Psychopharm

Journal of Psychopharmacology
20(3) (2006) 417–424

ISSN 0269-8811
SAGE Publications Ltd, London, Thousand Oaks, CA and New Delhi
10.1177/0269881106063274

Problematic versus non-problematic ecstasy/MDMA use: the influence of drug usage patterns and pre-existing psychiatric factors

K. Soar *School of Psychology, University of East London, London, UK.*
J. J. D. Turner *School of Psychology, University of East London, London, UK.*
A. C. Parrott *Department of Psychology, University of Wales Swansea, Swansea, UK.*

Abstract

Recreational ecstasy (3,4-methylenedioxymethamphetamine; MDMA) use has been increasingly associated with a number of psychiatric symptoms and psychological problems. However, previous studies assessing possible psychopathological effects have not identified whether users consider their ecstasy use 'problematic' or not. In addition, research has generally failed to address the potential role of premorbid psychiatric status. This study aimed to assess whether premorbid psychiatric history and/or patterns of ecstasy use would be associated with the degree of self-reported problems attributable to ecstasy. Problematic ecstasy users ($n = 53$) who had reported problems attributable to their ecstasy use were compared with non-problematic ecstasy users ($n = 62$), polydrug controls ($n = 62$) and illegal drug-naive controls ($n = 111$) on a recreational drug use questionnaire; a questionnaire, which ascertained personal and family psychiatric histories, and the Brief Symptom Inventory (BSI). Problematic ecstasy users exhibited significantly higher scores on a number of dimensions of the BSI compared to illegal drug-naive and/or polydrug controls. Problematic ecstasy users also exhibited significantly elevated scores on somatization, depression, anxiety and negative psychobiology compared to non-problematic ecstasy users. BSI scores for the non-problematic ecstasy users did not differ from polydrug or illegal drug-naive controls. Problematic ecstasy users reported significantly higher levels of ecstasy use, including lifetime consumption, average dosage and binge consumption compared to non-problematic ecstasy users. Additionally, a greater number of problematic ecstasy users reported personal and family psychiatric histories compared to controls and non-problematic ecstasy users. This study demonstrates two distinct ecstasy using groups: non-problematic ecstasy users who are not showing signs of psychopathology and problematic ecstasy users who are showing evidence of a range of symptoms. This data therefore partially supports the link between ecstasy dosage and negative psychological sequalae, but highlights the importance of the need to consider ecstasy-related attributions, pre-existing mental health status and vulnerability.

Keywords

problematic ecstasy use, psychopathology, MDMA, premorbid psychiatric history

Introduction

Recreational ecstasy (3,4-methylenedioxymethamphetamine; MDMA) use has been increasingly associated with long-term psychological changes including elevated levels of psychoticism, phobic-anxiety, obsessive-compulsive symptomatology, depression and generalized anxiety (Parrott *et al.*, 2000; Dugherio *et al.*, 2001; Parrott *et al.*, 2001; Daumann *et al.*, 2001; Morgan *et al.*, 2002; Thomasius *et al.*, 2003). In a UK survey of ecstasy users, 55% reported continuing to use ecstasy despite reporting problems (Winstock *et al.*, 2001). In the same study 15% of ecstasy users fell into the problematic range, as defined by the Severity of Dependence Scale. In addition, clinical case studies have demonstrated a number of problematic ecstasy-related effects (Schifano *et al.*, 1998; Windhaber *et al.*, 1998; Alciati *et al.*, 1999; Bone *et al.*, 2000; Milas, 2000; Vaiva *et al.*, 2001; Soar *et al.*, 2001). However, whilst such case studies have specifically described individuals who attribute problems directly to their ecstasy exposure, the non-clinical investigations have tended not to ask whether or not the participants considered that they may be suffering from problems which they themselves attribute to ecstasy use (Parrott *et al.*, 2000; Dugherio *et al.*, 2001; Parrott *et*

Corresponding author: K. Soar, School of Psychology, University of East London, Romford Road, London, E15 4LZ, UK. *Email*: k.soar@uel.ac.uk

al., 2001; Gamma *et al.*, 2001; Daumann *et al.*, 2001; Morgan *et al.*, 2002; Thomasius *et al.*, 2003). This distinction may help to account for some of the discrepancies amongst studies (Thomasius *et al.*, 2003). In addition, the development of ecstasy-related problems has implications for health care professions. Topp *et al.* (1999) reported that one fifth of ecstasy users had received treatment for an ecstasy-related problem, mainly from a General Practitioner (GP) or a natural therapist, while 7% were currently in treatment, and a further 15% wanted formal treatment for difficulties perceived to be related to ecstasy use. Hammersley *et al.* (1999) found that the heaviest users of ecstasy were more likely to report having been an inpatient in the last year.

Fox *et al.* (2001) were the first to distinguish between 'problematic' and 'non-problematic' ecstasy use, in a study assessing cognitive functioning. Despite the fact that the two ecstasy groups (problematic and non-problematic) differed markedly in reported problems attributed to ecstasy use, both ecstasy user groups showed similar drug consumption profiles, duration of use and lifetime consumption of ecstasy. Thus there were differences in perceived problems between groups yet they exhibited similar patterns of drug use and similar levels of cognitive impairment in comparison to controls. However, this study did not formally assess psychopathological status. Rather subjects were asked to indicate whether they had or had not experienced problems which they attributed to their past use of ecstasy.

The present study used this subjective attribution-based categorization (i.e. 'problematic' versus 'non-problematic'), and sought to address whether or not levels of ecstasy use are integral to issues relating to problematic ecstasy use, by assessing the patterns of ecstasy use and psychopathological status in users who reported psychological problems that they attributed to their past ecstasy use (labelled here as 'problematic' ecstasy users) and recreational ecstasy users who felt that they were problem free ('non-problematic' ecstasy users), in addition to a polydrug control group and an illegal recreational drug-naive control group. To address the increased need to assess the role of premorbid psychiatric vulnerability in ecstasy users (Fox *et al.*, 2001b), self-reported individual and family psychiatric histories were also recorded.

Psychopathological status was assessed in all groups, using the Brief Symptom Inventory (BSI; Derogatis and Melisaratos, 1983). The BSI is a shortened, reliable and valid alternative version of the self-report clinical rating scale, the SCL-90-R (Derogatis and Melisaratos, 1983), a revised version of the SCL-90 (Derogatis *et al.*, 1973). Previous studies have demonstrated elevated psychopathology in ecstasy users, compared to controls using both the SCL-90 (Parrott *et al.*, 2000; Parrott *et al.*, 2001; Dugherio *et al.*, 2001) and the SCL-90-R (Daumann *et al.*, 2001; Simon and Mattick, 2002; Morgan *et al.*, 2002; Thomasius *et al.*, 2003). Further still the BSI allows for a measure of psychopathology in the 'problematic' ecstasy users; to more formally assess whether they do exhibit higher psychopathological ratings compared to 'non-problematic' users, or whether there is just a difference in awareness and perception in problematic ecstasy users as demonstrated previously by Fox *et al.* (2001a) and Fox *et al.* (2001b).

Method

Participants

Participants were recruited throughout the University of East London's email system, posters around the University of East London (UEL) and various clubs throughout London and an advertisement (using the same wording) in the *Big Issue* magazine. The poster simply called for any ecstasy and/or other drug users, or other clubbers interested in psychological research to contact us for details. A total of 288 volunteers participated in the study: 111 (37 male, 74 female) illegal drug-naive participants, who reported no past drug use other than alcohol and nicotine; 62 (27 male, 35 female) polydrug users who had no history of ecstasy use but otherwise had used other illicit drugs; 62 (33 male, 29 female) non-problematic ecstasy users, who reported ecstasy and other polydrug use but did not report problems from their past ecstasy use; and 53 (25 male, 28 female) problematic ecstasy-polydrug users who indicated they had experienced problems which they attributed to ecstasy use. These problematic ecstasy users were distinguished *post hoc* from non-problematic users by answering 'yes' to the single question 'Have you experienced any problems, which you attribute to your ecstasy use?'; which was one of the questions within the ecstasy use section of the drug history questionnaire (see below).

Participants were asked to abstain from using ecstasy for at least 2 weeks and any other drug for 24 hours prior to testing. Informed written consent was obtained from all participants, and the protocol and measures used in this study were approved by the University of East London research ethics committee.

Assessment measures

All participants provided details of their own and their immediate family's psychiatric history, while past drug history was assessed using the UEL drug use questionnaire. Ecstasy users were required to provide further information concerning patterns of ecstasy use: the duration of ecstasy use; the last time taken; the average number of ecstasy tablets/capsules consumed in one occasion; and the largest number of tablets/capsules consumed in one occasion. Those ecstasy users that were self-identified as problematic ecstasy users were further asked whether the problems they had experienced had led them to seek help and/or advice from a professional or organization, and to indicate which particular service they had approached (e.g. GP, clinical psychologist, psychiatrist, drugs clinic/services or counselling).

Following completion of the above, psychopathological status was then assessed using the Brief Symptom Inventory (Derogatis and Melisaratos, 1983). This scale is comprised of 53 items, each rated on a standard five point Likert Scale: not at all (0), a little bit (1), quite a bit (2), moderately (3) and extremely (4). The distinct items reflect nine primary symptom dimensions or subscales: somatization, obsessive-compulsive behaviour (OCD), interpersonal sensitivity, depression, anxiety, anger/hostility, phobic anxiety, paranoid ideation and psychoticism.

Statistical analysis

Data analysis was conducted using SPSS 10.1.3. One-way ANOVAs were performed on the BSI data, demographic and drug use data to assess whether there were any group differences between illegal drug-naive, polydrug controls, ecstasy users and problematic ecstasy users. Where there were violations of homogeneity of variance (e.g. age, rating of health and drug use data) the Kruskall Wallis test was employed. *Post hoc* pair-wise comparisons between groups were conducted using the Tukey's HSD range statistic and Mann-Whitney test for the non-parametric equivalent, with the error rate set at 0.013, to avoid type I errors. Chi-squared tests were used to investigate any significant group differences with questions regarding gender, reported individual and family psychiatric history. The independent samples t-test was used to assess differences in patterns of ecstasy use between the two ecstasy using groups.

Results

Group characteristics, psychiatric histories and drug use data

Table 1 shows demographic data and patterns of drug use for all groups. There were no significant group differences for gender or health, however there was a significant group effect of age [$\chi^2(3) = 19.51$, $p < 0.001$]; non-problematic ecstasy users were significantly older than illegal drug-naive controls ($p \leq 0.001$).

Table 1 also shows that there were significant group differences across a number of the reported illegal drug types: amphetamine ($\chi^2(2) = 69.05$, $p < 0.001$); cocaine ($\chi^2(2) = 68.97$, $p < 0.001$); crack ($\chi^2(2) = 13.08$, $p = 0.001$); LSD ($\chi^2(2) = 60.93$, $p < 0.001$); magic mushrooms ($\chi^2(2) = 43.37$, $p < 0.001$); poppers ($\chi^2(2) = 57.01$, $p < 0.001$); ketamine ($\chi^2(2) = 37.39$, $p < 0.001$); and current ($\chi^2(2) = 11.42$, $p = 0.003$) and past cannabis use ($\chi^2(2) = 12.84$, $p = 0.002$). Specifically, polydrug controls reported using significantly less amphetamine, cocaine, LSD, magic mushrooms, poppers, ketamine and current cannabis use compared to non-problematic ecstasy and problematic ecstasy users; and significantly less crack and past cannabis use compared to problematic ecstasy users. Non-problematic ecstasy and problematic ecstasy users reported similar consumption of illegal drugs, with the exception of LSD and magic mushrooms, where the problem ecstasy group reported a significantly greater consumption of both drugs.

There were significant group differences on the consumption of tobacco ($\chi^2(3) = 78.23$, $p < 0.001$) and alcohol ($\chi^2(3) = 75.04$, $p < 0.001$). Illegal drug-naive participants reported using significantly less tobacco and alcohol compared to polydrug controls, non-problematic ecstasy and problematic ecstasy users. Polydrug controls also reported significantly less tobacco use compared to non-problematic ecstasy and problematic ecstasy users and significantly less alcohol compared to non-problematic ecstasy users.

Patterns of ecstasy use differed between the two ecstasy using groups. Problematic ecstasy users reported significantly higher lifetime consumption levels of ecstasy [$t(113) = -2.31$, $p = 0.025$], significantly higher average dosage levels [$t(109) = -3.09$, $p = 0.003$] and significantly higher maximum dosage levels [$t(109) = -2.90$, $p = 0.005$] compared to non-problematic ecstasy users. However, there were no significant differences in duration of ecstasy use and abstinence periods from ecstasy use between the two ecstasy using groups.

There was a significant difference in reported psychiatric history ($\chi^2(3) = 30.71$, $p < 0.001$) and family psychiatric history ($\chi^2(3) = 18.84$, $p < 0.001$), with a greater number of problematic ecstasy users reporting a psychiatric history compared to controls and non-problematic ecstasy users (Table 2).

Problematic ecstasy users were also asked to indicate whether they had sought some form of help for their ecstasy-attributed problems; 32.1% (n = 17) reported they had. The most common help sought was from a GP, with 26.4% of this subgroup of the problematic users having consulted their local doctor. In addition, 11.3% sought help from a psychiatrist or other organization, and 9.4% sought help from a clinical psychologist or drugs service.

Psychopathological indicators

Table 3 shows the group scores for all the subscales of the BSI. Problematic ecstasy users reported significantly higher levels of somatization [$F(3,284) = 4.35$, $p = 0.005$] compared to non-problematic ecstasy users, illegal drug-naive and polydrug controls. The problematic ecstasy users also reported significantly higher scores on the depression subscale [$F(3,284) = 3.60$, $p = 0.014$] and anxiety [$F(3,284) = 5.94$, $p = 0.001$] compared to illegal drug-naive controls and non-problematic ecstasy users. Problematic ecstasy users and polydrug controls reported significantly higher levels of obsessive-compulsive symptomatology [$F(3,284) = 4.65$, $p = 0.003$] compared to illegal drug-naïve participants. There were significant group effects on the anger subscale [$F(3,284) = 2.70$, $p = 0.046$], with illegal drug-naive controls showing lower scores than polydrug, non-problematic and problematic ecstasy users; however these no longer remained significant following *post hoc* analyses.

Discussion

Problematic ecstasy users demonstrated significantly higher levels of psychopathology compared to non-problem ecstasy users, polydrug users and illegal recreational drug-naive controls on a number of the BSI subscales. Problematic ecstasy users reported higher symptoms associated with somatization, depression and anxiety compared to non-problematic ecstasy users. However, despite similar patterns of other polydrug use between these two ecstasy using groups, problematic ecstasy users did report higher levels of ecstasy use (a significantly higher average dose, maximum dose and lifetime consumption) compared to non-problematic ecstasy users. What is interesting is that there were no differences in the duration of ecstasy use between the two ecstasy user groups, which suggest that problematic ecstasy use may be a function of intensity of ecstasy use rather than the duration of use.

This study also presents data of a group of ecstasy users (the

Table 1 Group demographics, drug use data and patterns of ecstasy use in illegal drug-naive, polydrug users, non-problematic and problematic ecstasy users

	Illegal drug-naive (N)	Non-ecstasy polydrug users (C)	Non-problematic ecstasy users (E)	Problematic ecstasy users (P)	Group effect	*Post hoc* comparisons
Gender	37 M/74 F	27 M/35 F	33 M/29 F	25 M/28 F	0.065	
Age	23.72 ± 6.79	25.55 ± 7.02	25.24 ± 4.22	25.74 ± 5.14	<0.001	N < E
Current rating of health	3.34 ± 0.80	3.16 ± 0.96	3.15 ± 0.70	3.13 ± 0.79	0.269	
Patterns of ecstasy use:						
Average dose	–	–	1.82 ± 1.07	2.89 ± 2.25	0.003	E < P
Maximum dosage	–	–	4.19 ± 3.08	6.56 ± 5.38	0.005	E < P
Total consumption	–	–	117.27 ± 273.48	404.61 ± 871.36	0.025	E < P
Duration of ecstasy use (months)	–	–	59.30 ± 42.34	75.02 ± 47.55	0.075	
Months since last used	–	–	13.94 ± 20.40	17.22 ± 28.91	0.493	
Other drug use:						
Amphetamine	0	2.06 ± 5.69	26.58 ± 36.35	73.45 ± 154.39	<0.001	C < E, P
Cocaine	0	3.50 ± 13.64	24.48 ± 39.85	74.13 ± 273.74	<0.001	C < E, P
Crack	0	0	0.11 ± 0.45	2.23 ± 13.76	0.001	C < P
Opiates	0	0.10 ± 0.53	0.23 ± 0.58	1.17 ± 4.07	0.058	
Benzodiazepines	0	0.85 ± 3.84	2.11 ± 7.40	3.68 ± 8.43	0.005	
LSD	0	0.27 ± 1.33	8.11 ± 13.99	70.84 ± 278.80	<0.001	C < E, P: E < P
Magic mushrooms	0	1.08 ± 4.41	15.18 ± 67.74	179.04 ± 733.17	<0.001	C < E, P: E < P
Solvents	0	0.15 ± 0.81	0.68 ± 3.86	10.00 ± 43.47	0.004	
Poppers	0	1.02 ± 2.83	28.85 ± 126.95	14.17 ± 19.16	<0.001	C < E, P
Ketamine	0	0	2.13 ± 10.23	5.66 ± 16.33	<0.001	C < E, P
Prozac	0	0.10 ± 0.56	0.18 ± 0.78	0.25 ± 1.65	0.662	
GHB	0	0	0.18 ± 0.92	3.06 + 20.60	0.053	
Others	0	0.19 ± 0.94	0.18 ± 1.09	0	0.292	
Tobacco (per day)	0.80 ± 3.67	3.55 ± 5.76	6.84 ± 7.95	6.53 + 7.18	<0.001	N < C, E, P: C < E, P
Alcohol (units per week)	4.16 ± 7.83	9.00 ± 10.99	15.02 ± 9.56	13.23 + 14.45	<0.001	N < C, E, P: C < E
Current cannabis use (no. per month × no. years)	0	564.97 ± 2349.78	990.19 ± 1639.99	1092.91 ± 1709.50	0.003	C < E, P
Past cannabis use (no per month × no. years)	0	239.71 ± 429.09	956.83 ±2053.35	1238.07 ± 1846.14	0.002	C < P

Table 2 Reported psychiatric and family psychiatric histories for illegal drug-naive, polydrug users, non-problematic and problematic ecstasy users

	Participants				Immediate family			
	Illegal drug-naive	Polydrug users	Non-problematic ecstasy users	Problematic ecstasy users	Illegal drug-naive	Polydrug users	Non-problematic ecstasy users	Problematic ecstasy users
Anxiety	3	4	6	14	5	12	5	19
Depression	9	9	14	22	31	22	22	32
Obsessive-compulsive disorder	0	1	0	1	0	2	2	2
Schizophrenia	0	0	0	1	1	2	4	5
Phobia	2	0	3	4	3	2	0	2
Panic attacks	1	2	3	16	6	7	6	14
Eating disorder	6	4	1	6	5	5	4	8
Alcohol and/or drug dependency	1	0	3	3	10	7	6	11

Table 3 Mean scores (SDs) across all dimensions of the BSI for illegal drug-naive, polydrug controls, non-problematic and problematic ecstasy users

Symptom dimension	Illegal drug-naive (N)	Polydrug controls (C)	Non-problematic ecstasy users (E)	Problematic ecstasy users (P)	Group effect	*Post hoc* comparisons
Somatization	0.46 ± 0.53	0.48 ± 0.56	0.45 ± 0.49	0.77 ± 0.64	0.005	N, C, E $<$ P
Obsessive-compulsive	1.05 ± 0.77	1.41 ± 0.92	1.21 ± 0.74	1.47 ± 0.76	0.003	N $<$ C, P
Interpersonal sensitivity	0.98 ± 0.89	1.14 ± 0.96	1.04 ± 0.88	1.38 ± 0.92	0.062	
Depression	0.69 ± 0.78	0.83 ± 0.82	0.74 ± 0.69	1.11 ± 0.89	0.014	N, E $<$ P
Anxiety	0.63 ± 0.65	0.83 ± 0.87	0.63 ± 0.65	1.11 ± 0.82	0.001	N, E $<$ P
Anger/hostility	0.65 ± 0.69	0.95 ± 0.89	0.81 ± 0.83	0.97 ± 0.91	0.046	
Phobic anxiety	0.37 ± 0.56	0.47 ± 0.71	0.36 ± 0.55	0.54 ± 0.69	0.285	
Paranoid ideation	0.88 ± 0.78	1.03 ± 0.86	0.85 ± 0.75	1.06 ± 0.75	0.306	
Psychoticism	0.58 ± 0.68	0.65 ± 0.74	0.66 ± 0.70	0.83 ± 0.77	0.216	

non-problematic ecstasy users) who do not appear to show significantly elevated psychopathology compared to polydrug and illegal drug-naive controls. This could be seen as contrary to previous research, which has demonstrated ecstasy users to have higher levels of psychopathological symptomatology compared to control groups (e.g. Parrott *et al.*, 2000; Dugherio *et al.*, 2001; Parrott *et al.*, 2001; Gamma *et al.*, 2001; Daumann *et al.*, 2001; Morgan *et al.*, 2002; Thomasius *et al.*, 2003). This suggests that ecstasy users may well fall into two broad but distinct categories, that differ with respect to subjective awareness and symptoms of clinical problems attributable to ecstasy use: ecstasy users who do not report any adverse effects from using the drug and who are not showing signs of psychopathology (non-problematic ecstasy users), and ecstasy users who do report problems attributable to the drug and who are showing evidence of psychopathology (problematic ecstasy users).

The current data do, however, also suggest that the development of problems in users may be a result of intense ecstasy use, which would support those findings of Parrott *et al.* (2002). They reported that ecstasy-attributed problems were a direct function of the number of occasions on which the drug has been consumed. Fox *et al.* (2001a) also demonstrated that cognitive problems were related to ecstasy dosage, and that perception of psychological well-being (i.e. whether participants defined themselves as problematic ecstasy users or not) was unrelated to ecstasy use. Instead, Fox *et al.* (2001b) suggested that problematic ecstasy use was related to less socially orientated motivations for using the drug and negative interpersonal experiences prior to taking the drug. This further suggests the need for the assessment of premorbid criteria when looking at problematic ecstasy use, in addition to clarification of dosage and patterns of use; particularly bingeing and prolonged periods of intense use.

The current study also supports the idea that problematic ecstasy use may be due to premorbid vulnerabilities in individuals (i.e. in those individuals that report problems associated with their ecstasy use). The data indicated that a greater number of problematic ecstasy users reported previous psychiatric histories, and were more likely to have a family history of psychiatric illness, compared to non-problematic ecstasy users. Thus, premorbid psychiatric differences may have contributed to these 'ecstasy-related'

problems in one of two ways. First, it may be the case that the problematic users may constitute a cohort of individuals with a predisposed psychopathological vulnerability; perhaps in evidence here with the greater number of reports of family psychiatric history in this group. The classic diathesis model for mental health, proposes that the combined impact of genetic predisposition and an environmental stressor produces a given negative mental health outcome (Gabbard and Goodwin, 1996). In the problematic users, their ecstasy use may have constituted this significant external stressor by negatively modulating normal brain function. In less vulnerable individuals (i.e. here the non-problematic users) ecstasy use alone may not be sufficient for the emergence of psychological problems.

Second, these problems may have existed prior to their ecstasy use. There is the possibility that the onset of psychopathological problems may have preceded rather than followed initiation of ecstasy and other drug use. Indeed, pre-existing psychopathological problems may be a cause rather than an effect of ecstasy use, since poor premorbid adjustment is associated with increased drug use (Goldberg and Ersnt, 2004). This possibility was not addressed, however, in the current retrospective nature study; though additional questions of this nature could be added to such a protocol in future. In a prospective-longitudinal study in a non-clinical sample, Lieb *et al.* (2002) found that in a majority of cases (88%), ecstasy and other polydrug use was actually secondary to the onset of DSM-IV mental disorders and psychological problems. These premorbid disorders consisted mainly of specific phobia (98.4%), social phobia (76.6%), alcohol abuse/dependence (78%) and somatoform conditions (73.2%). In addition, the risk of initiation of ecstasy use was higher in those individuals who presented themselves with a mental disorder at baseline. It should be noted though that in the present study, problematic users were those who attributed their problems to ecstasy use and, though not conclusive, this would seem to imply that these individuals had not had significantly notable difficulties prior to MDMA exposure.

However, the relationships between drug use, vulnerability to psychopathology and pre-existing problems are clearly not simple to formularize; other factors may also be crucial. For example, Brady *et al.* (1993) reported that whilst females were more likely to suffer from depression and other affective disorders prior to their drug use, males were more likely to develop depression after the onset of drug use; indicating that psychiatric factors may precede or contribute to the initiation of drug use in females, but be more consequential to drug use in males. This finding was later supported by Zilberman *et al.* (2003) who reported that females were more likely to use drugs as a result of mood and anxiety disorders, whereas males were more likely to show psychiatric problems after the onset of drug use. Such pre-existing differences could also account or contribute to the patterns of ecstasy use. For example, a slightly depressed or anxious individual may need to consume more ecstasy tablets in order to achieve the subjective effects similar to those experienced by 'normal' individuals and/or part of their ecstasy usage is a form of self-medication for these pre-existing pathologies. Both these issues may help to explain the differential patterns of ecstasy usage between the problematic and non-problematic ecstasy users in this research.

There are several limitations of the current study, which are characteristic of most research into the psychological effects of ecstasy use (Curran, 2000; Cole and Sumnall, 2003). There was no objective measure and confirmation of past ecstasy and polydrug use. Whilst it is noted that non-problematic and problematic ecstasy users reported similar consumption profiles of other drugs, there may have been distinct differences in the consumption patterns of these drugs on their own and in combinations (with ecstasy and/or other substances), which could have contributed to the different psychopathological profiles. Additionally, whether ecstasy was actually consumed, and in what amounts, is also open to debate, since there is little quality control on the streets with regard to content of ecstasy tablets. Some surveys report considerable variation in the composition of ecstasy tablets (Cole *et al.*, 2002), whilst others suggest that in recent years most ecstasy has contained MDMA, in varying doses, and little else (Parrott, 2004). Additionally, problematic ecstasy use was only confirmed using the BSI which, whilst a reliable and valid measure (Derogatis and Melisaratos, 1983), still relies on participants' subjective reporting. Further confirmation of current psychiatric status using more objective assessment tools/measures would be desirable in future work. Finally, estimates of other drug use are also problematical, like ecstasy, by being based on self-report and consumed in the context of illicit use. What constitutes a dose of cocaine, cannabis, LSD etc. is at best a rough estimate and at worst inaccurate; for example, because of individual's preparations (e.g. how strong is the cannabis and how much is put in a joint; or what constitutes a line of cocaine), and what is available from sellers. This is, of course, a common problem to all recreational drug research, and greater objectivity could be incorporated into further work by taking one or more biologic markers of drug use, such as the use of urine and/or hair analysis techniques; although these measures are not without significant flaws themselves (see, for example, Curran, 2000 and Cooper *et al.*, 2000, respectively).

Whilst there are a number of potential confounding variables, this study does highlight the need for future research focusing on the problematic nature of ecstasy-related effects; to distinguish between those who consider themselves to have developed problems attributable to their ecstasy, and those ecstasy users who appear to remain unaffected and not problematized by MDMA exposure. This study also highlights the importance of assessing not only current psychiatric status of ecstasy users (which is more often than not only the basis for exclusion criteria, employed in many studies assessing the psychological effects of ecstasy e.g. Morgan *et al.*, 2002; Daumann *et al.*, 2001), but participant's previous psychiatric history and that of their immediate family. The current data suggests this is a potentially vital concern in the exploration of problematic ecstasy use. Previous studies assessing both the cognitive and psychopathological effects of ecstasy use have not explicitly addressed such issues, which could potentially limit the interpretation of their findings. One of the key challenges for future research is to attempt to screen and control for these possible premorbid psychological characteristics in ecstasy users, before concluding that ecstasy is a primary risk factor for the onset of certain psychopathological problems.

There is also a need within future ecstasy research to be clear on the definition of 'problematic' ecstasy use, before drawing any

conclusions concerning ecstasy and the development of clinical problems and when comparing research findings. It is interesting to note, that within the current study 58 participants self-perceived themselves as being problematic, however, only 17 (32.1%) reported having sought some form of help for their problems. These individuals tended to seek help via primary care services (GP, psychiatrists, clinical psychologists), with the GP being the first port of call. This is consistent with findings of Topp *et al.* (1999) who found one-fifth of their ecstasy using sample had received formal assistance from a health practitioner for an ecstasy-related problem; and this too was predominantly from a GP (11%). Despite a smaller number of the problematic ecstasy users developing problems to the extent that they had to seek help for them, this is still of concern. Such help-seeking behaviour has implications for health services, where GPs may benefit from the dissemination of ecstasy-related information.

More generally future research looking at possible sub-categories of ecstasy polydrug users needs to be more explicit in the nature of the questions asked of participants. This study uses a somewhat crude classification system, labelling users as 'problematic' or 'non-problematic' on the basis of a single question relating to the experience of 'problems' which users attribute to use of ecstasy. This effectively replicates the method used in Fox *et al.* (2001b), although this study did also ask participants to give some qualitative information regarding the nature of problems. The problems most commonly reported were related to low mood, depression and anxiety, and to experiences of cognitive difficulties (Fox, 2002). However, limiting assessment to a single question may have missed some important information, as the word 'problem' is of course open to wide interpretation. As highlighted by one of our reviewers, it would be interesting and important in future to obtain more detailed data on the nature of problems: including those related to relationships, career/work, crime/convictions etc. Furthermore, the use of the word 'problem', and of asking users to self-identify themselves as having problems, could be argued to be an approach that may produce some response biases. This is possible; however we would suggest that this would be demonstrated by evidence of systematic responding on a questionnaire, in this case the BSI. The current data, however, show a selective pattern of decrements on this scale, such that the problematic users only scored higher than the non-problematic users on four of the nine factors (see Table 3).

In summary, the current findings suggest the need for future ecstasy-related research to distinguish between ecstasy users who have developed psychological problems from the drug, from those who have not and to further explore the differences between the two ecstasy using groups to establish what factors/issues contribute to the development of such adverse psychopathology. The current study points to the possible role of intense ecstasy use and a predisposed psychiatric vulnerability, in determining whether or not ecstasy-related problems develop.

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