

## ORIGINAL ARTICLE

# Factors associated with teenage ecstasy use

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### Abstract

**Aims:** The aim of this article was to investigate the factors associated with ecstasy use in school-aged teenagers.

**Methods:** This was a longitudinal study of adolescent drug use, which was undertaken in three towns in Northern Ireland. A questionnaire was administered annually to participants. In this article ecstasy use patterns amongst a cohort of young people aged 14–16 years participating in the Belfast Youth Development Study (BYDS) was explored.

**Findings:** The percentage of those who had used ecstasy at least once increased from 7% when aged 14 years to 9% at 15 and 13% at 16 years. Female gender, delinquency, problem behaviours at school and the number of evenings spent out with friends each week were found to be significant variables predicting ‘ever use’ of ecstasy in all 3 years by logistic regression.

**Conclusions:** The findings suggest that ecstasy use patterns may be changing from their historical perception as a ‘party’ drug, as the demographic profile ecstasy of users in this study reflected the traditional profile of illicit drug use during adolescence, which raises challenges for addressing the problems associated with this drug.

### Introduction

Despite being a relatively new drug (van Ours, 2005) ecstasy (3,4-methylenedioxymethamphetamine, MDMA) has become widely used as a recreational drug by young people around the world (Christophersen, 2000), and for over a decade has been an established part of youth culture in some countries (WHO, 1996) and part of the acid house, rave and dance scene in the UK for 20 years now. It is labelled one of the ‘party’ or ‘club’ drugs with use highest amongst teenagers and young adults in social settings including bars, concerts and dance parties (Koesters, Greenberg, Pollack, & Dolezal, 2002). Early studies of ecstasy users

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found generally self-limiting patterns of use, but some progress to problematic use, (Handy, Pates, & Barrowcliff, 1998; Schifano, 2000) and few negative health effects (Beck & Rosenbaum, 1994; Moore, 1993; Solowij, Hall, & Lee, 1992), or severe problems recorded among users (Beck & Rosenbaum, 1994; Chesher, 1990). As a result there appeared little cause for concern in relation to its use as ecstasy was considered a relatively benign substance (Chesher, 1990; Johnston, O'Malley, & Bachman, 2001; Solowij et al., 1992), with older adolescence and early adulthood the key period of use (Randall, 1992).

However, more recently the patterns of use indicate more prevalent use in a variety of settings (Boys, Lenton, & Norcross, 1997; Forsyth, 1997; Green, Cross, & Goodwin, 1995), with deaths reported particularly among young people in which ecstasy has been implicated (Clegg & Tracey, 1993; Henry, Jeffrey's, & Dawling, 1992; Landry, 2002; Raikos et al., 2002; Schifano et al., 2003; Schuster, Leib, Lamertz, & Wittchen, 1998; Solowij, 1993; White, Bochner, & Irvine, 1997; Wilkins, Bhatta, Pledger, & Casswell, 2003) and users now believing its use carries some risk (Gamma, Jerome, Liechti, & Sumnall, 2005). In the USA, Patel, Wright, Ratcliff, and Miller (2004) reported a 400% relative increase in ecstasy-related fatalities between 1999 and 2001. Serious health related incidents involving ecstasy often include references to the environment with temperatures reaching 40°C (Burke, 2001). Hyperthermia and hyponatraemia are the most significant, and potentially life threatening, acute adverse effects associated with use of the drug (Gowing, Henry-Edwards, Irvine, & Ali, 2002; Henry et al., 1992) leading to more scrutiny of the adverse effects of using ecstasy including its neurotoxic effects (Gowing et al., 2002; Green et al., 1995). Use of the drug has been linked to long-term effects including emotional health problems such as depression, psychotic symptoms and anxiety disorders (Falck, Carlosn, Wang, & Siegal, 2006; Huizink, Ferdinand, van der End, & Verhulst, 2006; Leib, Schuetz, Pfister, von Sydow, & Wittchen, 2002; Parrott, 2002; Parrott, 2001; Schifano, Di Furia, Forza, Minicuci, & Bricolo, 1998) with ecstasy users also reporting more experience of childhood trauma (Singer, Linares, Ntir, Henry, & Minnes, 2004). Huizink et al. (2006) found that those with childhood symptoms of anxiety and depression may have an increased tendency to use ecstasy in adolescence or young adulthood although this is not a proven causal relationship.

Strong links have been established between ecstasy and other drug use (Martins, Ghandour, & Chilcoat, 2005; Wu, Schlenger, & Galvin, 2006). Reid, Elifson, & Sterk, (2006) noted that age of onset of ecstasy influenced the initiation of cocaine use. Others highlight positive associations between the drug and deviant behaviours (Leib et al., 2002; Martins et al., 2005). These factors might influence the initiation of ecstasy use and progression to other drug use with Zimmerman, Wiottchen, Waszak, Hofler, and Leib (2005) noting that cannabis use was predictive of initiation among adolescents and Martins et al. highlighting a pathway from ecstasy initiation to cocaine and heroin. However, the physiological effects of ecstasy (e.g. hyperthermia and hypertension) either alone or in combination with other drugs, in rare instances, can be fatal

(Kalant, 2001), with the abusive potential and risks of ecstasy not be underestimated (Guillot & Berman, 2007).

To date, most studies of ecstasy have had a focus on adults and specific population subgroups (e.g. drug users, college students or party club participants). As a result the patterns and correlates of specific club drug use among young people in the community have been underestimated (Wu et al., 2006). Research on ecstasy has focused on its physiological effects with information on the social and behavioural characteristics of ecstasy users neglected to some extent (Curran, 2000; Ghuran & Nolan, 2000; Morgan, 1999; Panagopoulos & Ricciardelli, 2005; Ricaurte, 1996; Ricaurte, Yuan, & McCann, 2000; Ricaurte & McCann, 1992; Shewan, Dalgarno, & Reith, 2000). Completed surveys of school-aged young people suggest increases in use (Adlaf, Paglia, Ivis, & Ialomiteanu, 2000; Balding, 2001; Beinart, Anderson, Lee, & Utting, 2002; Johnston et al., 2001; Parker, Aldridge, & Measham, 1998); however, little is known about the correlates of adolescent ecstasy use, including whether polydrug use is more common among younger users (Degenhardt, Barket, & Topp, 2004; Rotheram-Borus et al., 1999; Yacoubian, 2002). Despite the growing levels of ecstasy use and the increasing body of evidence of both short- and long-term negative effects of its use, studies with a primary focus on ecstasy use amongst school-aged young people are limited although a number of UK-based surveys of school-aged young people have recorded prevalence estimated of use on this drug. For example, Beinart et al. (2002) reported 2.5% lifetime ecstasy use amongst 14/15 year olds in the UK with a higher proportion of female users. Parker et al. (1998) reported more than 5% lifetime use at 15 and 16 years of age with Balding (2001) reporting higher levels of lifetime use of 9% at this age. This article aims to examine the patterns of ecstasy use amongst young people participating in the Belfast Youth Development Study (BYDS), a longitudinal study of the onset and development of adolescent drug use, in order to explore more fully the factors associated with use of the drug amongst this age group.

## **Methodology**

### *Research design*

The young people participating in this study were part of the BYDS, a longitudinal study of the onset and development of adolescent drug use. It is described elsewhere (e.g. McCrystal, Higgins, & Percy, 2006, 2007a). This section will describe the key features of the study to this article.

### *The sample*

The young people participating in the study were attending 43 postprimary schools located in three towns in Northern Ireland (Belfast, Ballymena and Downpatrick). This represented 78% of those invited to participate. Twelve (28%) schools had a female only register, 12 (28%) male only and 19 (47%) had a co-educational register. Sixteen (40%) were grammar schools (i.e. pupils were

Table I. Data collection for BYDS years 1–5.

Stage	Year total	Refusal (N)	Refusal (%)	Absent (N)	Absent (%)	Questionnaires (N)	Response rate (%)
Total (Y10)	5229	335	6	399	8	4491	85
Total (Y11)	5010	284	6	823	16	3903	78
Total (Y12)	4969	304	6	877	18	3788	76

selected by academic ability at age 11 years) and the others secondary/comprehensive schools. The school sample represented 19% of all postprimary schools in Northern Ireland. Table I presents a summary of fieldwork undertaken for the 3 years of the study which corresponds to years 3, 4 and 5 of the BYDS but will be referred to as years 1, 2 and 3 in this article. Information on those who were absent at the time of data collection and the numbers for whom parental consent was not received and therefore did not participate in the study are also presented here.

#### *The BYDS questionnaire*

The BYDS questionnaire that is described elsewhere (McCrystal et al., 2006, 2007a) was developed by identifying key research priority areas for understanding adolescent drug use. Measures of both licit (alcohol, tobacco and solvents) and illicit drug use (cannabis, ecstasy, cocaine) were included. The respondents were asked about lifetime cigarette use (i.e. have you ever used?) and frequency of current use, as well as sources of the substance and locations of use. A measure of quantity of cigarettes smoked was also included. Delinquent or antisocial acts committed during the 12 months prior to each data collection sweep were assessed for all respondents from a list of 12 such behaviours. More serious offending was assessed by asking about contact with criminal justice agencies (i.e. police, courts) during the 12 months prior to the survey. Family level measures obtained here consisted of two main categories. The first of these was family structural characteristics (i.e. who lives at home with the young person). The second assessed the relationship between parent and child and the strategies that parents used to monitor and supervise the behaviour of their children. This was assessed using Stattin and Kerr's (2000) parental monitoring instrument. The socioeconomic status of each young person was assessed by asking if they were eligible for free school meals, a general measure of social deprivation in the UK (Cassen & Kingdon, 2007; DfES, 2005; DfES/HM Treasury 2005; Shuttleworth 1995). Commitment to school was assessed using seven Likert items assessing commitment to school e.g. 'I am quiet in class and get on with my work'. These items were summed to generate a total commitment score. An additional four items were used to gain an insight into the young person's motivation to continue education after the end of compulsory schooling (at age 16) (e.g. 'I want to go to university after school'). These items were summed

to generate a total motivation score. A 12-item Likert scale was developed to assess attitudes towards the neighbourhood in which they lived which was defined as 'the area within a 15 minute walk from your home'. Neighbourhood factors included in the analysis were neighbourhood attachment, neighbourhood disorganization, collective efficacy and perceived norms.

### *Data collection*

A passive parental consent procedure was adopted by the research team to gain parental consent at each datasweep. Prior to each datasweep, the parents/guardians of each young person received a letter from the researchers (posted by participating schools) informing them about the study and requesting permission for the participation of their son/daughter (i.e. they were required to sign a consent form and return it to the researchers). Parents who did not complete a refusal slip were deemed to have given passive consent during the first year of the study. In the subsequent years parents who did not consent to the participation of their child received an amended letter requesting active consent in the subsequent years of the study (i.e. they had to sign and return a consent request to the research team). At each data collection sweep participants were informed of the purpose of the study and assured of the confidentiality of their responses by the researchers before being invited to complete the questionnaire. Data was collected via a self-completion questionnaire within participating schools supervised by members of the research team. In the second year, three schools did not participate due to industrial action by teachers. In the third year one school refused to participate.

### *Data analysis*

All data obtained from the questionnaire was coded and input onto the SPSS software system for analysis. The drug using behaviours of ecstasy users in the present study was assessed through a comparison of the data on the measures described above with data obtained from the non-ecstasy using group in the three towns where the BYDS is located. This provided a contemporary context within which to place the experiences of ecstasy users participating in the study. The analysis therefore offers the opportunity to assess ecstasy using patterns and behaviours of young people from the age of 14–16 years.

## **Results**

The levels of lifetime ecstasy use more than doubled from 6% at the beginning of the reporting period when the young people were aged 14 years to 9% the following year and 13% the year after when they were aged 16 years. Ecstasy users were more likely to be female, less likely to live with both biological parents, with approximately one quarter living in a single parent family and others living in a 'reconstituted' family (i.e. one biological parental and another adult). They were also more likely to attend non-grammar schools where selection is based upon

academic ability, attend schools that were co-educational (attended by boys and girls) and live in Belfast. Ecstasy users were also more likely to be in receipt of free school meals, an indicator of social deprivation in the UK (Cassen & Kingdon, 2007; DfES, 2005; DfES/HM Treasury 2005; Shuttleworth, 1995).

Ecstasy users were more likely to use a range of both licit and illicit substances throughout the study period. In particular, more than 90% of ecstasy users had also used cannabis and two thirds also reported lifetime solvent abuse. More than one third reported cocaine use. These levels of ecstasy use were substantially higher than reported amongst those who did not use any of these substances at any time during the study period.

Ecstasy users were also more likely to have become regular (i.e. at least weekly) substance users particularly of alcohol and cannabis. Most used tobacco each day, with a mean number of 12.2 (standard deviation (SD) 7.1) cigarettes in the second year of the research, rising to 12.6 (SD 9.8) in the third year. Amongst the non-ecstasy using sample the mean number of cigarettes smoked each day was 8.9 (SD 7.0) in the second year of the study rising to 9.4 (SD 7.0) cigarettes in the third year. The level of regular use of alcohol and cannabis by ecstasy users increased during each year. By the age of 16 years around three quarters of ecstasy users also used each of these substances at least once a week. Around one fifth of them also reported cocaine use during the research, but there was a fall in the level of their cocaine use during the final year of the research.

The most popular source of ecstasy was a 'dealer', which remained at a consistent level with approximately half of all users reporting this source at each stage of the study. The other main source of ecstasy was peer networks with older friends more popular than same age friends, but same age friends became a more popular source at the end of the research period. Outside in a street or other public areas were the most popular locations for use at the beginning of the study. Other popular locations for use were a friend's house, a party or a disco. These 'social' locations became more popular among ecstasy users in the second and third years of the study as they became the most likely locations for use by the end of the study.

The range of other behaviour and lifestyle measures showed that ecstasy users were more likely to report higher levels of offending and antisocial behaviour, and have contact with the police and courts, indicating more serious levels of offending. They were more likely to report lower levels of communication with their parents/guardians compared with non-users for whom higher levels of parental monitoring, disclosure of information to parents/guardians and parental control was noted. Teenage ecstasy users were also less likely to report positive attitudes to school and lower levels of motivation to do well there when compared with non-ecstasy users during each year of the study. They were also more likely to report higher levels of truancy, detention, fighting at school and a greater likelihood to have been reported to the school principal because of misbehaviour at each stage of the research compared with non-ecstasy users. Around three quarters of ecstasy users reported truancy each year (compared with one quarter of non ecstasy users), more than two thirds received detention during each year of



the research, with the proportion of those reporting fighting at school ranging between 20% and 50% of ecstasy users and those who had been in trouble with the school principal ranging between 41% and 62% across the 3 years of the study.

Ecstasy users also reported going out more often in the evenings than non-ecstasy users. Whilst the frequency of this activity decreased as the research progressed, teenage ecstasy users continued to do so more often. They also reported lower levels of attachment to the neighbourhood in which they lived at each stage of the research as well as lower levels of perceived collective efficacy, perceived norms, and perceived neighbourhood disorganization compared with non-ecstasy users. It is likely that the factors highlighted in Tables II–V are intercorrelated. Therefore the relationship between these factors and last year ecstasy use was also examined by logistic regression analysis. Table VI presents the significance level and odds ratios for covariates included within the models.

## **Discussion**

This study provides prevalence rates and factors associated with ecstasy use during mid adolescence (i.e. 14–16 years), a period that has received comparatively little attention in the literature. Ecstasy users at this age were more likely to be female, live outside a traditional two parent family, possess an indicator of social deprivation, attend non grammar school, live in Belfast, the main urban centre in Northern Ireland, be regular polydrug users and be involved in a range of antisocial behaviours inside and outside school, compared with non-ecstasy users. These demographics contrast with early findings on ecstasy use which suggested its use was largely confined to well educated, high income earners with patterns of intermittent use (e.g. Beck & Rosenbaum, 1994; Peroutka, Newman, & Harris, 1998) who had little contact with police or social authorities (Topp, Hando, Dillon, Roche, & Solowij, 1999) and more recently evidence from Degenhardt et al. (2004) noted that ecstasy users in Australia were more likely to be young male (university) students.

More specifically these demographics highlight a number of important findings. Firstly, a higher proportion of teenage females reported lifetime ecstasy at each stage of the study. Whilst this appears to support existing findings (Grant, 1996; Warner, Kessler, Hughes, Anthony, & Nelson, 1995; Wu et al., 2006; Yacoubian, 2002), it contrasts with gender patterns for other illicit drugs such as cannabis where higher proportions of males reported lifetime and regular cannabis use during the study (McCrystal, Higgins, Percy, & Thornton, 2003; McCrystal et al., 2007a). It has also been suggested that ecstasy has a particular appeal to females (Henderson, 1999) when the drug was taken by clubbers in the 1990s in the UK. Our findings may suggest this gendered appeal is spreading downwards as the age of initiation falls into early teenage years. This is significant as some reports suggest that the prevalence of drug use disorders among females is increasing to match the rate of males, and young females appear to initiate drug

Table II. Demographic characteristics of young people using ecstasy with non-ecstasy users who participated in the BYDS.

	Year 1 (School year 10)			Year 2 (School year 11)			Year 3 (School year 12)		
	Ecstasy using group % (n=275)	Non-ecstasy using group % (n=4061)	Chi square and p-value	Ecstasy using group % (n=348)	Non-ecstasy using group % (n=3487)	Chi square and p-value	Ecstasy using group % (n=485)	Non-ecstasy using group % (n=3244)	Chi square and p-value
Gender									
Male	45	47	0.746 NS	37	48	16.4***	44	47	2.4 NS
Female	55	53		63	52		56	53	
BothPrt	62	76	27.3***	60	76	44.3***	58	76	66.5***
Recons	13	8		15	8		14	8	
Single	25	16		25	16		28	16	
FSM	38	23	32.6***	35	19	47.6***	37	17	99.5***
Grammar	33	46	18.1***	30	49	47.5***	30	52	78.3***
Non-grammar	67	54		70	51	47.5	70	48	
Male only	29	26	10.6**	24	27	27.9*	27	27	22.6***
Female only	41	33		46	33		42	32	
Co-ed	30	40		30	40		31	41	
Belfast	85	77	10.3**	85	74	24.6**	84	74	24.0***
Ballymena	8	12		10	13		7	14	
Downpatrick	7	11		5	13		8	12	

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



Table III. Drug use patterns for ecstasy users and non-ecstasy users.

	Ecstasy group		Non-ecstasy group	
	%	CI	%	CI
Tobacco use				
Year 1	96	91–100	62	59–67
Year 2	96	92–100	64	61–67
Year 3	96	93–100	68	90–94
Alcohol use				
Year 1	100	100–100	87	85–89
Year 2	100	100–100	90	88–92
Year 3	100	100–100	92	90–94
Intoxication				
Year 1	95	90–100	46	43–49
Year 2	97	94–100	55	52–58
Year 3	99	98–100	65	62–68
Solvent abuse				
Year 1	64	53–74	11	9–12
Year 2	60	47–73	10	8–12
Year 3	60	50–70	10	8–12
Cannabis				
Year 1	96	91–100	37	34–40
Year 2	93	88–98	30	27–33
Year 3	98	95–100	42	39–45
Cocaine				
Year 1	36	24–47	2	1–3
Year 2	31	23–40	2	1–3
Year 3	41	31–51	2	1–3
Heroin				
Year 1	13	5–21	0.5	0–1
Year 2	9	3–14	0.4	0–1
Year 3	6	2–11	0.4	0–1
Other pills				
Year 1	57	45–69	6	5–8
Year 2	58	49–67	6	5–7
Year 3	55	47–63	7	6–9
Poppers				
Year 1	57	45–69	9	7–11
Year 2	59	50–68	9	7–11
Year 3	57	50–65	10	8–12

Notes: The 95% confidence intervals were adjusted to account for the clustering (non-independence) within the data. In calculating the standard error of the proportions a design effect (deff) of 2 was assumed across all proportions.

use and to develop abuse or dependence at a younger age than older females (Grant, 1996; Warner et al., 1995).

A second important finding is that ecstasy users, as a group, reported high level polydrug use, a pattern similar to other studies (Martins, Mazzotti, & Chilcoat, 2007). Cannabis was the most popular illicit drug amongst the

Table IV. Lifetime substance use for ecstasy and non-ecstasy users.

	Year 1 (School year 10)			Year 2 (School year 11)			Year 3 (School year 12)		
	Ecstasy using group % (n=275)	Non-ecstasy using group % (n=4061)	Chi square and p-value	Ecstasy using group % (n=348)	Non-ecstasy using group % (n=3487)	Chi square and p-value	Ecstasy using group % (n=485)	Non-ecstasy using group % (n=3244)	Chi square and p-value
Tobacco	96	62	187.8***	96	64	151.8***	96	68	209.1***
Alcohol	100	87	56.4***	100	90	37.1***	100	92	50.2***
Intox	95	46	342.3***	97	55	239.5***	99	65	285.0***
Solvents	64	11	760.8***	60	10	642.0***	60	10	995.4***
Cannabis	96	37	477.2***	93	30	610.6***	98	42	664.9***
Ecstasy	100	.	NA	100	0	NA	100	0	NA
Cocaine	36	2	963.5***	31	2	581.9***	41	2	1104.5***
Heroin	13	0.5	361.9***	9	0.4	203.9***	6	0.4	153.5***
Pills	57	6	1004.6***	58	6	897.3***	55	7	1094.5***
Poppers	57	9	776.1***	59	9	688.2***	57	10	896.4***

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Table V. Behaviour and lifestyle measures of young people using ecstasy compared with non-ecstasy use in the BYDS.

	Year 1 (School year 10)		Year 2 (School year 11)		Year 3 (School year 12)				
	Ecstasy using group % (n=275)	Non-ecstasy using group % (n=4061)	Chi square and p-value	Ecstasy using group % (n=348)	Non-ecstasy using group % (n=3487)	Chi square and p-value	Ecstasy using group % (n=485)	Non-ecstasy using group % (n=3244)	Chi square and p value
Delinquency (max=14)	7.4	2.7	737.4***	6.0	2.1	753.8***	5.1	1.9	625.8***
Contact with criminal justice agencies									
Police (%)	76.7	29.3	256.5***	58.5	18.7	301.3***	50.6	17.0	280.5***
Arrested (%)	44.3	6.8	422.0***	27.7	42	302.2***	22.3	2.9	309.3***
Formally caution (%)	42.3	9.3	269.4***	36.6	60	380.2***	27.9	4.8	311.3***
Summon to court (%)	17.0	2.1	188.5***	11.4	1.4	146.5***	8.8	1.0	131.7***
School attitudes									
School commit (max=35)	20.4	24.5	162.7***	21.3	24.6	159.4***	22.0	25.0	184.2***
School motiv (max=25)	15.8	20.0	120.3***	16.0	19.6	133.9***	15.4	19.2	231.2***
Misbehav at school (max=4)	2.6	1.1	342.3***	2.2	0.9	366.1***	2.0	0.9	469.3***
Parental monitoring									
Monitoring (max=)	24.3	34.1	360.6***	25.7	33.5	338.0***	28.2	34.0	251.2***
Disclosure (max=)	12.2	16.8	200.5***	12.6	16.5	219.9***	13.4	16.7	207.7***
Solicitation (max=)	15.1	16.2	13.5***	15.1	16.2	18.2***	15.1	16.1	21.1***
Control (max=)	14.3	17.9	112.3***	14.5	17.4	92.8***	14.3	17.1	114.0***
Evenings out (max=7)	6.1	4.6	114.3***	5.9	4.5	124.4***	5.3	3.9	159.9***
Neighbourhood factors									
Neigh attachment (max=)	6.0	6.2	8.2**	7.0	7.6	21.8***	7.1	7.7	38.3***
Efficacy (max=)	5.7	6.6	34.2***	5.7	6.4	35.1***	5.8	6.5	37.7***
Norms (max=)	3.7	4.3	15.1***	3.9	4.4	10.1**	4.0	4.2	4.9*
Disorganization (max)	12.0	15.0	139.4***	12.5	15.3	180.2***	13.1	15.3	150.3***

Notes: Criminal Justice Agency factors report chi square value; other measures report F-value. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table VI. Logistic regressions: Estimated effects of background variables on ecstasy use.

	Recent ecstasy use		OR	95% CI
	Yes	No		
Gender–male <sup>a</sup>	<b>46</b>	<b>47</b>	<b>0.35**</b>	0.22–0.54
Low socioeconomic indicator – receive free school meals <sup>a</sup>	38	18	1.35	0.96–1.90
Live with single parent <sup>a</sup>	<b>27</b>	<b>17</b>	<b>1.53*</b>	1.10–2.13
Live in reconstituted family <sup>a</sup>	<b>15</b>	<b>8</b>	<b>1.56*</b>	1.00–2.46
School type <sup>a</sup>	70	49	1.26	0.72–2.24
School gender <sup>a</sup>	<b>73</b>	<b>58</b>	<b>2.10*</b>	1.24–3.57
School management <sup>a</sup>	<b>70</b>	<b>51</b>	<b>1.79*</b>	1.04–3.08
In trouble with police <sup>a</sup>	55	18	1.68	1.11–2.54
Arrested by police <sup>a</sup>	24	3	1.88	1.03–3.45
Cautioned by police <sup>a</sup>	30	5	0.99	0.60–1.66
Summoned to court <sup>a</sup>	9	1	1.29	0.59–2.83
No delinquent behaviours <sup>b</sup>	<b>3.5</b>	<b>2.0</b>	<b>1.22**</b>	1.14–1.30
Commitment to school <sup>b</sup>	21.8	25.0	1.02	0.98–1.05
Motivation to school <sup>b</sup>	<b>15.1</b>	<b>19.1</b>	<b>0.95**</b>	0.92–0.98
Problem behaviours at school <sup>b</sup>	<b>1.9</b>	<b>0.9</b>	<b>1.47**</b>	0.90–0.99
Parental monitoring <sup>b</sup>	27.3	33.8	0.99	0.97–1.02
Parental solicitation <sup>b</sup>	14.9	16.1	1.04	0.99–1.09
Parental control <sup>b</sup>	13.9	17.0	0.97	0.99–1.00
Child disclosure <sup>b</sup>	<b>12.9</b>	<b>16.6</b>	<b>0.94*</b>	0.90–0.99
Number of evenings out <sup>b</sup>	<b>5.4</b>	<b>4.0</b>	<b>1.14*</b>	1.00–1.29
Neighbourhood attachment <sup>b</sup>	<b>7.2</b>	<b>7.7</b>	<b>0.90**</b>	0.85–0.95
Neighbourhood efficacy <sup>b</sup>	5.9	6.5	0.96	0.80–1.04
Neighbourhood norms <sup>b</sup>	3.9	4.2	0.99	0.92–1.07
Neighbourhood disorganization <sup>b</sup>	13.1	15.3	1.01	0.98–1.05

Note: <sup>a</sup>Percentage per group reported, <sup>b</sup>mean score for group reported. \* $p < 0.05$ , \*\* $p < 0.01$ .

ecstasy users, a frequent finding in other studies (Duff, 2005; Premier's Drug Prevention Council (PDPC), 2004). This may not be surprising due to its status as an important gateway drug amongst young people (Kandel, Yamaguchi, & Chen, 1992; Yamaguchi & Kandel, 1984). However, it was not clear if this was the first illicit drug used by these ecstasy users as a proportion had used it regularly throughout the period of the research. Furthermore, others highlighted that young female polydrug users were more likely to report physical and psychological problems, at least in part due to their ecstasy use (Falck et al., 2006; Topp et al., 1999). However, the females in these studies were older than those participating in the BYDS. This is important as cannabis use may predict subsequent ecstasy initiation among adolescents and young adults (Zimmerman et al., 2005), but precedes the initiation of other illegal drugs (Kandel, 2003; Lynskey et al., 2003). For Martins et al. (2007) this raises the issue of a parallel gateway effect (in addition to cannabis) (Kandel, 2003) where ecstasy might play a role in the future initiation of cocaine and heroin but they acknowledge that such causal linkages remain unproven. However, this suggestion must be considered within the context of increasing controversy surrounding the accuracy

of the gateway theory (Fergusson, Boden, & Horwood, 2006; Lynskey, Vink, & Boomsma, 2006). A further implication linked to the young age of ecstasy users in this study is raised by Reid et al. (2006) who suggest initiating ecstasy at a later age may decrease the risk for initiating the use of cocaine and metamphetamine; however, van Ours (2005) suggests that ecstasy users are also more likely to use cocaine.

Whilst polydrug use appeared common amongst the majority of ecstasy users, which is consistent with the notion of the 'big night out' (Johnston, Laslett, Jenkinson, Miller, & Fry, 2004; Measham, Aldridge, & Parker, 2001; Riley & Hayward, 2004), such polydrug use is commonly associated with acute physical and psychological harms. However, as these young people have remained at mainstream school until the age of 16 years, a broad mainstream social institution, they may have adapted their drug use behaviours to 'fit in' with this mainstream lifestyle. This raises a particular challenge for the design of targeted interventions for young people who will be in receipt of school-based drug education developed for all school-aged young people which generally does not address the individual needs of school-aged polydrug users.

As a substantial proportion of the sample regularly used cannabis, alcohol and tobacco concurrently with ecstasy, this emphasizes the need for research and education on the effects of polydrug use. Given the extent of polydrug use among the sample, it might be difficult to highlight any drug related symptoms specifically to ecstasy (Topp et al., 1999). Topp and her colleagues go on to suggest that the vulnerability of adolescents to the social and psychological consequences of drugs such as cannabis may be extended to harm associated with ecstasy use. For a number of young people in the current study, polydrug use may have become normalized. The sources and locations of use reported by young ecstasy users perhaps provides further evidence for the development of such a lifestyle. The source and location of ecstasy use throughout the study period showed that social networks were important when understanding ecstasy use in adolescence. Access to ecstasy may have become more affordable for these young people who have more personal finance than previous generations, which has been linked to illicit drug use particularly ecstasy at this age (McCrystal et al., 2007a). By the age of 16 years the young ecstasy (and polydrug) users in this study were perhaps entering the 'dance drug' environment which may to some extent account for the rise in lifetime use from 7 to 13% by age 16 years.

However, the key finding from this study is the age of those reporting ecstasy use. The existing literature has highlighted late teenage/early twenties as the most popular period for onset of use (Huizink et al., 2006), which was similar to the age at which ecstasy initiation was reported around the year 2000 in the UK (Measham et al., 2001). The young people in this study were much younger, but evidence is emerging of ecstasy use amongst younger adults. For example, Wu et al. (2006) noted that recent ecstasy users tended to be aged 18–21 years. This finding may highlight a potential emerging trend in drug use generally and ecstasy use in particular with initiation beginning during the early teenage years for some young people. It raises the possibility that by age 16 some young people may have

become very 'drug experienced' (Duff, 2005). This may also be in part explained by the expansion of ecstasy use beyond the specific rave/dance scene of its origin (Boeri, Sterk, & Elifson, 2004) which in the past may have made it difficult to access for young people aged 14 years especially as it has become increasingly difficult for those aged under 18 to gain access to pubs and clubs due to the implementation of stricter ID measures for those challenged by door staff to confirm their age.

However, whilst the prevalence estimates of lifetime ecstasy use amongst those participating in this study are comparable with findings from the Netherlands for those aged 20–24 in 2001 at 13.1% (National Drug Monitor (NDM), 2002) and similar figures of 13% for undergraduate studies in the UK (Webb, Ashton, Kelly, & Kamali, 1996), twelfth graders in the USA at 11.7% (Johnston et al., 2001) and amongst 18–25 year olds in the USA at 15.1% (Substance Abuse and Mental Health Services Administration (SAMHSA), 2003) it was higher than other studies. For example, Schuster et al. (1998) reported that 3% of a sample of 3000 14–25 year olds had taken ecstasy and Perkonig et al. (1998) revealed that 4% of males and 2.3% of females in a survey of 3021 adolescents and young adults in Munich (Germany) had used ecstasy. van Ours (2005) reported 3.6% of the Amsterdam population of 12 years and older used ecstasy with a mean age of first use of 25.9 years. The majority of ecstasy users in the BYDS lived in Belfast, the main urban centre in Northern Ireland. Other research has placed the majority of self-reported ecstasy users between 20 and 29 years (National Drug Strategy Household Survey, 1998).

In a number of UK school-based surveys over the past decade prevalence estimates for school-aged young people were lower than those reported in the BYDS. For example, Beinart et al. (2002) reported lifetime ecstasy use at 1% for those aged 13/14 years, 2% at 14/15 years and 4% at 15/16 years. The prevalence estimate was similar for both males and females. In a longitudinal study of drug use in the 1990s the levels of lifetime ecstasy use was 5.8% at 14 years, 7.4% at 15 years and 5.4% at 16 years (Parker et al., 1998). Prevalence estimates from Parker et al. at 17 years were similar for the BYDS when aged 16 years. The prevalence estimates for ecstasy use within the BYDS were also higher than the levels of use reported in the UK based on components of the ESPAD reports. For 15/16 year olds this was 5.1% in 2003 (Hibell et al., 2003), 3% in 1999 (Hibell et al., 1999) and 8% in 1995 (Hibell et al., 1995). The findings in this article may suggest an emergent trend of ecstasy initiation during middle adolescence. Such a trend has potentially serious social and health implications, both in the short and long-term for those using ecstasy at this stage.

Given the young age of this sample, these findings raise concerns regarding the potential adverse consequence of risk-taking behaviours associated with their ecstasy use, for example, even intermittent use of club drugs and other drugs may lead to risky sexual behaviours (Colfax et al., 2005). Singer et al. (2004) reported multiple social difficulties, psychosocial symptoms and health risk behaviours among older adolescents who occasionally used ecstasy. Laws and Kokkalis (2007) noted that visual memory of ecstasy users was affected more by



concurrent cannabis use. These health issues were not investigated during this stage of the BYDS, but will be explored during early adulthood and beyond amongst this cohort.

In recent research ecstasy use has been associated with deviant behaviours which Martins et al. (2007) suggest might influence the initiation of its use and progression from ecstasy to other drug use. This contrasts with earlier research, which claimed that in the UK young people had shaken off the associations between ecstasy, deviance and delinquency (Parker, 1997). Among a sample of juvenile offenders, females were found to be more likely than males to use ecstasy (Yacoubian, 2002). However, whilst the ecstasy users participating in the BYDS were younger than Parker et al.'s sample, they did report substantially higher levels of delinquency and antisocial behaviour as well as contact with formal criminal justice agencies. Ecstasy users in this study also reported lower levels of communication with their parents and higher levels of disaffection with school. These patterns of behaviour were consistent with the high risk subsamples of the BYDS (McCrystal, Percy, & Higgins, 2007b). Researchers may believe that educating uninformed users of the risks associated with ecstasy will reduce its use, but whilst this assumption may prove too simplistic others suggest that ecstasy users may benefit from the dissemination of credible information to inform their use patterns and reduce the associated problems. The current findings have a number of practical implications. In the past ecstasy had the reputation for being largely problem-free (Saunders, 1995), but it is becoming increasingly clear that this reputation is no longer accurate. As all ecstasy users in this study were in their mid teenage years and given that adolescent polydrug use is a significant predictor of risky behaviours (Baker, Kochan, Dixon, Wodak, & Heather, 1994), there is a need for both primary and focused prevention programmes to prevent the initiation of club drug use and to reduce the adverse consequences of continued drug use, such as risky sexual behaviours and neuropsychological impairment, although existing evidence here is inconclusive.

Before concluding the research it is important to consider the potential limitations of the research when assessing its value. Potential limitations revolve around the self report nature of data collected and the type of data collected on ecstasy use. Questions are often raised about the value of self-report of illicit drug use. The data analyzed from this article was obtained from young people who were participating in the BYDS for the third, fourth and fifth occasions. This frequency of participation enabled the researchers to strengthen reassurances of confidentiality and exhortations to provide full and honest responses to all questions asked of them. Whilst the BYDS asks young people about the frequency of their ecstasy use, it did not explore the dose consumed, the calculation of such a measure is fraught with difficulties (Laws & Kokkalis, 2007). However, studies have suggested that the negative effects of ecstasy are dose-related (Siegel, 1986; Solowij et al., 1992). Others suggest retrospective reports of drug use may be problematic, particularly with ecstasy users, as this drug has been shown to affect memory abilities (Bolla et al., 2001; Gouzoulis-Mayfrank et al., 2000; Parrott, 2001; Verke et al., 2001). However, as the data was collected over

three annual data sweeps, with the resultant drug use behaviours in other categories of illicit drug use, during this period of development, also recorded each year adding support to the value and accuracy of the information obtained.

## Conclusions

Drug policy and intervention should ideally be empirically based. The findings presented in this article provide information to inform both policy and practice in the area of illicit drug use and ecstasy use in particular. Despite early suggestions that 'ecstasy use is a fad that will soon die out' (Solowij et al., 1992, p. 1171), the drug remains in circulation with little sign that its popularity will diminish. The findings in this article suggest the age of onset may be falling with regular use becoming established amongst some users by the age of 16 years, with a higher proportion of female users of this drug. However, with the exception of this demographic the remaining profile of ecstasy users in the BYDS were similar to that of the trends for illicit drug use in adolescent, i.e. more likely to live in a disrupted family, report indications of social deprivation, attend non-grammar school and are polydrug users. The findings from this study support the case for primary prevention programmes, such as the use of media campaigns or school-based prevention programmes, beginning in early adolescence (e.g. middle school years) and that they need to take into account the age, gender and different drugs used. The increased trend in ecstasy use worldwide (United Nations, 2003) also implies a need for universal efforts to educate the general public about the adverse health consequences of misusing this drug. These findings perhaps provide strong evidence for evaluating ecstasy use to a similar position within teenage drug prevention policy and practice as a drug like cannabis, which has historically received much attention.

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