of functioning (e.g. alertness). The pattern of Factor 1 and Factor 2 scores over time suggested that 6 years since initiation of ecstasy use might be a time when some long-term users may be open to reassess their use of the drug. Broader implications of the findings for health education initiatives aimed at ecstasy users are discussed.

Keywords

Ecstasy, methylenedioxymethamphetamine, MDMA, risk perception

Introduction

Ecstasy is the term given to black market supplies believed to contain the drug 3,4-methylenedioxymethamphetamine (MDMA). The British Crime Survey for 2003/04 reported that in England and Wales alone over 2.1 million people aged between 16 and 59 years had used ecstasy at some time, with 614 000 of these having used it in the previous year and 281 000 in the previous month (Chivite-Mathews *et al.*, 2005). Only cannabis and cocaine showed higher levels of use in the previous month (a measure of current drug use) than did ecstasy. High levels of ecstasy usage have also been recorded across Europe (ELDD, 2004) and the United States (SAMSHA, 2002). This level of use poses potentially serious problems for societies due to the neurotoxic nature of the drug (Reneman *et al.*, 2002), and performance deficits in areas of cognitive functioning, such as working memory, which have been associated with its use (Wareing *et al.*, 2000). On the assumption that health education and other professional interven-

tions aimed at ecstasy users will work most effectively with an understanding of the beliefs and experiences of the target group about the behaviour in question, this questionnaire study was designed to examine users' self-reported patterns of ecstasy consumption, perceptions of the risks associated with such use, the use of precautions against these perceived risks, and the effects of ecstasy use on their lives generally.

Previous studies have established that ecstasy use has strong associations with the social context of 'clubbing' and 'dance music' amongst people predominantly under 30 years of age (e.g. Winstock *et al.*, 2001; Riley and Hayward, 2004). Some disagreement exists with regard to the level of risk perceived to be associated with ecstasy use, with some practitioners claiming that users and young people more generally perceive its use to be relatively safe (e.g. Psychiatric Services, 2002; Smith *et al.*, 2002), whilst research findings show that users frequently do perceive some risk to their health and well being from their use of the drug (Gamma *et al.*, 2004; Riley and Hayward, 2004; Kelly, 2005; Levy *et al.*,

2005; White *et al.*, 2006). These risks include dehydration, depression, and impaired brain functioning. On some occasions the perceived risks may be exaggerated in nature to include such things as 'holes in the brain' and the draining of cerebrospinal fluid (Carlson *et al.*, 2004). Gamma *et al.* (2004) emphasize the need to understand the acceptance of ecstasy related risks by users if the effectiveness of health education initiatives in this area is to be maximized. However, one important aspect of this risk acceptance by ecstasy users is their use of precautions to minimize such risks. Panagopoulos and Ricciardelli (2005) report a range of harm reduction strategies employed by users before use (e.g. taste/lick pill), during use (e.g. dissolve under tongue rather than swallow), and after use (e.g. try to sleep). Other strategies included only purchasing supplies from known dealers and rationing use over time (see also Hansen *et al.*, 2001; Larkin and Griffiths, 2004). The effectiveness of these strategies and the efficiency with which they are employed is likely to vary considerably. In summary, it is reasonable to assume that understanding as much as possible about the perception and acceptance of risks by ecstasy users, and of the precautions, if any, taken to minimize such risks, is fundamental to the provision of effective health education for this group, and the present study sought to augment the literature addressing these areas.

Whilst a desired positive mood state is a commonly reported acute effect underlying ecstasy use (e.g. Riley and Hayward, 2004), experiences of depression and lethargy are commonly reported in the days following ecstasy use (e.g. Curran and Travill, 1997; Topp *et al.*, 1999; Verheyden *et al.*, 2003; Travers and Lyvers, 2005). Indeed, Topp *et al.* indicated that depression and irritability were reported by at least 20% of users in their sample as occurring at times beyond the come-down period from ecstasy use. Lethargy and insomnia were both reported as occurring in this way by more than 16% of users, with 27 other symptoms, classed either as physical or psychological, being reported by smaller percentages. Verheyden *et al.* report that headaches, anxiety, confusion, and skin irritation could also be acute effects of ecstasy consumption (i.e. prior to the come-down period), and that depression and poor concentration were long-term effects in their sample of users. A significant relationship has also been identified between ecstasy use and the reporting of long-term memory problems by users (Rodgers *et al.*, 2001). Persistence in the use of ecstasy in the face of such negative consequences is clearly an area requiring further investigation, and this present study sought to explore the nature of the benefits to costs ratio perceived by its users.

One final question addressed in the present study was that of gender differences in the experience of ecstasy use. Topp *et al.* (1999) reported that female users were more susceptible to negative side effects of use than their male counterparts. However, Verheyden *et al.* (2003) did not replicate this finding. The existence of such a difference could clearly influence the perception of the risks and costs of ecstasy use between the genders, as well the employment of precautions to reduce harm.

Method

Questionnaire design

A self-completion questionnaire was designed to seek information concerning the aspects of ecstasy use in question. The questionnaire did not address the use of other drugs in order to avoid overloading potential respondents with too many questions, and so diminishing the likelihood of their completing it. A screening question asked respondents to confirm whether or not they had used the drug ecstasy. The remaining questions addressed the following areas.

Background information Respondents were asked to specify their age, gender, and occupation, and to indicate the number of years they had spent in full-time education, together with the number and type of qualifications gained. Two questions with a 'yes/no' response format asked respondents if they had any criminal convictions for drug related and other offences, respectively. In each case a subsequent open question asked for further details of any convictions. Current living circumstances were recorded by means of presenting seven options (e.g. 'live alone', 'parental home'), with respondents ticking the appropriate option.

Perceived effects of ecstasy use In order to examine the perceived risks of ecstasy use, respondents were asked to list the harmful effects of ecstasy use which they were aware of, and then rated their concern about these possible effects overall on a five point scale labelled 'not concerned', 'slightly concerned', 'concerned', 'very concerned', and 'extremely concerned'. Self-perceived changes in mood states, personal qualities, and behaviours since the initiation of ecstasy use were measured by means of a 15 item (positive and negative) adjective rating scale. Respondents were asked if they had changed since their exposure to ecstasy in relation to these 15 adjective items, with the response options being 'Less', 'No Change' and 'More'.¹ The adjectives used were caring, paranoid, alert, depressed, sociable, aggressive, happy, healthy, moody, patient, irritable, confident, sad, loving, and confused. The responses to these items were subsequently scored from one to three respectively.

Ecstasy-using behaviour A short series of open questions provided respondents with an opportunity to state in their own words where they usually took ecstasy, what activities they engaged in under its influence, and what precautions, if any, they took in order to manage any potentially harmful effects from taking the drug. Some guidance was provided in the latter area by asking respondents if they took rest breaks and monitored their fluid intake. Respondents were asked to state the overall duration of their ecstasy use, whether or not they had set for themselves a maximum number of ecstasy tablets to be taken in one session and, if so, they were asked to state what that maximum number was. A subsequent open question asked them to describe what factors they took into account when deciding that they had taken enough tablets for one session. Respondents' current pattern of ecstasy use was measured on a five point scale labelled 'previous user (more than 6 months since last used)', 'less than once a

month', 'less than once a week but more than once a month', 'once a week', and 'more than once a week'. They were also asked to identify their sources of information about the drug by ticking any appropriate options from a list of potential sources (e.g. TV news, friends, music magazines, etc.).

Questionnaire distribution

Hard copies of the questionnaire were distributed by a variety of means. An advertisement was placed in the music magazine 'Club On' asking those with experience of ecstasy use and who would be willing to complete a questionnaire about it to contact one of the research team (Michelle Wareing). Those who responded to this advertisement were sent a hard copy of the questionnaire with a stamped addressed envelope for its return. Other hard copies were distributed to ecstasy users known to this researcher and who had, for example, participated in an early experimental study by the authors (Wareing *et al.*, 2000). Subsequently, the basic questionnaire reported here formed part of a larger questionnaire administered in hard copy to a subset of respondents who were also participants in recent experimental studies conducted by the authors, and reported elsewhere (e.g. Wareing *et al.*, 2004). It was, therefore, possible to include data from these respondents with the sample who completed only the basic questionnaire.¹ A total of 165 hard copies of the questionnaire were correctly completed by ecstasy users based in Britain.

Electronic copies of the questionnaire were administered through the website 'www.ecstasy.org.uk'. This website, operated by a non-profit making organisation, was aimed at people with experience of, or an interest in, the use of ecstasy. The use of the Internet to gather data does pose the risk of multiple submissions by one or more respondents, so that it is important to check the email addresses of respondents for any sign of duplication. Despite these checks having been carried out in this study, it is conceded that this is not a watertight means of eradicating duplicate submissions. However, this danger has to be weighed against the opportunity afforded by the relative anonymity of the internet to gather data from relatively large samples about covert behaviours such as illegal drug use. Similarly, the distance of the researcher from the situation of questionnaire completion in this study, whether electronic or hard copy, which may have implications for the quality of responses, may also be weighed against the advantage of recruiting a relatively large sample concerning such covert behaviours. A fuller discussion of issues concerning the use of the Internet in data collection can be found in Buchanan and Smith (1999). A total of 163 electronic copies of the questionnaire were correctly completed. In terms of countries from which these completions originated, 99 (60.7%) were from the United States, 51 (31.3%) were from the United Kingdom, nine (5.5%) were from other European countries, 3 (1.8%) were from Australia, and one (0.6%) was from Canada.

Data from all the completed questionnaires were entered into SPSS™ for storage and subsequent analysis.

Results

Sample details

The 328 correctly completed questionnaires came from respondents with a mean age of 22.5 years (SD = 4.9 years), all of whom indicated experience of having used ecstasy. In terms of gender, 139 respondents identified themselves as female, 187 as male, one as transsexual,² and one failed to answer this question. The mean age of female respondents (21.7 years, SD = 4.4 years) was significantly younger than that of male respondents (23.0 years, SD = 5.1 years), with $t(321) = -2.48$ ($p = 0.014$, two-tailed). This is consistent with significant age differences across genders reported by other surveys of ecstasy users drawn from populations of British (Verheyden *et al.*, 2003) and Australian (Topp *et al.*, 1999) users, and could reflect an interaction between gender and age in willingness to participate in such research rather than indicating a characteristic of the ecstasy-using population overall. The mean age of electronic respondents (21.3 years, SD = 5.1 years) was significantly younger than that of hard copy respondents (23.6 years, SD = 4.4 years), with $t(322) = 4.49$ ($p < 0.000$, two-tailed). However, there was no association between gender and means of responding ($\chi^2[1, n = 326] = 0.06, p = 0.81$).

In terms of living circumstances, 34.1% of respondents indicated that they shared accommodation with friends, 29.3% lived in the parental home, 15.5% lived with a partner, and 11.6% lived alone. No other classification exceeded 10% of the sample. With regard to occupation, 48.3% of respondents described themselves as students, whilst 12.3% indicated unskilled manual occupations. No other occupational category exceeded 10% of the sample. More males had criminal convictions for drug related offences than females (19 and seven respectively), as well as for non-drug related offences (31 and five respectively). The association between gender and criminal convictions showed a non-significant trend for drug related offences ($\chi^2[1, n = 321] = 2.87, p = 0.09$), but was highly significant for non-drug related offences ($\chi^2[1, n = 321] = 13.74, p < 0.000$).

Unfortunately, the questions concerning years of full-time education and qualifications gained did not provide usable data due to the difficulties inherent in wording questions appropriately for respondents from a variety of national education systems.

Use of ecstasy

Patterns of consumption and behaviour A total of 35 respondents (17 female, 18 male) identified themselves as former users of ecstasy by indicating that longer than 6 months had elapsed since its last use. Of the 292 current users (122 female, 168 male, one transsexual, and one missing value), 25 reported that they currently used it more than once a week, 58 used it once a week, 129 used it less frequently than once a week but more than once a month, and 80 used it less than once a month. The relationship between ecstasy consumption and music was borne out by the large majority of respondents ($n = 285$, 86.9% of the sample) who stated that they usually took the drug at raves, parties, or nightclubs, each of these being a venue where loud music might reasonably be expected.

The mean estimated time elapsing since ecstasy had first been used³ was 3.3 years (SD = 2.7 years) for the sample as a whole. Current users reported having used it for 3.1 years (SD = 2.6 years), whilst former users reported that 4.7 years (SD = 2.6 years) had elapsed since their first use of the drug. Comparisons of males and females in the sample as a whole, and in the groups of current and former users respectively failed to show any significant differences in time since first use of ecstasy. With regard to the maximum number of ecstasy tablets respondents were willing to take within one session, an overall sample mean of 3.5 tablets (SD = 3.1 tablets) was reported, with males being willing to use significantly more tablets than females (male mean = 4.0 tablets (SD = 3.9 tablets), female mean = 2.9 tablets (SD = 1.9 tablets)). The obtained *t* value was corrected due to unequal variances between the gender groups on this variable (*t* (193.769) = -2.763, *p* = 0.006, two-tailed). There was a small but highly significant positive correlation for current users between the maximum number of ecstasy tablets respondents were willing to use in a session and the time elapsing since their first use of it (*r* = 0.282, *p* < 0.000, two-tailed), which would be consistent with a tolerance having developed to the drug.

Responses to the open question concerning behaviour under the influence of ecstasy were coded into nine categories. Only the category for 'touch' (e.g. hugging, massaging, kissing) showed a significant association with gender (χ^2 [1, *n* = 326] = 5.62, *p* = 0.018). More females engaged in such behaviour than would be expected under the null hypothesis of no association, whilst fewer males behaved in this way than their corresponding expected value.⁴ In total, only 12.8% of respondents indicated that they engaged in specific touching behaviour under the influence of ecstasy. The overall percentages for the other categories were dancing (82.3%), talking (68.6%), having sex (11.9%) seeking company (11.0%), listening to music (9.2%), going for a walk (7.3%), taking cannabis (7.3%), and driving (3.4%).

Perceptions of risks and precautions taken In percentage terms the most popular means of obtaining information about ecstasy and its effects was through friends, with 67.4% of respondents indicating this. This was also the only information source to show a clearly significant association with gender (χ^2 [1, *n* = 326] = 7.96, *p* = 0.005), whereby females showed more use of friends in this way than the expected value under the null hypothesis of no association, whilst fewer males used friends in this way than their expected value.⁴ Nightclubs as a source of information showed a borderline association with gender (χ^2 [1, *n* = 326] = 3.60, *p* = 0.058), with more females again indicating their use as a source of information than the expected value, whilst fewer males used nightclubs in this way than expected under the null hypothesis. Overall, 30.2% of respondents indicated that nightclubs were a source of information about ecstasy, although it was not clear whether this was simply a matter of contact with other users, or whether information was available through other means in such venues (e.g. posters, leaflets). No other significant gender differences were obtained regarding information sources. The percentages identifying the other sources as having provided information about ecstasy were TV news (35.7%), other TV pro-

grammes (28.7%), daily newspapers (23.8%), music magazines (34.2%), other magazines (28.7%), radio (12.5%), drug agencies (15.9%), and drug leaflets (36.0%). The number of information sources identified by each gender was not significantly different (*t* (324) = 0.838, *p* = 0.403, two-tailed).

The possible harmful effects of ecstasy use listed by respondents are summarized in Table 1 under five categories. It is acknowledged that the categorization of responses involved some element of subjective judgement. Responses emphasizing confusion and memory loss were categorized as dementia, whilst those emphasizing physical damage to the brain as an organ were categorized as 'neuroanatomical'. A total of 221 respondents (67.4%) perceived a risk of ecstasy use in at least one of these categories, but there was no association between this overview of risk and gender (χ^2 [1, *n* = 326] = 1.91, *p* = 0.167). When the categories were examined individually the perception of long-term psychiatric effects yielded the largest disparity for gender between observed and expected frequencies,⁴ but the chi-squared result was not significant (χ^2 [1, *n* = 326] = 1.92, *p* = 0.166). Chi-squared tests on the remaining four categories were not, therefore, conducted. In summary, it was apparent that there was no indication of an association between gender and categories of perceived risks of ecstasy use present in the data.

Table 1 also summarizes responses to questions concerning precautions taken to reduce any risks of harm arising from ecstasy use. Significant gender differences were found for the use of rest breaks and placing a limit on the number of tablets they were willing to take in one session. Males were more likely to take rest breaks than females (χ^2 [1, *n* = 326] = 5.70, *p* = 0.017), whilst females were more likely to limit their consumption than males (χ^2 [1, *n* = 326] = 9.13, *p* = 0.003). No other gender comparisons were found to be significant.⁴ The small number of respondents reporting toilet use as a precaution used urination as a safeguard against excessive fluid build up (hyponatraemia). As 5HTP (5-hydroxytryptophan) is the immediate precursor of 5HT (serotonin), the small number of respondents consuming it were attempting to guard against serotonin depletion.

The final section of Table 1 shows the categories applied to the open question concerning which indicators were used to decide when sufficient ecstasy had been consumed within a session. Only the category for nausea yielded a significant result for an association with gender⁴ (χ^2 [1, *n* = 326] = 4.69, *p* = 0.03), with females being more likely to take this as a sign of sufficient use than males.

The relationship between precautions and level of concern about ecstasy related damage was investigated by dividing respondents into two groups on the basis of their responses to the five point scale measuring concern about the effects of ecstasy. Those who responded 'concerned', 'very concerned', or 'extremely concerned' were deemed to have expressed tangible concern (*n* = 167), as opposed to those responding 'slightly concerned' or 'no concern' (*n* = 161). These groups did not differ significantly in age, gender composition, or the number of information sources they consulted about ecstasy. Following the same procedure for administering chi-squared tests as for associations with gender,⁴ respondents in the tangible concern group were more likely than

Table 1 Numbers and percentages of male and female respondents with regard to categories of risk perception, precautions, and reasons for ceasing ecstasy consumption within a session

	Males		Females	
	<i>n</i>	% of males	<i>n</i>	% of females
<i>Risk category</i>				
Psychiatric (e.g. depression)	64	34.2	58	41.7
Neuroanatomical (e.g. 'rewiring' of brain cells)	33	17.6	28	20.1
Neurochemical (e.g. lowered serotonin)	42	22.5	27	19.4
Dementia (functional) (e.g. increased risk of it)	53	28.3	34	24.5
Physical (e.g. liver damage)	57	30.5	35	25.2
<i>Precautions</i>				
Monitor own fluid level	123	65.8	92	66.2
Limit ecstasy consumption	132	70.6	118	84.9
Take rest breaks	166	88.8	110	79.1
Eat	24	12.8	13	9.4
Consume vitamin pills	35	18.7	31	22.3
Temperature monitoring	20	10.7	17	12.2
Consume 5HTP	12	6.4	6	4.3
Avoid alcohol	9	4.8	11	7.9
Use toilet	3	1.6	2	1.4
<i>Sufficient consumption marked by:</i>				
Nausea	5	2.7	11	7.9
Impaired consciousness	25	13.4	22	15.8
Visual impairment	12	6.4	7	5.0
No more money	15	8.0	12	8.6
Fatigue	13	7.0	11	7.9

their counterparts to limit their consumption within a session (χ^2 [1, $n = 328$] = 4.57, $p = 0.033$), and to take vitamin tablets as a precaution against the negative effects of ecstasy (χ^2 [1, $n = 328$] = 4.94, $p = 0.026$). Whilst respondents in the tangible concern group were more likely to impose a limit on their ecstasy consumption within a session, the maximum number of tablets they were willing to consume in a session was not significantly different from the low or no concern group (t (248) = -0.657, $p = 0.512$, two-tailed).

Perceived personal changes since initiation of ecstasy use

Ratings on the 15 item adjective rating scale were submitted to a principal components analysis followed by a varimax rotation.⁵ Three factors were extracted with eigenvalues greater than 1.0, accounting for 56.3% of the variance in total. The cut off for significant loadings on each of these factors was 0.50, and all significant loadings were positive. Details of all the significant loadings are shown in Table 2. Factor 1 accounted for 23.8% of

the variance and had significant loadings for seven items, the nature of which led to it being labelled the negative experiences factor. Factor 2 accounted for 22.0% of the variance and had significant loadings for five items, the nature of which led to it being labelled the positive personal qualities factor. Factor 3 accounted for 10.5% of the variance and had significant loadings for three items, the nature of which led to it being labelled the selective aspects of functioning factor. In summary, these three factors may be seen to represent three categories of experiences which ecstasy users associate with their use of the drug.

Raw factor scores were calculated by simply summing the scores for items with significant loadings on the respective factors. On this basis, no overall change since initiation of ecstasy use on Factor 1 would yield a score of 14, and this was obtained for 17.7% of respondents. However, 42.4% of respondents had scores less than this, indicating a net reduction in the negative experiences listed since first ecstasy use, whilst 39.9% had scores above 14, indicating a net increase in these experiences. For Factor 2 no

Table 2 Rotated factor loadings (varimax) for changes in moods states and behaviours (significant loadings in **bold**)

Item	Factor 1	Factor 2	Factor 3
Caring	0.034	0.677	0.371
Paranoia	0.671	0.023	-0.216
Alertness	0.110	0.281	0.579
Depression	0.745	0.012	-0.049
Sociability	0.058	0.812	0.106
Aggression	0.639	-0.085	0.156
Happiness	-0.130	0.798	0.059
Healthiness	-0.136	0.086	0.775
Moodiness	0.777	0.028	0.017
Patience	-0.146	0.337	0.559
Irritability	0.770	-0.113	0.114
Confidence	0.095	0.794	0.156
Sadness	0.700	0.047	-0.149
Loving	0.040	0.807	0.176
Confusion	0.620	0.186	-0.120

overall change was indicated by a score of ten, and this was obtained for 12.1% of respondents. Scores less than this were obtained from 17.8% of respondents, indicating a perceived net reduction in the positive qualities associated with this factor. However, 70.1% had scores greater than ten indicating a perceived net increase in these qualities. For Factor 3 no overall change was indicated by a score of six, and this was obtained for 32.7% of respondents. Scores less than this were obtained from 40.5% of respondents, indicating perceived net reductions in these aspects of functioning, whilst the remaining 26.8% of respondents had scores greater than six, indicating perceived net increases in them.

In order to avoid possible distortions due to differences in the standard deviations of item scores contributing to the raw factor scores, subsequent analyses employed predicted standard scores for each respondent on each factor which were calculated by the regression method as part of the factor analysis procedure using SPSS™ (see Tabachnick and Fidell, 2001). The higher the predicted score, the more respondents had reported experiencing the effects associated with that factor. The t-tests of three independent samples revealed no significant differences by gender, the results for Factor 1 being $t(310) = 1.538$, $p = 0.125$, for Factor 2 $t(310) = 0.129$, $p = 0.897$, and for Factor 3 $t(310) = -0.975$, $p = 0.330$. Each of these tests was two-tailed.

Factor 2 scores showed a moderate but highly significant negative correlation with time since initiation of ecstasy use ($r = -0.34$, $p < 0.000$, two-tailed), whilst scores for Factor 1 and Factor 3 failed to significantly correlate with this variable ($r = 0.007$, $p = 0.187$, two-tailed, and $r = -0.029$, $p = 0.619$, two-tailed, respectively). Fig. 1 shows the mean standard scores for each factor for respondents indicating that various periods had elapsed since their initiation of ecstasy use. It can be seen that Factor 1 scores oscillate narrowly either side of zero for respondents reporting periods of up to 5 years elapsing since first use of ecstasy. The 19 respondents (16 of whom were current users)

reporting between 5 and 6 years elapsing show a dramatic increase in perceived negative effects, with the mean reaching a peak for this factor of 0.652 (SD = 1.148). However, the 15 respondents (ten current users) indicating that between 6 and 7 years had elapsed yielded the lowest scores on this factor, with a mean of -0.285 (SD = 1.303). It should be noted that the mean of 0.213 (SD = 1.048) for the 22 respondents (18 current users) reporting that more than 7 years had elapsed since initiation of ecstasy use is higher than the means for any other period covered, except the peak at 5 to 6 years. Factor 2 shows a clear picture of declining scores for the perceived effects on personal qualities of ecstasy use, indicating that the positive qualities in question progressively diminished over time. The peak for this factor was for the 89 respondents (87 current users) with up to 1 year elapsing since first use which generated a mean of 0.512 (SD = 0.691), whilst its lowest point occurred with 5 to 6 years having elapsed where the mean was -0.682 (SD = 0.820). The respondents generating this low mean are the same group who generated the peak mean for Factor 1 scores, so that the passage of between 5 and 6 years since the initiation of ecstasy use yielded both the peak for perceived negative effects and the nadir for perceived personal effects of a positive nature. However, this elapse period also produced the peak for Factor 3 scores, representing the perceived functional effects of using the drug (e.g. alertness), with a mean of 0.256 (SD = 0.987). The lowest point for Factor 3 scores was for the 34 respondents (30 current users) who reported between 2 and 3 years having elapsed since first use, where the mean was -0.273 (SD = 0.892).

In order to explore further the relationship between the factors and the time elapsing since initiation of ecstasy use, a multiple linear regression analysis was conducted using the factor regression scores as the predictor variables, and the time since first ecstasy use as the dependent variable. One advantage of using factor regression scores as predictors in such an analysis is that they correlate with each other with a coefficient of zero, so that multicollinearity does not arise as a problem. The regression solution yielded $F(3, 291) = 13.328$, $p < 0.000$, with $R^2 = 0.121$, adjusted $R^2 = 0.112$, and a standard error of the estimate of 2.498. Table 3 shows that only Factor 2 was a significantly better predictor than chance of variability in time since the first use of ecstasy. The squared semipartial correlation coefficient showed that this factor accounted for 11.424% of variability in the dependent variable with the contribution of the other predictor variables partialled out. The negative coefficient indicates that respondents had rated their experience of the positive qualities loading on this factor as progressively diminishing as their reported time since first use of ecstasy increased.

Discussion

The high percentages of respondents indicating that they danced under the influence of ecstasy, and indicating that they usually took it at raves, parties or nightclubs is consistent with the social and musical context of ecstasy use identified by earlier researchers (e.g. Winstock *et al.*, 2001; Riley and Hayward, 2004).

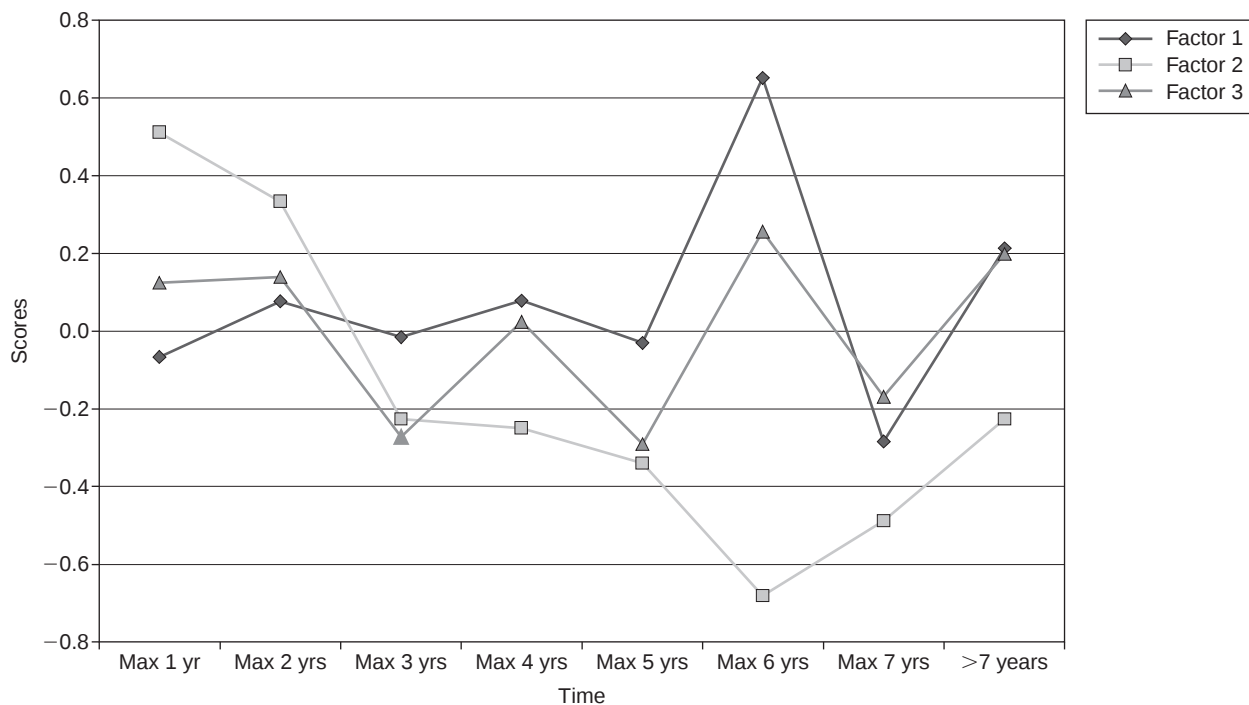


Figure 1 Regression scores for each factor plotted against time since initiation of ecstasy use

Table 3 Results for the predictor variables in the regression analysis

Predictor	Coefficient (B) ^a	t (291)	p
Perceived negative effects of ecstasy use (Factor 1)	0.161	1.092	0.276
Perceived effects on personal qualities of ecstasy use (Factor 2)	-0.925	-6.146	0.000
Perceived effects on functioning of ecstasy use (Factor 3)	-0.109	-0.747	0.456

^aConstant = 3.303.

A relatively small proportion of respondents, just under 12%, indicated that they characteristically had sex under the influence of ecstasy. In a study of female 'clubbers' Hutton (2004) reported that ecstasy might increase feelings of affection and physical sensuality in women, whilst not necessarily increasing a desire for sexual intercourse. Indeed, intercourse might be more likely within the come-down period from the drug. Whilst reporting a similar reduction in sexual performance for some users of both sexes, McElrath (2005) also identified a minority subgroup comprising both males and females whose sexual functioning was enhanced under the influence of the drug. In some cases this resulted in unprotected sex and the increased risk of HIV and other infections. The relationship between ecstasy use and sexual behaviour would seem to require further examination in order to maximize the impact of 'safe sex' messages for possible subgroups within the ecstasy-using population.

At least one category of risk was associated with use of the

drug by just over two-thirds of the sample, which is not consistent with the claims of some practitioners that ecstasy is largely considered to be a safe drug by its users and by young people generally (e.g. Psychiatric Services, 2002; Smith *et al.*, 2002). It is consistent, however, with the findings of other studies which indicate that ecstasy users accept that a certain level of risk comes with their use of the drug (Gamma *et al.*, 2004; Riley and Hayward, 2004; Kelly, 2005; Levy *et al.*, 2005; White *et al.*, 2006). It is important to note that no significant gender differences in the perception of risk, as exemplified by the five categories in Table 1 were found, nor was there an association between gender and membership of the 'tangible concern' or 'slight or no concern' groups. It is also worth noting in this context that female users did not have significantly higher scores on Factor 1 (reflecting negative experiences attributed to the drug) than their male counterparts. This latter finding would seem to contradict the finding of Topp *et al.* (1999) that female users were more susceptible to the

negative side effects of ecstasy use than male users. Further research would appear to be required in the area of gender differences in the experience of the effects of ecstasy.

The acceptance of risk in their use of ecstasy by this, and other samples of users, would seem to make it clear that health educators concerned to communicate the risks of ecstasy use need to take into account the willingness of people to accept such risks, in order to be maximally effective in this task. Friends were the most commonly cited source of information about ecstasy for the current sample by quite a large margin. This might indicate that health promotion initiatives which seek to work through peer groups have much potential for communicating the dangers of this drug. In the long term this may help to overcome the apparent mistrust of messages from official sources reported by Gamma *et al.* (2004). One area where such health promotion messages might concentrate is that of the precautions which users take in order to minimize the risk of harm from ecstasy. Table 1 shows clearly that monitoring fluid levels, limiting ecstasy consumption, and taking rest breaks were common within the sample, indicating a relatively high degree of awareness of such strategies. The remaining precautions were adopted on a relatively idiosyncratic basis. Both the usefulness and limitations of these three commonly used precautions (e.g. the development of hyponatraemia from excessive fluid intake) need to be stressed.

The 15 scales measuring perceived personal changes since the initiation of ecstasy use showed that use of the drug was seen to be associated with both positive and negative effects over time. This is consistent with the findings of other studies (e.g. Topp *et al.*, 1999; Verheyden *et al.*, 2003). In light of this, it is to be expected that the decision to continue ecstasy use over a period of years would involve a process of balancing out (involving both cognitive and affective processes) these positive and negative effects. An awareness of this process and the particular issues it addresses, which may be exemplified by the items loading on the respective factors, may be important in the further development of effective health promotion and other professional interventions aimed at ecstasy users. It has to be remembered that Fig. 1 represents data from users who are responding at the current point in time since initiating ecstasy use, rather than representing changes in individuals over time. Nevertheless, it is apparent that the perceived positive effects from using ecstasy steadily diminish over the first 6 years of its use, whilst the perceived negative effects reach a peak at the same time. Whilst this pattern cannot be assumed to be universal for all ecstasy users, it is possible that for some, a period of approximately 6 years of ecstasy use represents a time for some long-term users when there might be a heightened openness to messages about the dangers of the drug, and to possible new avenues in life without it. It is possible that the rise in Factor 2 scores for those who had used the drug for more than 6 years, together with the drop in Factor 1 scores between 6 and 7 years of use, may indicate a group of users whose experience of the drug does not fit the pattern just described for the first 6 years of use. It is clear that only a longitudinal study could address such a question adequately.

The peak for Factor 3 scores after 6 years of use may appear anomalous at first as they suggest elevated functioning in the three areas with significant loadings on this factor. However, Wareing *et*

al. (2000) found some evidence for disturbed levels of arousal in ecstasy users, and this may bear some relationship to a perception of enhanced alertness in the present sample. Further research in this area is clearly needed. The perception of elevated health and patience at this point since the initiation of ecstasy use is also difficult to comment upon without further data, but it does need to be remembered that this data represents subjective perceptions without any external verification.

In conclusion, the results of this study have some important implications for the delivery of health education and other professional interventions aimed at users of ecstasy. The importance of peer relationships in learning about the drug has been emphasized, and there appears to be little in the way of gender differences in the perception of ecstasy related risks. The results from the scales measuring perceived personal change since the initiation of ecstasy use may be taken to indicate the issues addressed by users in their decision to persist with its use, and a period of 6 years may be a time when some long-term users may be amenable to reconsidering this behaviour. Whilst a survey of subjective experiences and outlooks is necessarily limited in scope, it can provide insights into the framework of reference and construal for a particular target group, in this case users of ecstasy, and can constitute an important informational basis for professional interventions, especially where voluntary behaviour change is desired.

Notes

- 1 The subset of 26 respondents in experimental situations received a five-point scale including the terms 'much more' and 'much less'. This was collapsed to a three-point scale for analysis with other respondents' data. This was the only difference in question format encountered by this subset.
- 2 As only one respondent identified themselves as transsexual, this respondent's data were omitted from all analyses involving gender.
- 3 Given the difficulty of obtaining reliable information concerning intermittent patterns of ecstasy use through a self-completion questionnaire, it was considered more appropriate to concentrate upon time since the initiation of ecstasy use rather than the duration of its use.
- 4 In order to protect the alpha level of 0.05 from an inflated Type 1 error rate when looking at behaviour under the influence of ecstasy information sources, perceived risk categories, precautions taken, and terminating ecstasy consumption within a session of use, obtained and expected frequencies (i.e. under Ho.) were first obtained for each response category. Chi-squared tests were only conducted initially for the category with the largest disparity. If this yielded a significant result then the category with the next largest disparity was tested, and so on until a non-significant result was obtained.
- 5 'While the use of factor analysis on ordinal data is not without its critics such applications have become widespread in the psychological research literature. The response scale used here consisted of three possible alternatives on which a clear ordering can be imposed. Thus we feel that in general terms our

approach has ample precedent. Nonetheless in future research it might be advisable to increase the number of response alternatives so that a stronger case for continuity can be made.

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