RESEARCH REPORT

Ecstasy and new patterns of drug use: a normal population study

WILLY PEDERSEN¹ & ANDERS SKRONDAL²

¹Norwegian Social Research & ²Department of Epidemiology, National Institute of Public Health, Oslo, Norway

Abstract

Aims. (i) To describe illegal drug use patterns in an adolescent normal population sample with special emphasis on MDMA, ecstasy; (ii) to investigate where ecstasy is introduced in a hypothesized drug use sequence, and (iii) to contrast the predictors of ecstasy use with those of other illegal substances. Special attention was given to the relationship to subcultural music preferences and house-party-going. Design. A school-based survey of the total cohort of adolescents enrolled in the school system in a city. Participants. 10 812 adolescents, age 14–17 years, response rate 94.3%. Setting. Oslo, the capital and only metropolis town in Norway. Measurements. Social class was measured by the occupation standard ISCO 88, questions were posed as regards frequency of alcohol use and alcohol intoxication, cigarette smoking and use of cannabis, amphetamines, ecstasy and heroin. Alcohol problems were measured by a shortened version of Rutgers Alcohol Problem Index (RAPI), conduct problems were measured according to the four categories of acts forming the basis of the diagnosis conduct disorder in DSM-IV, internalizing mental health problems were measured using items from Hopkins Symptoms Checklist (HCL). A number of questions were asked as regards subcultural music preferences and house-party-going. Statistical models. A hypothesized cumulative sequence in drug use was investigated by means of latent class analysis, and the predictors of the various patterns of drug use were estimated and compared by means of multinominal logistic regression analysis.

Findings. The use of ecstasy was often intermingled with the use of cannabis, amphetamines and heroin, in a pattern of polydrug use. The latent class analysis revealed the following drug use sequence: (1) alcohol, (2) cigarettes, (3) cannabis, (4) amphetamines, (5) ecstasy and (6) heroin. There was no significant association between ecstasy use and parental social class or residential area of the town. All patterns of illegal drug use were highly associated with cigarette smoking, alcohol use, alcohol problems and conduct problems, whereas the associations with internalizing mental health problems were of less magnitude. Multinominal logistic regression analysis revealed that the use of ecstasy (E) was significantly more weakly associated with cigarette smoking than were the use of cannabis only (C), amphetamines (A) and the combination of ecstasy and amphetamines (A+E). The association between E and conduct problems (CP) was weaker than the association between CP and A and A+E. Finally, there were associations between E and A+E and House/Techno preferences and house-party-going, which were not found for C and A.

Conclusions. Ecstasy is used by adolescents who use other legal and illegal substances in a polydrug-use pattern. The substance is introduced late in a hypothesized drug use sequence. Even so, ecstasy use seems to differ from the use of, e.g. amphetamines, in that the association with smoking and conduct problems is weaker and that the associations with subcultural music preferences and house-party-going are much stronger.

Correspondence to: Willy Pedersen, Norwegian Social Research, Munthes gate 29, 0260 Oslo, Norway. Tel: +47 22 54 12 00/24; Fax: +47 22 54 12 01; e-mail: Willy.Pedersen@isaf.no
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Introduction

Subcultures create a basis for the diffusion of styles and fashions, which subsequently spread to larger groups. Drugs have often played a part in these processes. Jazz and cocaine were associated as long ago as the 1920s, and the “beat” generation experimented with cannabis (Berridge, 1988). During the last few decades new subcultures have developed among adolescents, with characteristic drug habits: hippies used cannabis and LSD, mods often used amphetamine, some of the British punks used inhalants and heroin and now we find, as the most dramatic change of pattern of drug use, the acid-house and rave movements, which have been associated with MDMA or ecstasy (Kohn, 1992; Forsyth, Barnard & Mikegany, 1997).

Ecstasy emerged as a significant drug in Europe in the late 1980s. The drug first became popular in the United Kingdom, Germany, the Netherlands and Spain. Recently a report from the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 1996) described what we know about ecstasy use in various countries, and a uniform picture has emerged: patterns of use are on the rise. Whereas life-time prevalence is usually higher for amphetamines and LSD, recent use is higher for ecstasy. A number of school studies of mid-adolescents show prevalence rates ranging from 0.2% in Finland and 0.5% in Portugal to 5.2% in Netherlands and 8.3% in the United Kingdom. Studies of “at-risk” populations such as disco and night-club attenders show much higher prevalence, and police seizures at have also shown a steep increase (Griffiths, Vingoe & Jansen, 1997).

In Oslo, annual surveys of use of drugs in the normal population of adolescents are conducted by the National Institute for Alcohol and Drug Research. Data were collected on ecstasy for the first time in 1994, when 2.1% had used the substance. In 1996 the figure had increased to 4.2%, and in 1997 to 5.1%. The use of cannabis and amphetamines had also increased (Skretting, 1997). Thus, the use of illegal substances seems to be growing and ecstasy use is becoming more firmly established. Reports from the police confirm the trend: from about 10 annual seizures of ecstasy in Norway before 1994, the figure increased to 39 in 1994, 160 in 1995, 198 in 1996, and in 1997, 242 seizures of ecstasy were reported (KRIPOS, 1998).

Few studies have moved beyond descriptive epidemiological statistics on the use—and users—of ecstasy. Some of the literature is psychiatric—usually clinical studies of individuals who have come into contact with the health services. Some of the literature is biomedical and pharmacological, often based on animal experiments (for a survey see McCann & Ricaurte, 1995). It is typical of both types of study that the findings are seldom conclusive, and that they tell us little about the characteristics of the users. On the other hand, there are a few studies of selected user groups.

Beck & Rosenbaum (1994) carried out a qualitative study of ecstasy users in the San Francisco area, based on snowball-sampling. Three user groups were identified: (i) one group was seeking self-knowledge and a better relationship to others (“New Age Seekers”), (ii) supporters of the band Grateful Dead and rave participants (“Dancers”), and (iii) students and resourceful young people in independent occupations (“Yuppie Hedonists”). The common trait was substantial additional use of other psychoactive substances, and a “recreational” and “sophisticated” relationship to drugs. Snowball-sampling techniques were also used in an Australian study (Solowij, Hall & Lee, 1992). The picture there was reminiscent of the San Francisco study: “curiosity”, “recreation” and “fun” were the most important reasons for use. Both studies confirmed the typical media picture: ecstasy is used by active young people. The substance symbolizes recreation, time out and style.

There is agreement that ecstasy first became popular in small segments of “fashionable elites” who attended nightclubs in various countries. Gradually, however, the drug was filtered down to a larger population of young people. A common position has been that the subcultural link has diminished. The EMCDDA report put it this way: “... it appears that the consumption of the drug is no longer linked to any particular musical fashion, but rather with nightclubs and dance parties in general” (Griffiths et al., 1997, p. 51). In line with this, Parker, Meashan & Aldridge (1995) suggested that for many young people “the availability of drugs is a normal part of the leisure-pleasure landscape”.

In Norway there have been house and rave parties since the end of the 1980s. Observers maintained that nine out of 10 participants at these parties were under the influence of ecstasy,
and social workers reported that it was not the usual city drifters who took part. “These drugs are marketed as ‘party-drugs’ targeted at new user groups, often ordinary adolescents without previous experiences with use of illegal drugs. In some contexts, ecstasy has become an alternative to alcohol” (Norwegian Directorate for Alcohol and Drugs, 1995).

However, these hypothesized characteristics would—if they were correct—represent a new pattern. First, previous research shows that socialization to drug use normally takes place through so-called stages, where adolescents who are familiar with legal drugs start to use illegal drugs subsequently. The less prevalent illegal drugs such as amphetamine and cocaine are usually adopted after a more widespread substance such as cannabis (Kandel, Yamaguchi & Chen, 1992; Blaze-Temple & Lo, 1992). Secondly, if these new users of illegal drugs were well adjusted as regards other types of problem behaviour, this would also represent a new pattern. Numerous studies have investigated risk factors for early onset of the use of cannabis and other substances. One set of factors that seems particularly important centres on early behavioural problems (Farrington et al., 1990; Ferguson, Lyskey & Horwood, 1993). Other studies indicate that those fulfilling the clinical criteria for conduct disorder (CD) are at highly increased risk of substance abuse (Greenbaum et al., 1991; Keller et al., 1992; Martin et al., 1993). If use of ecstasy is proved to not be part of such a pattern, this would represent a new and uncommon feature.

In conclusion, there is obviously a tendency towards increased use of ecstasy—in Norway and in other western countries. Further, it is commonly believed that the substance appeals to new groups, without the psychosocial problems often associated with drugs. This was also the starting point for the questions posed in the present study. More specifically, we ask: are young people from prosperous regions a primary recruiting base for ecstasy? Does ecstasy appeal to young people with little experience of other drugs, or does the substance follow the traditional stage sequence—before heroin and together with amphetamine—in the wake of legal drugs and cannabis? Previously, conduct problems have earlier been established as a major risk factor for illegal drug use. Does this apply to ecstasy use as well? Is use of ecstasy still associated with interest in special types of music? Is participation at house parties particularly important for the use of ecstasy? Finally: is there in fact any difference between users of ecstasy and users of the established substances cannabis and amphetamine?

**Material and methods**

The data are from the study Young in Oslo 1996. The adolescents were recruited from the 8th, 9th and 10th grades in the school system in Oslo. All the schools in Oslo were included. Every student gave his or her consent based on a written and oral description of the research project, formulated according to the standards prescribed by the Norwegian Data Inspectorate. The target sample included full cohorts of adolescents in the 8th and 9th years of school—which are compulsory—as well as those in the 10th year, attended by 90% of the cohort. The response rate was 94.3%. Some of those who use drugs are clearly concealed among those who dropped out but, even so, the high response rate makes the material particularly well suited for investigating the use of illegal drugs. The sample then consisted of 10 812 adolescents, 50.8% boys and 49.2% girls. The mean age was 15.4 years (SD 0.94).

The respondents were classified into groups according to where they lived. Oslo was divided into four categories covering the dimensions outer–inner city and east–west location. In general, the western parts of the city have the most prosperous and well-educated population. To measure parental social class, information about parents’ education and work was classified according to the occupation standardisco 88 (ILO, 1990). A classification with five categories was used, with a range from “upper managerial” (9.1%) to “working class” (26.8%); 7.4% of the respondents had fathers who were unemployed or living on social welfare, the corresponding figure for the mothers was 6.7%. The prevalence of divorce among parents was high: 32.6% of the adolescents did not live with both biological parents.

In order to measure use of alcohol, the respondents were asked: “Do you ever drink any kind of alcohol?” Seven possible answers were suggested from “do not drink alcohol” to “drink more than twice a week”. In order to measure alcohol problems, a shortened version of Rutger’s Alcohol Problem Index (RAPI) was used, with
five questions related to social consequences of alcohol (fights, school absence, black-outs and depression) (White & Labouvie, 1989). The index had a Cronbach’s alpha of 0.72 and a range of 0–5 (mean 0.8, SD 1.22). Exposure to alcohol in the home was measured by three questions pertaining to whether the adolescent obtained alcohol from the parents in various situations (“particular occasions”, “Sunday dinner” and “to take with you to a party”). The answers were combined into an index with values 0–3 (mean 0.7, SD 0.9). Further, they were asked about cigarette smoking, where the alternatives were: “have never smoked”, “have smoked, but have now stopped”, “smoke, but not daily” and “smoke daily”: 18.5% reported that they smoked daily. The respondents were asked if they had used cannabis, amphetamines, ecstasy and heroin during the past year (no/yes).

Conduct problems (CP) were measured according to the four categories of acts forming the basis of the diagnosis conduct disorder according to the DSM-IV (APA, 1994). Aggression was measured by using questions about bullying, fighting with a weapon and threatening with or committing violence to another person. Destruction of property included “tagging” and vandalism. Deceitfulness or theft included theft of more than NOK 1000 (about £100 sterling), burglary and theft of a car or a motorbike, and finally serious violations of rules was measured by using questions about truancy and running away from home. For the last two items, according to the DSM-IV, the behaviour has to have been initiated before the age of 13 years. All items were combined into a conduct problems index (alpha 0.72), with possible values from 0 to 10, and a mean of 0.53 (SD 1.25). Six questions about depression and anxiety from the Hopkins Symptom Checklist were used to measure internalizing mental health problems (Derogatis et al., 1974). The questions included “worried too much about things?”, “had sleeping problems”, “felt stiff and tense”, all applied to the past week. The answers were summarized in an index with values 1–6 (alpha 0.81, mean 0.6, SD 1.2).

Finally, four types of music were hypothesized to be associated with the use of drugs, “House/Techno”, “Seattle subpop/Grunge”, “New Age” and “Acid Jazz”. The respondents were asked whether they liked these types of music, on a three-point scale (“do not like, and have not heard of” = 0, “like somewhat” = 1, “like very much” = 2). House/techno was the most popular genre: 65% of the adolescents reported that they liked this music “very much” or “somewhat”, while corresponding figures for Seattle subpop/Grunge was 20% and for New Age and Acid, 17% and 10%, respectively. Further, they were asked how many times they had been to a house party during the last year: 27% answered in the affirmative. The answers were categorized into three values (0 = 0, 1–9 times = 1, 10 + = 2).

Results
Prevalence of drug use
Fourteen per cent of the adolescents had used an illegal drug during the last year. Use of cannabis was the most prevalent (12.9%). Three per cent had used ecstasy and 2.8% had used amphetamines, while 1.5% had used heroin. More boys than girls had used all three drugs, but the gender difference was greatest for ecstasy and amphetamine, with a ratio of about 2:1. For cannabis, there was a steady increase in use with age, but the difference was less for amphetamine and least for ecstasy. Frequency of use was generally low, and we have therefore dichotomized the drug use variables. When controlled for age, the findings agree closely with other data available from Oslo (Skrentting, 1997).

There was considerable polydrug use. For example, among those who had used ecstasy, 65.8% had also used cannabis, 56% had used amphetamines and 31.5% had used heroin. We therefore decided to investigate the four patterns of drug use which were typical: use of cannabis only (later denoted C), use of amphetamines (A), use of ecstasy (E) and use of both amphetamines and ecstasy (A + E). Note that adolescents in the three last groups had most often used cannabis as well. In Table 1, the prevalences of these patterns of use are reported. The C group was largest, while the prevalences of the A, E and A + E groups varied in the range from 1.2% to 1.6%. The gender difference was of a great magnitude only in the A + E group, with a ratio of 3:1. These four possible patterns were then converted into a categorical variable named “drug use”, with five values—from 0 “no illegal drug use” to 4 “A + E”.

1 In the case of cannabis, 4.3% of the sample had used the substance more than 10 times, while the corresponding figures for ecstasy and amphetamine were 0.6 and 0.7%.
Table 1. Prevalence of illegal drug use, in percentage and number in paintleses

<table>
<thead>
<tr>
<th></th>
<th>No drugs</th>
<th>Cannabis only</th>
<th>Amphetamines</th>
<th>Ecstasy</th>
<th>Amph. + ecstasy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>84.3 (4631)</td>
<td>10.5 (575)</td>
<td>1.2 (65)</td>
<td>1.6 (90)</td>
<td>2.5 (135)</td>
</tr>
<tr>
<td>Girls</td>
<td>87.7 (4662)</td>
<td>9.3 (492)</td>
<td>1.2 (63)</td>
<td>1.1 (59)</td>
<td>0.8 (40)</td>
</tr>
<tr>
<td>Total</td>
<td>86.0 (9397)</td>
<td>9.9 (1068)</td>
<td>1.2 (128)</td>
<td>1.4 (150)</td>
<td>1.6 (175)</td>
</tr>
</tbody>
</table>

$\chi^2$ (df 4) 61.6, $p < 0.0001$.

Sequence of drug use

We then investigated whether the use of drugs took the form of a so-called Guttman scale, which would be the result if the drug use fitted the typical cumulative sequence. However, in practice some respondents will not adhere to this idealized sequence due to measurement error and/or unobserved heterogeneity. Consequently, a number of stochastic Guttman models have been proposed. In this paper, we will use an approach based on latent class analysis (e.g. Lazarsfeld & Henry, 1968; Clogg & Sawyer, 1981). The MLLSA software of Clogg (1977), as implemented in CDAS (Eliaison, 1992), is used to implement this methodology. MLLSA produces maximum likelihood estimates of the parameters of the latent class models and goodness-of-fit measures. In the latent class approach the ideal sequence is construed as a discrete latent construct where each sub-sequence represent a latent class. We estimated all stochastic Guttman models considered by Clogg & Sawyer (1981) and found that Lazarsfeld’s latent distance model (e.g. Lazarsfeld & Henry, 1968) had superior fit among the competing models in terms of both the likelihood-ratio test and the Bayesian Information Criterion (BIC). We found that drug use typically follows this cumulative sequence: (1) no drugs, (2) alcohol, (3) daily smoking, (4) cannabis, (5) amphetamines, (6) ecstasy and (7) heroin. Ninety-three per cent of the sample fitted this sequence and the Index of Dissimilarity was below 0.02, which indicates a very good fit (e.g. Clogg, 1996). Our findings replicate earlier research, in that alcohol and cigarettes came first in the sequence, then cannabis was introduced. A finding worth noting was that amphetamines were then introduced, then ecstasy, and finally heroin. One should, however, note that the fit of the model was almost as good when the order of ecstasy and amphetamines was reversed.

Characteristics of drug users

We then investigated which part of the city the adolescents lived in according to drug use. Location had no significant association with A, E and A+E, but a strong association with C, cannabis use, where we found approximately double rates of users in inner Oslo west (9.3% vs. 17.2%, $\chi^2$ (df 1) 54.5, $p < 0.0001$). In Oslo, the highest social classes live in the western part of the city, while “inner west” has, in addition, an urban character. However, there were no associations with the parents’ social class, and neither the group with parents who were unemployed or on social security had increased patterns of use. Thus, there were only small differences in the use of ecstasy in different parts of the city and in different social classes. When examining associations with other aspects of the family milieu, a well-known picture was found: those not living with both parents were associated with all patterns of illegal drug use, and similarly with exposure to alcohol at home.

The association was investigated between cigarette smoking, use of alcohol and alcohol problems and various patterns of drug use. The same procedure was utilized for conduct problems (CP scores) and anxiety and depression (HCL scores). All variables showed significant relationships to the various patterns of drug use; but were there differences between the four drug-using groups in this respect? In the group without any illegal drug use 12.0% were daily smokers, whereas 56.3% in the C group smoked daily, 64.1% in A, 48.7% in E, and 76.0% in the A+E group ($\chi^2$ (df 4) 1926.2, $p < 0.0001$). Pairwise comparisons showed that the A+E group was significantly different ($p < 0.001$) from C and E, but not from A, while A not was different from E. Since the distributions of alcohol consumption, alcohol problems, conduct problems and HCL-scores were asymmetric, we used non-parametric test-procedures. A series of
Kruskal–Wallis tests were first conducted, with “drugs” as grouping variable. The distributions of all variables were significantly different \((p < 0.001)\) for the drug groups. Then, post hoc tests were performed in terms of Mann–Whitney tests for each pair of categories of drug use. The results are shown in Table 2. The group without use of any illegal drugs was the most anomalous, and scored significantly lower than all other groups on all variables reported. The C group had lower RAPI and conduct problem scores than groups A, E and A + E. Finally, the A + E group had the highest scores on all variables, even if not all differences were significant. On the other hand, the differences between groups A and E did not reach significance.

We found that those without any illegal drug use reported significantly less interest in all the relevant kinds of music (House/Techno, Seattle, Acid Jazz and New Age). The differences were not very pronounced between the drug-using groups. However, both the E and the A + E groups had a strong preference for House/Techno, more so than C and A \((p < 0.01)\). There was also a strong association with attending house parties, and in particular the E and A + E group had often attended such parties. For those who had not used any illegal substances, 3.7% had attended a house party more than 10 times. In both the C and A group the percentage was 9.5%, in the E group 25.3% and in the A + E group, 40.6% \((\chi^2 \ (df \ 8) \ 945.0, \ p < 0.0001)\). (The differences between E and A + E and C and A groups were all significant \((p < 0.001)\), while the differences between E and A + A groups were not significant.)

In conclusion, there were many common characteristics between the users of cannabis (C), amphetamines (A), ecstasy (E) and the combination of ecstasy and amphetamines (E + A), but also a few peculiarities. Further, the distribution of contextual variables, indicators of legal substance use and abuse and conduct problems, and also indicators of music preferences varied across drug use groups and formed a somewhat mixed picture.

### Explaining the drug use

A multinomial logistic regression analysis (e.g. Hosmer & Lemeshow, 1989) was then performed, using LIMDEP (Greene, 1997). The dependent variable was the “drug” variable with five categories, where the “no drugs” category served as reference. The explanatory variables were those described in the previous analyses: first the background variables gender, age (three dummies and “14 years” as reference category), then area of the city, with “inner west” as dummy variable. The parents’ socio-economic status had no effect and was not included. As regards family characteristics, not living with both parents and exposure to alcohol at home were included. Among individual characteristics daily smoking, use of alcohol, alcohol problems, conduct problems and mental health were used. We included linear, quadratic and cubic components to capture potential non-linear effects. Finally, indicators of music preferences and house-party participation were also included in the models.

The results are reported in Table 3. Here, the second column contains the estimated adjusted odds-ratios (aOR) for the C group versus no drug use for all the included explanatory variables; 95% confidence intervals (95% CI) for the aORs are reported in parentheses. The third column shows the aORs for A versus no drug use, the fourth column similar information for E versus no drug use, and the final column A + E versus no drug use. Note that only linear components were retained for the explanatory variables. This table shows several noteworthy features: all variables except the music preferences “Acid Jazz” and “New Age” had some impact on one

### Table 2. Mean scores of frequency of alcohol consumption, alcohol problems, conduct problems and anxiety/depression (HCL-scores) for the different drug use groups. Results from pairwise Mann–Whitney tests \((p < 0.01)\) reported in superscripts

<table>
<thead>
<tr>
<th>Drug Use Group</th>
<th>Alcohol freq.</th>
<th>RAPI scores</th>
<th>CP scores</th>
<th>HCL scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>No illegal drugs (0)</td>
<td>1.48(^1,2,3,4)</td>
<td>0.62(^1,2,3,4)</td>
<td>0.33(^1,2,3,4)</td>
<td>0.57(^1,2,3,4)</td>
</tr>
<tr>
<td>Cannabis only (1)</td>
<td>3.84(^0,4)</td>
<td>1.72(^0,2,3,4)</td>
<td>1.34(^0,2,3,4)</td>
<td>0.79(^0,4)</td>
</tr>
<tr>
<td>Amphetamines (2)</td>
<td>3.75(^0)</td>
<td>2.23(^1)</td>
<td>2.41(^0,1,4)</td>
<td>1.10(^0)</td>
</tr>
<tr>
<td>Ecstasy (3)</td>
<td>3.71(^0)</td>
<td>2.14(^0,1)</td>
<td>2.13(^0,1,4)</td>
<td>1.08(^0)</td>
</tr>
<tr>
<td>Amphetamines + ecstasy (4)</td>
<td>4.06(^0)</td>
<td>2.54(^0,1)</td>
<td>3.38(^0,1,2,3)</td>
<td>1.53(^0,1)</td>
</tr>
</tbody>
</table>
Table 3. Multinomial logistic regression of four patterns of drug use on contextual and individual characteristics; estimated adjusted odds ratios with 95% confidence intervals

<table>
<thead>
<tr>
<th></th>
<th>Cannabis only</th>
<th>Amphetamines</th>
<th>Ecstasy</th>
<th>Amph. + ecstasy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (boy 0, girl 1)</td>
<td>0.9 (0.79–1.09)</td>
<td>1.3 (0.87–1.99)</td>
<td>0.8 (0.56–1.20)</td>
<td>0.4 (0.26–0.62)</td>
</tr>
<tr>
<td>Age (15)</td>
<td>1.3 (1.00–1.70)</td>
<td>1.6 (0.87–1.99)</td>
<td>1.2 (0.72–2.01)</td>
<td>1.0 (0.58–1.81)</td>
</tr>
<tr>
<td>Age (16)</td>
<td>2.3 (1.76–2.93)</td>
<td>2.5 (1.31–4.79)</td>
<td>1.0 (0.58–1.68)</td>
<td>1.4 (0.80–2.45)</td>
</tr>
<tr>
<td>Age (17)</td>
<td>2.3 (1.68–3.02)</td>
<td>3.6 (1.76–7.39)</td>
<td>1.3 (0.69–2.41)</td>
<td>2.6 (1.43–4.84)</td>
</tr>
<tr>
<td>Oslo west (0,1)</td>
<td>1.5 (1.16–1.84)</td>
<td>0.6 (0.25–1.35)</td>
<td>0.7 (0.36–1.48)</td>
<td>1.4 (0.76–2.54)</td>
</tr>
<tr>
<td>Not both parents (0,1)</td>
<td>1.3 (1.08–1.48)</td>
<td>1.9 (1.31–2.77)</td>
<td>1.3 (0.90–1.80)</td>
<td>2.0 (1.42–2.89)</td>
</tr>
<tr>
<td>Alcohol exposure (0,1)</td>
<td>1.0 (0.77–1.37)</td>
<td>0.8 (0.42–1.71)</td>
<td>2.6 (1.62–4.24)</td>
<td>3.0 (1.87–4.76)</td>
</tr>
<tr>
<td>Daily smoking (0,1)</td>
<td>4.0 (3.40–4.67)</td>
<td>4.7 (3.16–7.04)</td>
<td>2.2 (1.54–3.20)</td>
<td>6.8 (4.57–10.16)</td>
</tr>
<tr>
<td>Alcohol consumption (0–6)</td>
<td>1.5 (1.45–1.60)</td>
<td>1.3 (1.13–1.45)</td>
<td>1.3 (1.15–1.43)</td>
<td>1.2 (1.05–1.33)</td>
</tr>
<tr>
<td>Alcohol problems (0–5)</td>
<td>1.1 (1.06–1.20)</td>
<td>1.3 (1.12–1.48)</td>
<td>1.3 (1.13–1.46)</td>
<td>1.3 (1.18–1.51)</td>
</tr>
<tr>
<td>Conduct problems (0–10)</td>
<td>1.4 (1.34–1.50)</td>
<td>1.8 (1.60–1.94)</td>
<td>1.5 (1.41–1.69)</td>
<td>1.8 (1.62–1.93)</td>
</tr>
<tr>
<td>Depression/anxiety (0–6)</td>
<td>1.0 (0.94–1.05)</td>
<td>1.1 (0.95–1.21)</td>
<td>1.1 (0.99–1.23)</td>
<td>1.2 (1.08–1.33)</td>
</tr>
<tr>
<td>House preference (1)</td>
<td>1.0 (0.78–1.18)</td>
<td>0.8 (0.50–1.41)</td>
<td>1.5 (0.88–2.67)</td>
<td>1.3 (0.66–2.38)</td>
</tr>
<tr>
<td>House preference (2)</td>
<td>0.8 (0.70–1.01)</td>
<td>0.8 (0.50–1.22)</td>
<td>2.0 (1.23–3.25)</td>
<td>3.1 (1.90–5.18)</td>
</tr>
<tr>
<td>Seattle preference (1)</td>
<td>1.8 (1.45–2.23)</td>
<td>1.7 (1.02–3.00)</td>
<td>1.6 (0.98–2.63)</td>
<td>1.3 (0.72–2.33)</td>
</tr>
<tr>
<td>Seattle preference (2)</td>
<td>2.8 (2.25–3.39)</td>
<td>1.9 (1.06–3.25)</td>
<td>1.5 (0.84–2.54)</td>
<td>2.3 (1.38–3.79)</td>
</tr>
<tr>
<td>House party (1)</td>
<td>1.3 (1.11–1.56)</td>
<td>2.1 (1.40–3.16)</td>
<td>3.3 (2.15–4.93)</td>
<td>1.5 (0.97–2.33)</td>
</tr>
<tr>
<td>House party (2)</td>
<td>1.4 (1.02–1.82)</td>
<td>1.4 (0.70–2.76)</td>
<td>5.9 (3.57–9.78)</td>
<td>5.0 (3.14–7.90)</td>
</tr>
</tbody>
</table>

1 Reference category: 14 years.
2 For all music preferences and house-partying, reference category: 0.

We note in passing that consistent, but not asymptotically efficient, estimators for the aORs could have been obtained by simply performing four binomial logistic regressions for each of the different drug use groups versus the no drug use group (Begg & Gray, 1984). However, estimation of a multinomial logistic regression model is a prerequisite for testing whether the adjusted odds-ratios for an explanatory variable are significantly different for the various drugs. We confined the investigation to the explanatory variables of main theoretical interest; daily smoking, alcohol problems, conduct problems, depression/anxiety and the house-party variables. Since ecstasy is the focus of this paper, we compared the aORs for (i) E versus C (ii) E versus A and (iii) E versus A + E. The null hypotheses of equal aORs across these pairs of adjusted odds-ratios were tested by means of Wald tests. The aORs for daily smoking were significantly different for all three comparisons. For alcohol problems and depression/anxiety, on the other hand, there were no significant differences. The impact of conduct problems was significantly different for the second and third comparisons. For low-frequency house-partying (1) there were significant differences for the first and last comparison, whereas significant differences for a high

or more of these patterns of drug use, also when controlling for other variables. Gender had a significant impact only on the A + E group, with reduced aOR for girls. Age had the largest impact on the C and A groups, while the C group was the only group where part of city had importance, with increased aOR for “inner Oslo west”. Smoking, consumption of alcohol and alcohol problems had a pronounced impact on all patterns. The effect of smoking is especially worth noting: it had an aOR of 4.0 and 4.7 for the C and A groups, and as much as 6.8 for the A + C group, while the effect on E was weaker. The effect of alcohol problems (RAPI) was pronounced for all groups, and the same pattern was revealed as regards conduct problems (CP), while the A + E group was the only group where depression and anxiety (HCL, scores) had a significant effect. Only two of the music preferences were significant predictors: Seattle/Grunge had an effect on C and A, while House/Techno had an effect on E and E + A. Note, however, that only the group who liked House/Techno “very much” had an increased OR for E and A + E. Finally, a low frequency of house-partying had an effect on all patterns of drug use, while a high frequency (10+) had a very strong impact on E and E + A.
frequency of house-partying (2) appeared for the first and second comparison. In conclusion, ecstasy use was less associated with cigarette smoking and conduct problems than, e.g. amphetamines. On the other hand, there was an association with House/Techno music, and a very strong association with high frequency of house-partying which was not revealed as regards amphetamine use.

As a complement to the adjusted odds-ratios, we also estimated the attributable risks (AR) for the ecstasy category. AR is a central measure in the development of prevention strategies because it gauges the potential impact of removing a risk factor (Kleinbaum, Kupper & Morgenstern, 1982). Note that removing a low-prevalent risk factor will have only a minor impact on the use of a drug, even though the association measured through, e.g. aOR may be high. Conversely, removing a risk factor which is moderately associated with the outcome may be effective if that risk factor has a high prevalence. The ARs for ecstasy were as follows: alcohol consumption 0.43, alcohol problems 0.22, daily smoking 0.19 and conduct problems 0.27. House/Techno preferences had an AR of 0.26, a low frequency of house-partying 0.33 and high frequency of party-going 0.20. Thus, two groups of factors were important: both indicators of substance involvement and conduct problems and those pertaining to music and party-going. In particular one should note the importance of alcohol consumption, which had an AR of 0.43. Alcohol consumption has a very high prevalence in the adolescent population.

It could be hypothesized that the aetiology of illegal drug use might vary in subgroups. There are three obvious possibilities: first, it is well known that a small fraction of adolescents is responsible for a large part of the total number of behavioural problems. Therefore, one could hypothesize that these associations are based primarily on a small subgroup of conduct-disordered adolescents. Secondly, one could hypothesize that different risk factors are associated with the development of drug use in the prosperous and the more proletarian segments of the population. Finally, it could be hypothesized that the risk factors differ according to gender. Therefore we repeated the multivariate analyses with different subsamples: first, we omitted those with a score above 3 on the conduct problem index (approximately 5% of the sample) and reanalysed the models for ecstasy use. Then we did the analyses separately for each gender. Finally the analyses were conducted separately for the eastern and western parts of the city. The associations were robust and they were neither weakened nor were their contents altered significantly. Thus, the associations reported in Table 3 seem to be valid, regardless of level of behavioural problems, gender and residential area.

Discussion

The present study aimed to investigate to what degree users of ecstasy had characteristics making them different from traditional users of illegal drugs—something which has been suggested both by the media and researchers. The dataset was a large and representative sample of mid-adolescents from Oslo, the only metropolitan city in Norway. The strengths of the study are related to sample size, response rate and the fact that well-established measures have been used. One should, however, note that we have not had longitudinal data at our disposal, making it more difficult to draw causal conclusions.

The use of ecstasy was intermingled with use of other illegal drugs such as cannabis and amphetamines in a pattern of polydrug use. A latent class analysis suggested that ecstasy was introduced after the legal substances cigarettes and alcohol, cannabis and often also after amphetamines. Further, we found that the users of ecstasy had much in common with users of other drugs. However, the association with cigarettes was less pronounced than for other illegal substances, and the association to conduct problems was not as strong as for amphetamines. Further, subcultural music preferences were predictors of all illegal drug use patterns, but the associations to House/Techno was of greatest magnitude for ecstasy. A high frequency of participation at house parties was a strong predictor for the use of ecstasy and the combination of ecstasy and amphetamines. Thus, the use of ecstasy was related to two different groups of variables: on one hand the use of other substances and to conduct problems and on the other hand to subcultural affiliations and house-party-going. The first group of variables was somewhat less important for ecstasy than for other drugs, while the opposite was true for the second group of variables. A striking finding in our study was that
Ecstasy and new patterns of drug use

House/Techno has become one of the most popular types of music among Norwegian adolescents. Several researchers have argued that the associations with illegal drug use would be weakened when these preferences diffused to broader groups. However, we found that use of ecstasy and the combination of ecstasy and amphetamines was still highly associated with preferences for these types of music.

Subcultural diffusion

It is common to see music preferences as sensitive labels of characteristics of youth subcultures (Hebdige, 1979). Note the terms subculture and underground. Youthful club ideologies are almost as anti-mass culture as the art world. Both criticize the mainstream for being superficial and derivative. There is, however, a difference: the art world “trickles down”. The subculture gushes up to the mainstream. Thus, metaphors pertaining to sub and under are not arbitrary, but betray a sense of social place, as argued by the sociologist Sarah Thornton (1996). Subcultural ideology implicitly gives alternative interpretations and values to young people’s subordinate status, it re-interprets their social world. At the same time, the house culture is supported by a profit-seeking entertainment industry. How do the messages in this culture diffuse?

The most important products in this entertainment industry are records, concerts and dance clubs. However, numerous other channels are also used for spreading the subcultural message: pirate radios, e-mail lists and Internet archive sites are among the recently developed channels. More traditional are flyers, fanzines and flyposters. Rose (1991) maintained that the youth crowd is the unit the flyers, are directed at. The broader subculture, on the other hand, is the target group of the magazine. Numerous niche magazines continuously interpret this culture in Norway—and even British magazines such as The Face and i-D are readily accessible. Thus, an array of media, from primitive print forms to the most advanced interactive techniques, have been used by the house culture. Our data support the assumption that there are important channels here, for diffusion of drug habits as well, and these connections should be studied in more detail.

One of Dick Hebdige’s (1979) key terms is “selling out”, which implies a process by which the subculture becomes incorporated into the cultural hegemony. The result is a metamorphosis, a process whereby previously subversive signs are converted into mass-produced commodities. Thornton (1996) interpreted this position as referring to a process by which artists sell beyond their initial market. “Selling out” means selling to outsiders. Griffiths et al. (1997) suggested that this would imply that the use of drugs would no longer be associated with any particular music genre. Our findings did not confirm this suggestion: we still found strong associations between drug use and House/Techno music and in particular with attending house-parties, also when other characteristics of the adolescents were controlled for; but note that these associations were much weaker for amphetamines.

New and old

The most striking finding was that the use of ecstasy had such an ambiguous character: the substance certainly had a subcultural dimension, but even so it fell into place in a stage sequence. The structure of the latent class analysis indicated that the development of ecstasy use follows in the wake of the legal substances, as well as cannabis, and that the substance is often used by those who also use amphetamines. Further, as many as one in three of the ecstasy users had also used heroin. It is worth noting that not only use of alcohol but also alcohol problems were highly associated with ecstasy use. About half of the ecstasy users had RAPI scores that reflected a risk of alcohol abuse or dependence according to diagnostic convention. This contrasts sharply with the myths about the substance, which are also found in official information campaigns, and which imply that ecstasy is often used by adolescents who have little experience with other drugs. On the other hand, the finding fits well with findings from earlier studies that new illegal drugs normally take their place in the sequence reflecting the substance’s degree of “deviation”. In one way, the ecstasy user is a new figure. At the same time he is strangely familiar.

Earlier studies of the normal population have shown that there is a relatively weak connection between internalizing mental health problems such as depression and anxiety and the use of drugs (Silbereisen, Robin & Rutter, 1995). This is probably because in some people internalizing mental health problems are associated with per-
sonality traits such as introversion—traits that are in turn associated with reduced inclination to try illegal substances. On the other hand, over time users of illegal drugs often develop poor mental health, usually as a function of a deeper tendency towards social and occupational marginalization (Fergusson & Horwood, 1997). The moderate association between anxiety/depression and use of illegal drugs in this, very young, sample was therefore not unexpected. However, there were statistical effects from anxiety/depression on the combination of ecstasy and amphetamines. As the sample was very young, and the use was primarily of low frequency, these effects were probably due primarily to selection, but effects of use cannot be excluded. A recent study of affective reactions to ecstasy use indicates that a “week-end high” is often followed by a “mid-week low” (Curran & Travill, 1997).

Conduct problems characterized all the illegal drug users, even if the association to ecstasy was of a lesser magnitude than to amphetamines. These problems also makes up the core of what is called conduct disorder in psychiatric nosology. Earlier research shows that those who satisfy the criteria for the diagnosis—normally about 5% of adolescents—are at increased risk of developing a broad spectrum of problems as adults. A new finding in our study was that these connections were just as robust in subgroups of the sample with subclinical levels of conduct problems. The finding indicates that use of illegal drugs is connected strongly with early onset conduct problems in the whole youth population, not only in those with clinical levels of conduct problems; but note again that the association was not as strong for ecstasy as for amphetamines and the combination of ecstasy and amphetamines.

Why do we find the relationships between substances earlier in an assumed hierarchical sequence and conduct problems, and illegal drug use? As yet, no studies have thoroughly penetrated this link. However, in our opinion, the most promising hypothesis seems to be related to the mechanism which has previously been labelled cumulative continuity (Caspí, Bem & Elder, 1989). Cumulative continuity occurs when the adolescent’s interactional style leads him or her to select and create an environment that reinforces the behaviour in question. For example, aggressive children may face peer rejection among their classmates and hence turn to antisocial peers, who then reinforce and model aggressive behaviour. Secondly, conduct problems in a child may elicit behaviour in others that reinforces their own behavioural problems. The two mechanisms may well operate together, so that the cumulative consequences of maladaptive behaviours may channel the individual into social situations which, in turn, may act as precursors to drug use (see Kaplan, 1984). The findings presented here suggest that subcultural music preferences are important factors in these processes. Further, social gatherings such as house-parties seem to be extremely important. Note also that the importance of house-parties seems to be drug-specific: whereas a high frequency of house-partying partying was hardly associated with the use of cannabis and amphetamines, a powerful relationship was revealed as regards the use of ecstasy and the combination of ecstasy and amphetamines.

A broader frame

Böpple & Knüfer (1996) showed how the European techno and ecstasy scenario developed, with London and Berlin as bridgeheads. An international phenomenon was developing, and concepts such as rave, house and techno gradually became common in many countries. However, if one is to study the development of techno music, the city of Detroit is most central, and they also maintain that the history of the city provides a striking metaphor about what it is all about. Detroit is the car metropolis of the United States. The rhythm of the assembly lines was the leading expression of modernity; but then growth stopped, and many of the machines became silent. Techno and house grew out of this threatening silence. Closed factories, with poverty and garbage, were the backdrop for music. The sound picture was meant to express a destroyed metropolis, said the pioneer Derrick May. “It is what it is” was one of the first tracks (Böpple & Knüfer 1996).

Ecstasy use has been associated with the hunt for experience and uncomplicated fun. However, Böpple & Knüfer’s analysis implies that, at a deeper, although less clearly defined, level there is also a political dimension. The rave transcends—in spite of its lack of words and its sense for the external. Primitive impulses are interwoven with new technology. Others have pointed at a similar aspect. Rave and ecstasy fell into place in a meaning vacuum in Thatcher’s England, as
Matthew Collin recently maintained. Ecstasy use is, on the surface, non-political, but is even so a response to what youth experiences as lack of roots in post-Thatcher’s England. The substance has become popular because of its ability to create companionship and attachment for young people who are seeking, but who feel weak ties to society, says Collin (Collin, 1997).

We can perhaps supplement this by saying that the perspective has common features with what sociologists would call the late-, high- or post-modern society’s weakened grip on its inhabitants, in today’s terminology that youth is “culturally liberated” and characterized by “reflexivity”. The imperative ties become fewer, the scope for possibilities larger, the potential identities many. A new drug such as ecstasy is formed and spreads in a flickering context of cult authors, music videos and new dance forms. In essence, these youth cultural patterns and the accompanying industry are international. Everything diffuses at lightning speed, unhindered by international frontiers, and spreads to larger groups than previously. Even so, there is something familiar in the new and spectacular: the users of ecstasy still have many characteristics that make them difficult to differentiate from users of more well-known drugs.

References


