

Factors associated with Ecstasy use in Turkish students

Aytül Çorapçioğlu¹ & Kültegin Ögel²

Kocaeli University Medical Faculty¹ and Bakırköy Hospital for Mental Disorders², Istanbul, Turkey

Correspondence to:

Aytül Çorapçioğlu
Tophanelioglu Cad. Petek Sitesi A5/9
Altunizade
Istanbul
Turkey
E-mail: aytul@mail.koc.net

Submitted 3 March 2003;
initial review completed 23 April 2003;
final version accepted 22 July 2003

ABSTRACT

Aims The purpose of this study was to establish the factors associated with Ecstasy use in secondary school students in Turkey.

Design, setting and participants This is a survey of a representative sample drawn from cities in different geographical regions in Turkey in 1998 and 2001. The questionnaire was administered to a total of 18 556 and 11 911 10th-grade students in 1998 and 2001, respectively.

Measurements The questionnaire administered in the study was adapted from the questionnaires used in 'Monitoring the Future' study in the United States and ESPAD (the European School Survey Project on Alcohol and Other Drugs). It included questions about demographic characteristics, family characteristics, school life, social contacts and use of substances.

Findings While the percentage of those who used Ecstasy at least once in their life-times was 2.65% in 1998, the figure reached 3.31% in 2001. Male gender, older age, use of alcohol, cannabis, heroin and cocaine, non-medical use of psychotherapeutic drugs and participation in a meeting concerning the adverse effects of substance use were found to be significant variables predicting 'ever use' of Ecstasy in both years by logistic regression analysis.

Conclusions Ecstasy use, while low in Turkey, appears to be on the increase and follows a pattern in terms of correlates that is similar to other illicit drugs. Whatever the causes behind the rise in Ecstasy use, creative, personalized and informative educational programmes should be conducted in all educational institutions to curb Ecstasy use.

KEYWORDS Ecstasy use, epidemiology, prevalence.

INTRODUCTION

Ecstasy is a methamphetamine derivative becoming increasingly popular throughout the world, particularly among adolescents and young adults. In this report Ecstasy refers to 'Ecstasy tablets' without any reference to the content, as there is little evidence about the contents of Ecstasy tablets sold in Turkey, MDMA (3,4 methylenedioxymetamphetamine), analogues of MDMA or any other compound. Ecstasy was considered to be a confidence-booster for many years because of the euphoria, increased energy and vitality it provided. Its harmful characteristic was often disregarded (Greer & Tolbert 1986; Parrot & Lasky 1988; Peroutka, Newman & Harris

1988). However, this misconception is changing, as evidenced by the increasing number of articles dealing with the short- and long-term detrimental consequences of Ecstasy use (Cregg & Tracey 1993; McGuire 2000; Gowing *et al.* 2002). The first encounter and becoming addicted to Ecstasy often takes place in adolescence, as with other substances (Schwartz & Miller 1997). Studies conducted in industrialized countries in particular indicate an ever-increasing trend in Ecstasy use. The 'Monitoring the Future' survey reported an increase in Ecstasy use among 10th graders from 3.3% to 4.4% in the United States in one year (Johnston, O'Malley & Bachman 1999). Strote *et al.* established a 69% increase in Ecstasy use among college students from 1997 to 1999 (Strote,

Lee & Wechsler 2002). It was reported in a monitoring study on college students in the United States between 1986 and 1990 that cocaine and amphetamine use had decreased, marijuana use remained stable and mescaline/psilocybin and Ecstasy use had increased (Cuomo, Dymont & Gammino 1994).

When the relationship between Ecstasy use and gender, age, marital status, social relations and polydrug use were investigated in certain studies examining the characteristics of substance-using students, results proved to be too disparate for drawing conclusions. However, this was not unexpected. Changing society and family structures influence patterns of substance use, creating diverse risk groups in each type of population (Cuomo *et al.* 1994; Bell, Wechsler & Johnston 1997; Johnston, O'Malley & Bachman 1997; Strote *et al.* 2002).

We have only limited knowledge concerning the differing characteristics of Ecstasy users in different societies, as most studies on the prevalence of substance use and user characteristics are administered in the United States or Canada, often on fairly small samples. Furthermore, they deal largely with prevalence rather than user characteristics. Few studies are carried out in developing countries. A very limited number of cross-sectional studies are reported in countries where alcohol and substance use are frowned upon for religious reasons (Smart & Ogborne 2000). Turkey, situated between eastern and western societies with a predominantly Islamic population, can provide significant data concerning Ecstasy use and user characteristics. However, until now, only one study of this kind, on secondary school students in Istanbul, has been carried out in Turkey. The study that included 2800 students in 15 schools in Istanbul was conducted within the framework of the European School Survey Project on Alcohol and Other Drugs (ESPAD), administered in 26 countries in Europe (Hibell *et al.* 1995). It was observed that 1% of the students had used Ecstasy at least once (Yazman 1995). Ecstasy was not even included among the substances in the survey performed on 1382 college students in Ankara in 1990. Hallucinogen use, at least once, was reported to be 5% in that study (Yüksel, Dereboy & Çifter 1994). However, these studies are limited to the cities in which they were executed and do not represent the wider Turkish population. This report includes data related to Ecstasy use drawn from the database of the Turkish National Substance Use Survey. We have focused on Ecstasy use because despite its becoming more prevalent, particularly in developed countries, there are insufficient data on Ecstasy use in developing countries. This survey was carried out among Turkish secondary school students to establish frequency of substance use, the change through the years and associated factors.

SUBJECTS AND METHODS

In Turkey, elementary education starts at 7 years of age. The first 8 years of elementary education is obligatory (primary school). Students may then attend secondary school. The duration of secondary school education may vary between 3 and 5 years, due to extra years of foreign language education.

Tenth-grade students in different geographical areas in Turkey were enrolled into the study. Multi-stage sampling was performed to select subjects.

At the first stage, cities from different geographical regions were selected by proportional sampling based on the ratio of the number of 10th-grade students in individual cities to the number of 10th-grade students in the region in which the city is located. The number of cities selected was predetermined by the number of institutes that could join the project; therefore, the study sample was drawn from 15 cities in 1998 and from nine cities in 2001.

In addition to detect the overall national prevalence of substance use, each institute needed to be knowledgeable about local prevalence. Therefore, at the second stage, in order to ensure that the subsamples drawn from each city would be sufficient to estimate local prevalence, non-proportional sampling was performed. The minimum number of subjects that should be selected from each city was set to 1000; with this sample size, prevalences from 1% to 50% could be detected within reasonable precision limits (power 90%, estimated precision limit was ± 5 for prevalence of 25–50%, and ± 4 , ± 3 and ± 2 for prevalence of 15–25%, 5–15% and 2–4%, respectively). In order to compensate for 20% non-response rate, the minimum number of subjects selected from each city was set at 1250. The number of students in 10th-grade in that particular city was taken as a base in establishing the subsample size. If the total number of students was less than 50 000, 1250 students were enrolled. If the number exceeded 50 000, then 2500 students were included in the sample. Planned sample sizes were 25 000 and 15 000 in 1998 and 2001, respectively.

At the third stage, the mean class size and number of subjects helped in establishing the number of classes to be included in the study. The classes to be enrolled in the study were selected from the list of all 10th-grade classes in that particular city through systematic sampling. Classes in the enrolment list that could not be reached due to various reasons were not replaced with new ones. All students in selected classes were included into the study sample. The sample sizes reached were 18 599 and 11 991 in 1998 and 2001, respectively.

The questionnaire administered in the study was adapted from a questionnaire used formerly in Turkey in the 'Youth Survey 1996'. The questionnaire for that sur-

vey had been inspired by the questionnaires used in 'Monitoring the Future' study in the United States (Johnston *et al.* 1999) and ESPAD (the European School Survey Project on Alcohol and Other Drugs), conducted by the Pompidou group (Hibell *et al.* 1995). The questionnaire included sections about demographic data, family characteristics, school life, social contacts and use of substances including tobacco, alcohol, cannabis, heroin, cocaine and non-medical use of psychotherapeutic drugs (stimulants, sedatives, tranquilizers, analgesics). The questions about substance use were 'did you ever use [substance]?', 'did you use [substance] within the previous year and if yes, how many times?' and 'did you use [substance] within previous month and if yes, how many times?'

The study was carried out between April and June in 1998 and 2001. Questionnaires were administered by a research assistant chosen under the supervision of the specialists in charge of the survey in each city. They were trained according to the guide prepared previously. Care was taken to ensure that school teachers were not present during the administration of the questionnaire in order to increase accuracy. Questionnaires were filled in anonymously and were collected randomly. Evaluation of the forms was performed by optical readers.

Questionnaires were applied on the day when final semester examinations were held, in order to minimize absenteeism. The overall response rate was close to 100%; the non-response rate for individual items were less than 10–15% for 1998 and 2001 data, respectively.

The ratios of the following responses for various substances were compared in order to determine the consistency of the answers: 'I have used [substance] at least once in my life' and 'I have used [substance] at least once within this year'. The percentage of those who confirmed having used a substance at least once but denied having used a substance within the last year for different substances (cannabis, heroin, cocaine, non-medically used sedative, hypnotic and anxiolytic drugs, inhalants) varied between 0.2% and 0.4% in 1998 and between 0.3% and 0.8% in 2001.

The percentage of students who did not declare the frequency of substance use varied between 0.4% and 5.1% in 1998, and 3.2% and 10.7% in 2001.

Statistical analysis

The main purpose of the analyses was to determine the factors related with Ecstasy use. Use of Ecstasy and other substances were defined as dichotomies with the categories 'ever used' and 'never used'. All the factors related to Ecstasy use were categorical variables. Therefore, the relationships between these factors and Ecstasy use were analysed using χ^2 tests. Pearson's χ^2 test was used to

analyse the relationship between dichotomized variables (gender, substance use, etc.) and Ecstasy use. Since at least one of the expected values was smaller than two, the relationship between living alone and Ecstasy use was analysed by using Fisher's exact test. The Mantel-Haenszel χ^2 test was utilized to analyse the relationship between ordinal variables (age, absenteeism, etc.) and Ecstasy use. However, if the relationship between ordinal variables and Ecstasy use was not linear, Pearson's χ^2 test was also performed. Pearson's χ^2 test was also employed for analysing the relationship between Ecstasy use and 'family status' variable, which included categories such as parent alive, parent divorced, parent living abroad or family living together. Finally, all these variables (except family status) were entered as predictors in a logistic regression model where Ecstasy use was the dependent variable. The forward stepwise regression method was used to determine the significant predictors in the logistic regression model.

As the sample was extremely large for both years, the power of the analysis was extremely high. Therefore, an overall type 1 error level was established at 0.01 instead of 0.05 in univariate analyses. By so doing, the power of the analysis was aimed to be kept not higher than 0.95. Furthermore, in order to avoid significance inflation due to multiple comparisons (up to 10 different group comparisons were performed in each category of predictors of ecstasy use), the type 1 error level was further adjusted downward to 0.001 ($1 - (0.99)^{10}$), as calculated with the formula $[1 - (1 - \text{type 1 error level})^{\text{the number of comparisons}}]$. Therefore, test results with *P*-values lower than 0.001 were interpreted as 'statistically significant'. Consequently, clinically non-significant minor differences between compared prevalences were not interpreted as being statistically significant.

RESULTS

The sample of 18 599 10th-grade students in 1998 and the sample of 11 991 10th-grade students in 2001 had mean ages of 16.0 (SD 0.9) and 16.0 (SD 1.0), respectively.

Demographic characteristics (Table 1)

The life-time prevalence of Ecstasy use increased during 3 years from 2.65% to 3.31% ($\chi^2 = 11.4$, $P = 0.001$). The rate of increase is 25%. The rise can be attributed to the increase in the number of male students from 1998 to 2001. Although Ecstasy use remained stable among girls (1.2% in both 1998 and 2001), it increased in boys by 36% (3.9% in 1998 and 5.3% in 2001).

Table 1 Percentages for 'ever use' of Ecstasy in subgroups by socio-demographic characteristics and family status.

	1998 (n = 18 599)			2001 (n = 11 991)		
	%	χ^2	P	%	χ^2	P
Gender						
Female	1.2	125.4	<0.001	1.2	155.5	<0.001
Male	3.9			5.3		
Age						
15	1.8	61.7	<0.001 ^a	1.9	139.0	<0.001 ^a
16	2.6			3.1		
17	3.4			4.8		
18	6.1			8.3		
19	4.8			9.7		
20	13.0			17.1		
Income						
Low	2.3	28.9	<0.001 ^a	3.4	4.94	0.026 ^a
Medium	2.5			2.9		
High	4.6			4.6		
Living						
Alone	17.1	–	<0.001 ^b	11.9	–	0.013 ^b
With family	2.6			3.3		
Paternal education level						
Illiterate	2.8	5.53	0.02 ^a	6.3	14.5	0.001
Primary, secondary or high school	2.5			3.1 ^c		
College	3.3			4.0		
Maternal education level						
Illiterate	1.7	30.2	<0.001 ^a	3.3	6.4	0.01 ^a
Primary, secondary or high school	2.5			3.1		
College	4.6			6.0		
Family status						
Mother and father deceased	13.9	1065.5	<0.001	17.5 ^c	201.4	<0.001
Parents divorced	12.3			9.7		
Mother and father live abroad	13.0			10.2		
Lives with parents	1.2			3.0 ^c		

^aMantel-Haenszel χ^2 test; ^bFisher's exact test; ^csignificantly different groups.

Older students had higher rates of life-time use of Ecstasy. While Ecstasy use prevalence was the lowest in 15-year-old students, it peaked in 20-year-old students in both years (15 years old 1.9%, 20 years old 17.1% for 2001).

It was observed that Ecstasy use was more common in families with a higher income when compared with those with average or lower incomes in 1998. While the percentage of Ecstasy users remained stable in families with a higher income (4.6% in both 1998 and 2001), there was a significant increase in the number of students using Ecstasy from lower income brackets (2.3% in 1998 and 3.4% in 2001).

Family characteristics (Table 1)

The life-time prevalence of Ecstasy use among students who lived alone was much higher in both years (although statistically non-significant in 2001) when compared

with those who lived with their families (17.1% and 11.9%, respectively). The students who lived alone had 6.5 times higher Ecstasy use in 1998 when compared with students who lived with their families. The same figure was 3.5 times in 2001. However, as the number of students living alone is extremely small in proportion to the whole group (0.2% in 1998, 0.4% in 2001), the decrease in 2001 cannot be considered as significant.

While there was no relationship between Ecstasy use and father's educational background in 1998, a rise in Ecstasy use was observed in 2001 among those whose fathers' educational background was poor. On the other hand, Ecstasy use was found to be higher in both years among students who had mothers with higher educational backgrounds. The life-time prevalence of Ecstasy use among students who lived with both parents was considerably lower than that of students with parents who have deceased, divorced or were living abroad.

Table 2 Percentages for 'ever use' of Ecstasy in subgroups by education and social contacts.

	1998 (n = 18 599)			2001 (n = 11 991)		
	%	χ^2	P	%	χ^2	P
Type of school						
Public	–			3.2	44.4	<0.001
Private	–			10.6		
Absenteeism (in the last 30 days)						
None	1.9	47.2	<0.001 ^a	2.0	184.2	<0.001 ^a
1–4 days	2.5			4.0		
5 days and above	4.9			18.8		
School success						
Successful	2.0	17.0	<0.001 ^a	2.3	33.7	<0.001 ^a
Fair	2.3			2.6		
Poor	7.1			14.0		
Problem sharing with parents						
Yes	2.2	29.6	<0.001	2.5	89.2	<0.001
No	3.7			6.1		
Relationship problems with opposite sex						
Present	3.1	8.0	0.005	4.4	18.8	<0.001
Absent	2.4			2.8		
Tendency for risky behaviours						
Present	3.2	39.9	<0.001	–		
Absent	1.7			–		
Anger management problems						
Present	2.8	4.8	0.03	3.7	8.7	0.003
Absent	2.3			2.7		
Pessimistic look on future						
Present	3.6	110.0	<0.001	4.7	40.4	<0.001
Absent	1.4			2.5		

^aMantel-Haenszel χ^2 test.**School life (Table 2)**

Ecstasy use was 3.5 times more common among students attending private schools when compared with students attending public schools (this assessment was not made in 1998).

The life-time prevalence of Ecstasy use was significantly higher in both years among those who had been absent at school for 5 days or longer in the last month. The prevalence of Ecstasy use in students with absenteeism rose almost four times from 1998 to 2001.

The students with poor school success had higher Ecstasy use than students with fair or good school success. The life-time prevalence of Ecstasy use in the students with poor school success nearly doubled from 1998 to 2001.

Social contacts (Table 2)

Ecstasy use was more prevalent in both years among students who did not share their personal problems with their families. While the rate of Ecstasy use remained stable during 3 years among students who were able to

share their problems with their families, the rate of Ecstasy use increased 65% in the same period among students who were not able to do so.

Ecstasy use was more common among those who had relationship problems with the opposite sex and were pessimistic about their future. The students who had inclinations towards risky behaviour were twice as likely to use Ecstasy (this assessment was not made in 2001).

While Ecstasy use prevalence seemed to be higher in those with anger management problems, this difference was found to be statistically non-significant, due to downward adjustment of the type 1 error level.

Use of other substances

The percentages of students who ever used Ecstasy and other substances are presented in Table 3. Figures of associated use of Ecstasy and other substances are summarized in Table 4.

Ecstasy use among those who smoke and drink was found to be more prevalent. However, the rate of Ecstasy use among those who drank alcohol remained steady. On the other hand, the life-time prevalence of Ecstasy use

among smokers increased from 3.2% in 1998 to 4.7% in 2001.

The prevalence of Ecstasy use among those who had never used cannabis, heroine, cocaine and psychotherapeutic drugs varied between 1.3% and 1.6% in both years. Ecstasy use in those who had used those substances at least once along with Ecstasy varied in both years approximately from 40% to 85%.

Ecstasy use was about nine times more common in students with substance users in close relatives. It was observed that Ecstasy use was also more common among

those who had participated in informative meetings concerning the adverse effects of substance use.

Logistic regression analysis

It is probable that the factors in Tables 1, 2 and 4 regarding Ecstasy use are intercorrelated. Consequently, some results obtained from univariate analyses might be confounded by other factors which were not taken into account in the analyses. Therefore, the relationship between these factors and Ecstasy use was also examined by logistic regression analysis, in addition to the univariate analyses described above. For this purpose, the data sets from 1998 and 2001 were evaluated in two different regression models. All the students could not be included in the logistic regression model because of certain incomplete data. Accuracy rates of the regression model to predict Ecstasy use in Ecstasy users are 44.1% in 1998 and 61.0% in 2001. Accuracy rates of the models for non-users, on the other hand, are 99.8% for both years. Following the analysis of data sets from both years, the factors influencing increased Ecstasy use were determined to be male gender, older age, use of alcohol, cannabis, heroin, cocaine and non-medical use of psychotherapeutic drugs

Table 3 Percentages for 'ever use' of substances.

Substance	Ever use (%)	
	1998	2001
Tobacco	63.9	56.0
Alcohol	30.0	45.1
Cannabis	4.34	5.01
Non-medically used psychotherapeutic drugs	3.20	2.81
Heroin	1.49	2.50
Cocaine	1.37	2.45

Table 4 Percentages for 'ever use' of Ecstasy in subgroups by use of other substances.

	1998 (n = 18 599)			2001 (n = 11 991)		
	%	χ^2	P	%	χ^2	P
Tobacco						
Yes	3.2	37.8	<0.001	4.7	77.9	<0.001
No	1.7			1.7		
Alcohol						
Yes	6.3	369.6	<0.001	6.0	182.4	<0.001
No	1.2			1.3		
Cannabis						
Yes	37.8	2825.6	<0.001	46.8	2544.4	<0.001
No	1.5			1.6		
Heroin						
Yes	78.3	6295.7	<0.001	85.6	5360.6	<0.001
No	1.5			1.4		
Cocaine						
Yes	78.0	5711.8	<0.001	87.6	5294.6	<0.001
No	1.6			1.4		
Non-medically used psychotherapeutic drugs						
Yes	41.7	3651.4	<0.001	81.5	5235.9	<0.001
No	1.3			1.3		
Substance use in close relatives						
Yes	18.0	787.7	<0.001	22.2	543.4	<0.001
No	1.9			2.6		
Participation in a meeting concerning the adverse effects of substance use						
Yes	3.2	30.9	<0.001	4.4	39.5	<0.001
No	1.9			2.2		

Table 5 Predictors found significant by logistic regression analysis.

	1998 ^a (n = 13 285)			2001 ^b (n = 7422)		
	OR	95% CI	P	OR	95% CI	P
Gender			<0.001			<0.001
Female	1.00 ^c	–		1.00 ^a	–	
Male	3.47	2.35–5.12		2.73	1.61–4.65	
Age			0.01			0.02
Maternal educational level			NS ^d			0.004
Illiterate				1.00 ^c	–	
Primary and secondary school				1.88	1.02–3.46	0.04
College				3.36	1.62–6.94	0.001
Absenteeism (last 30 days)						NS
None	1.00 ^c	–	0.007			
1–4 days	2.22	1.34–3.67	0.002			
5 days and above	1.29	0.43–3.84	0.65			
School success			NS			0.001
Successful				1.00 ^c	–	
Fair				1.23	0.85–1.77	0.27
Poor				3.30	1.75–6.23	<0.001
Problem sharing with parents	1.72	1.07–2.78	0.03			NS
Alcohol	2.71	1.89–3.87	<0.001	1.76	1.03–3.01	0.04
Cannabis	2.76	1.76–4.33	<0.001	3.68	1.93–7.00	<0.001
Heroin	20.69	11.09–38.58	<0.001	9.06	3.74–21.93	<0.001
Cocaine	3.37	1.69–6.69	<0.001	7.89	3.35–18.56	<0.001
Non-medically used psychotherapeutic drugs	9.49	6.19–14.56	<0.001	18.32	8.99–37.35	<0.001
Substance use in close relatives			NS	3.29	2.14–5.06	<0.001
Participation in a meeting concerning the adverse effects of substance use	1.52	1.09–2.12	0.01	2.49	1.55–4.01	<0.001

^aModel $\chi^2 = 1258.2$, $P < 0.001$. ^bModel $\chi^2 = 969.6$, $P < 0.001$. ^cReference category. ^dNot significant (these variables could not be entered into logistic regression models).

and having attended informative meetings on the adverse effects of substance use (Table 5).

Not sharing problems with parents and absence at school longer than 5 days in the last 30 days without a valid reason were found to be factors affecting increased use of Ecstasy only in 1998. Higher educational background of the mother, existence of substance use in the close relatives and poor school success were established as factors affecting increased use of Ecstasy only in 2001 (Table 5).

DISCUSSION

Ecstasy use increased by 25% in 3 years (2.65% in 1998 and 3.31% in 2001) according to data from this study. The subgroups with a significant increase from 1998 to 2001 were males, secondary school students over 18, students from low income brackets, those with poorly educated fathers, those who do not share their problems with their families, those with high absenteeism rates and poor school success. Life-time prevalence of Ecstasy use, 3.9% in male students in 1998, increased 1.5 times in 3

years, reaching 5.3%. However, the same figure for female students remained steady in the same period.

A 25% increase in 3 years should not be concluded as a significant increase when compared to a 33% increase in 1 year that has been reported in a study conducted on 10th-graders in the United States (Johnston *et al.* 1999). On the other hand, when Ecstasy is compared with cannabis, which is the most commonly used substance, it can be observed that the increase in Ecstasy use over the years is higher.

Cannabis use was 4.3% in 1998, and 5.0% in 2001 (rate of increase 15%). Although Ecstasy use was less common in both years, the rate of increase for Ecstasy was 25%, higher than cannabis. One of the reasons for this might be the fact that Ecstasy is usually regarded as a non-addictive substance which provides euphoria.

The results should be interpreted in the context of certain limitations of the study. A self-reported questionnaire was used in the study. As a result, for some questions the non-response rate reached as high as 10–15%. It should be kept in mind that non-response bias is a potential problem with substance users, therefore the study sample

may not be representative of the wider population. However, considering the fact that the questions reached the students directly, unlike in mail or telephone surveys, 10–15% the non-response rate was low. Another limitation of the study is that the sample consisted of 10th-grade students. The proportion of children within secondary school age attending school is 54.7% in Turkey. Therefore the results should not be extrapolated to the young population in general.

The factors associated with Ecstasy use can be classified into two groups as modifiable and unchangeable ones. Among the factors that are associated significantly with Ecstasy use, age, gender, mother's educational background and substance use in close relatives are factors that cannot be modified (Table 5). All other factors, including use of alcohol, cannabis, heroin, cocaine, non-medical use of psychotherapeutic drugs, poor school success, high absenteeism rate, not sharing problems with parents and having attended informative meetings can be potentially rectified. Therefore, programmes planned and implemented for preventing Ecstasy use should focus on correctable risk factors. On the other hand, their teachers and social institutions such as their families should monitor closely the students who are in high-risk groups with unalterable factors.

It has been observed that students who are supervised less by their families (living alone, without parents, with parents divorced or living abroad, with mother who is better educated and possibly works outside the home, with high absenteeism rate, not sharing problems with parents) are in the group with the highest Ecstasy use. Changes in society and economic conditions have compelled women to seek employment. Consequently, the mother's care, monitoring and supervision on children has slackened. It was observed that if their journey to school, new friends, relationships and habits are not supervised sufficiently, children can pick up harmful habits more easily. Ecstasy use was demonstrated to be higher among students who stayed at dormitories in a study conducted on college students (Strote *et al.* 2002).

The prevalence of Ecstasy use was higher in subgroups constituted by students who were over 18 but still at secondary school, with poor school success and with high rates of absenteeism. These findings seem to be contrary to the data from previous studies, that concluded that Ecstasy use had no effect on academic success (Peroutka *et al.* 1988; Williamson *et al.* 1997). Because our study design was cross-sectional, the above findings should be interpreted as an association, not a casual relationship between school success and Ecstasy use.

Ecstasy use is more common among those with higher incomes. However, while Ecstasy use remained stable among those with higher incomes, it increased by 47% among those with lower incomes in 3 years. The reasons

behind this issue merit investigation. It is necessary to establish how and why young people acquire Ecstasy, which is expensive, the first time. Young people with low incomes can commit crimes or can be abused because of their urge to obtain the substance to which they are addicted. Ecstasy users in our sample had inclinations towards risky behaviours, as has also been noted in other studies (Andrews & Duncan 1997; Bell *et al.* 1997). Furthermore, the students who have relationship problems with the opposite sex and a pessimistic future outlook are more likely to use Ecstasy. This issue can clearly have a negative impact on the future and safety of society.

Tobacco, alcohol, cannabis, heroin, cocaine use and non-medical use of psychotherapeutic drugs were found to be associated significantly with Ecstasy use in this study. The Ecstasy use risk in 1998 cohort was 20 times higher in particular for students who had ever used heroin at least once. It was pointed out in a paper (Smart & Ogborne 2000) analysing various studies carried out on students in 36 countries that use of one substance increased significantly the use of another substance. However, it was reported that no explanation had been offered concerning the reasons behind this fact in the studies. It was demonstrated that college students who had reported having used cannabis within the last year had 13 times higher Ecstasy use when compared with students who had never used cannabis (Strote *et al.* 2002). Using one substance possibly makes obtaining another substance easier and polydrug use becomes an issue for those at risk. Several studies conducted on this issue revealed similar results (Boys, Lenton & Norcross 1997; Schifano *et al.* 1998; Topp *et al.* 1999; Siliquini *et al.* 2001). Use of alcohol, cannabis, heroin, cocaine and non-medical use of psychotherapeutic drugs were found to be risk factors increasing Ecstasy use both in 1998 and 2001 in the logistic regression analysis conducted.

A major conclusion of this study concerned educational programmes. Having participated in an informative meeting about the adverse effects of substance use was established in logistic regression analysis as one of the factors associated with Ecstasy use in both years. This paradoxical finding could be explained by two factors. First, it can be hypothesized that young people who are curious about and interested in the substance participate more readily in these meetings. Secondly, the contents and format of educational programmes might be inappropriate. Although there is some controversy about the content, format and effectiveness of educational programmes (Brown & Kreft 1998; Gorman 2002), several successful educational programmes have been published. An interventional programme called the 'Life Skills Training programme' has been shown to be effective in reducing alcohol and illicit drug use (Botvin *et al.* 1995; Botvin *et al.* 2000). In another study, performed in Israel, a structured

education programme has been proved to be effective in controlling alcohol consumption (Peleg *et al.* 2001). Therefore, scientifically proven and targeted effective prevention programmes should be implemented.

CONCLUSION

A great deal of previously conducted monitoring studies have reported substance use as an increasing health hazard for young people throughout the world (Cuomo *et al.* 1994; Hibell *et al.* 1995; Korf & Wurth 1995; Smart & Ogborne 2000; Strote *et al.* 2002). Our data indicate that Ecstasy use, while low in Turkey, appears to be on the increase and follows a pattern in terms of correlates that is similar to other illicit drugs. Whatever the causes behind the rise in Ecstasy use, creative, personalized and informative educational programmes should be conducted in all educational institutions to curb Ecstasy use.

ACKNOWLEDGEMENTS

The authors are grateful to regional project coordinators: Yunus Emre Evlice and Şükrü Oğuz (Adana), Kadri Gücer (Antalya), Berna Uluğ, Emin Önder and Recep Çalık (Ankara), Tuncay Besim (Denizli), Aytekin Sır (Diyarbakır), Çınar Yenilmez (Eskişehir), İsmet Kırkpınar (Erzurum), Defne Tamar and Cüneyt Evren (Istanbul), Hakan Coşkunol and Müge Tamar (Izmir), Süheyla Ünal (Malatya), Şenel Tot (Mersin), Hakan Toksöz (Muğla), Orhan Doğan (Sivas), Mehmet Bekaroğlu and Mustafa Bilici (Trabzon), Hayrettin Kara (Van). Without their enthusiastic participation, this project could not have been realized.

REFERENCES

- Andrews, J. & Duncan, S. (1997) Examining the reciprocal relation between academic motivation and substance use: effects of family relationships, self-esteem and general deviance. *Journal of Behavioral Medicine*, **20**, 523–548.
- Bell, R., Wechsler, H. & Johnston, L. D. (1997) Correlates of college student marijuana use: results of a US national survey. *Addiction*, **92**, 571–581.
- Botvin, G. J., Baker, E., Dusenbury, L., Botvin, E. M. & Diaz, T. (1995) Long-term follow-up of a randomized drug abuse prevention trial in a white middle-class population. *Journal of the American Medical Association*, **273**, 1106–1112.
- Botvin, G. J., Griffin, K. W., Diaz, T., Schwier, L. M., Williams, C. & Epstein, J. A. (2000) Preventing illicit drug use in adolescents: long-term follow-up data from a randomized control trial of a school population. *Addictive Behaviors*, **25**, 769–774.
- Boys, A., Lenton, S. & Norcross, K. (1997) Polydrug use at raves by a Western Australian sample. *Drug and Alcohol Review*, **16**, 227–234.
- Brown, J. & Kreft, I. (1998) Zero effects of drug prevention programmes. *Evaluation Review*, **22**, 3–4.
- Cregg, M. T. & Tracey, J. A. (1993) Ecstasy abuse in Ireland. *Irish Medical Journal*, **86**, 118–120.
- Cuomo, M. J., Dymont, P. G. & Gammino, V. M. (1994) Increasing use of 'Ecstasy' (MDMA) and other hallucinogens on a college campus. *Journal of American College Health*, **42**, 271–274.
- Gorman, D. M. (2002) The 'science' of drug and alcohol prevention: the case of the randomized trial of the Life Skills Training program. *International Journal of Drug Policy*, **13**, 21–26.
- Gowing, L. R., Henry-Edwards, S. M., Irvine, R. J. & Ali, R. L. (2002) The health effects of Ecstasy: a literature review. *Drug and Alcohol Review*, **21**, 53–63.
- Greer, G. & Tolbert, R. (1986) Subjective reports of the effects of MDMA in a clinical setting. *Journal of Psychoactive Drugs*, **18**, 319–327.
- Hibell, B., Anderson, B., Bjarnason, T., Kokkevi, A., Morgan, M. & Narusk, A. (1995) Alcohol and other drug use among students in 26 European countries. The Swedish Council for Information on Alcohol and Other Drugs. Council of Europe Co-operation Group to Combat Drug Abuse and Illicit Trafficking in Drugs 1995 (Pompidou Group). Strasbourg: Council of Europe.
- Johnston, L. D., O'Malley, P. M. & Bachman, J. G. (1997) *National Survey Results on Drug Use from the Monitoring the Future Study, 1975–95*. Vol. 2: *College Students and Young Adults*. NIH Publications no. 98–4140. Rockville, MD: National Institute on Drug Abuse.
- Johnston, L. D., O'Malley, P. M. & Bachman, J. G. (1999) *National Survey Results on Drug Use from the Monitoring the Future Study, 1975–98*. Vol. 1: *Secondary School Students*. NIH Publications no. 99–4660. Washington, DC: US Department of Health and Human Services.
- Korf, D. J. & Wurth, B. (1995) *New Drugs in Europe. An Overview of Trends and Monitoring Systems in Europe* (Pompidou Group). Strasbourg: Council of Europe.
- McGuire, P. (2000) Long term psychiatric and cognitive effects of MDMA use. *Toxicology Letters*, **112–113**, 153–156.
- Parrot, A. C. & Lasky, J. (1988) Ecstasy (MDMA) effects upon mood and cognition before and after a Saturday night dance. *Psychopharmacology*, **139**, 261–268.
- Peleg, A., Neumann, L., Friger, M., Peleg, R. & Sperber, A. D. (2001) Outcomes of a brief alcohol abuse prevention program for Israeli high school students. *Journal of Adolescent Health*, **28**, 263–269.
- Peroutka, S. J., Newman, H. & Harris, H. (1988) Subjective effects of 3,4 methylenedioxymethamphetamine in recreational users. *Neuropharmacology*, **1**, 272–277.
- Schifano, F., Di Furia, L., Forza, G., Minicuci, N. & Bricolo, R. (1998) MDMA ('Ecstasy') consumption in the context of polydrug abuse: a report on 150 patients. *Drug and Alcohol Dependence*, **51**, 85–90.
- Schwartz, R. H. & Miller, N. S. (1997) MDMA (Ecstasy) and the rave: a review. *Pediatrics*, **100**, 707–710.
- Siliquini, R., Faggiano, F., Geninatti, S., Versino, E., Mitola, B. & Ippolito, R. (2001) Patterns of drug use among young men in Piedmont (Italy). *Drug and Alcohol Dependence*, **64**, 329–335.
- Smart, R. G. & Ogborne, A. C. (2000) Drug use and drinking among students in 36 countries. *Addictive Behaviours*, **25**, 455–460.
- Strote, J., Lee, J. E. & Wechsler, H. (2002) Increasing MDMA use among college students: results of national survey. *Journal of Adolescent Health*, **30**, 64–72.
- Topp, L., Hando, J., Dillon, P., Roche, A. & Solowij, N. (1999) Ecstasy use in Australia: patterns of use and associated harm. *Drug and Alcohol Dependence*, **55**, 105–115.

Williamson, S., Gassop, M., Powis, B., Griffiths, P., Fountain, J. & Strang, J. (1997) Adverse effects of stimulant drugs in a community sample of drug users. *Drug and Alcohol Dependence*, **44**, 87–94.

Yazman, Ü. (1995) *How do secondary school students regard*

psycho-active substances? An analysis of prevalence within Turkey-Istanbul sample. Graduation (Specialisation) Thesis, Istanbul.

Yüksel, N., Dereboy, Ç. & Çifter, İ. (1994) Substance use among college students. *Turk Psikiyatri Derg*, **5**, 283–286.