Use of MDMA and Other Illicit Drugs by Young Adult Males in Northern Spain

A Five-Year Study


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Key Words
3,4-Methylenedioxymethamphetamine · Epidemiology · Military recruits · Personality · Sensation seeking

Abstract

Aim: To measure the prevalence of 3,4-methylenedioxyamphetamine (MDMA) and other drug use in young males entering compulsory military service in Asturias (northern Spain) and to define trends in MDMA use in this group during the period from 1995 to 1999. We also sought to determine whether MDMA users have distinct personality features or higher levels of sensation seeking.

Methods: 3,634 conscripts (mean age (SD) = 20.19 years (2.52)) who entered military service during the period between 1995 and 1999 were evaluated using the World Health Organization (WHO) questionnaire for drug consumption, the Eysenck Personality Questionnaire-A (EPQ-A), and the Zuckerman Sensation Seeking Scale.

Results and Conclusions: The prevalence of lifetime, previous year and previous month MDMA use among military recruits between 1995 and 1999 was 10.9, 7.8 and 4.5%, ranking fifth among illicit drugs ever used. Once individuals used MDMA for the first time, they were likely to use it again, with 71% of individuals who had ever used MDMA reporting that they had used it during the past year (ranking second only to hallucinogens), and 41% reporting having used it in the last month. Compared to recruits who had never used MDMA (but who may have used other illicit drugs), MDMA users had a more extensive drug abuse history. Recruits who had used MDMA during the year prior to study had significantly higher scores on the Neuroticism and Psychoticism Subscales of the EPQ-A, and reported higher levels of sensation seeking.

Introduction

3,4-Methylenedioxymethamphetamine (MDMA, Ecstasy) is an amphetamine analogue with both stimulant and mild hallucinogenic properties that continues to gain in popularity worldwide [1–3]. In addition to its potential of abuse, MDMA has neurotoxic effects on serotonin nerve terminals in the brain of animals, including nonhuman primates [4, 5] and possibly humans [6, 7]. As yet, the functional consequences of such damage are not well
understood [8, 9]. However, there is growing evidence from controlled studies indicating that MDMA users suffer cognitive impairment and neuroendocrine abnormalities [10–13], as well as sleep abnormalities, increased impulsivity and sensation-seeking tendencies [12, 14, 15]. In addition to these potential consequences of brain serotonin neurotoxicity, a number of reports have implicated MDMA in the development of a wide variety of adverse physical effects, including multiorgan failure leading to death [16–18].

The National Institute on Drug Abuse (USA) has collected formal epidemiological data on MDMA use since 1994. During that period, the popularity of MDMA has increased steadily. Figures from 1998 indicate that 7.2% of young adults have used MDMA at least once, and 2.9% have used it in the past year [19]. Although various estimates of illicit MDMA use in Western Europe have been made, the exact prevalence remains unknown. Some authors [20–22] calculate ecstasy consumption over the last two decades at several million doses. Despite efforts made in the epidemiological field, European trends of ecstasy use are not entirely understood. Nevertheless, the general impression is that the use of MDMA and similar substances is increasing in all European countries.

One reason for the difficulties in determining the extent of MDMA use in Europe is the lack of homogeneity among countries regarding consumption. Whereas in some European countries (e.g., Nordic countries), MDMA abuse is a relatively new phenomenon [16], others, such as the UK, Spain, the Netherlands, Italy, and Germany have a relatively long-established population of ecstasy users and its prevalence is comparatively high [16, 23–25]. Spain appears to be among those with higher consumption rates for ecstasy and related products [16, 17, 24, 26–28]. The prevalence of MDMA consumption by young adults aged 20–24 years is cited at 6.4% in 1999 [28]. Though there is no data for Asturias for the same age group, we do have data regarding consumption amongst secondary school students. (Lifetime prevalence for students aged 14–18 was 3.8% in 1999 [29].)

This study sought to better define the extent of MDMA use by taking advantage of the military conscription system, which involves all able-bodied adult men. To this end, lifetime and recent histories of drug use were obtained from all new military recruits over a 5-year period in the province of Asturias, in northern Spain. A variety of psychological measures were also obtained in an effort to determine whether a history of MDMA exposure is associated with a distinct psychological profile. The primary aims of this study were: (1) to determine the prevalence of MDMA use (lifetime, past year, past month) in new military recruits from Asturias, (2) to determine trends in MDMA use during the 5-year period 1995–1999, and (3) to determine whether MDMA use is associated with distinct personality features or increased sensation seeking.

**Methods**

**Subjects**

The subjects were young, male, military conscripts from Asturias, entering obligatory military service between 1995 and 1999 (February, May and November of each year). All recruits entering the army during the study period were included. The only subjects excluded were those that were in the infirmary on the day information was gathered. Before filling in the information sheets, confidentiality was fully assured.

**Outcome Measures**

All recruits were evaluated 2 weeks after entry into military service using the Spanish versions of the following instruments: a sociodemographic ‘ad hoc’ protocol, the World Health Organization (WHO) questionnaire for drug and alcohol use [30], the Eysenck Personality Questionnaire Adult Form (EPQ-A) [31], and the Zuckerman Sensation Seeking Scale-Form V (SSS) [32].

**Data Analysis**

Subjects were divided into three groups: (1) non-drug users (group 1), (2) individuals who had used illicit drugs but had never used MDMA (group 2), and (3) MDMA users (group 3). A secondary analysis was conducted that excluded all subjects who had previously used opiates, so as to eliminate the possibility that opiate use may have confounded (i.e., either masked or explained) psychological features distinguishing MDMA users. All data were analyzed using either t tests, χ² (with Yates’ correction when required), or analysis of variance tests (two-tailed). Post hoc Duncan tests were performed when necessary, to clarify the nature of the findings. Statistical significance was defined as two-tailed probability ≤ 0.05. All analyses were conducted using SPSS/PC+ (version 6.0.1).

**Results**

**Subject Sample**

A total of 3,634 valid protocols were obtained (as per EPQ-A Sincerity Subscale scores >4). Of these, 2,465 had never used illicit drugs (group 1), 885 had used illicit drugs but not MDMA (group 2), and 284 had used MDMA (group 3). The sociodemographic characteristics of the total sample are shown in table 1, as are those of the three subgroups. Group 3 was significantly younger than groups 1 and 2 (ANOVA one-way test, p = 0.000). No other significant sociodemographic differences were found.

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Bobes/Sáiz/González/Bascarán/Bousoño/Ricaurte/McCann

Eur Addict Res 2002;8:147–154
Table 1. Sociodemographic data

<table>
<thead>
<tr>
<th>Total sample (n=3,634)</th>
<th>Non-drug users (n=2,465)</th>
<th>Non-MDMA drug users (n=885)</th>
<th>MDMA users (n=284)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td>20.19 (2.52)</td>
<td>20.31 (2.60)</td>
<td>20.09 (2.38)</td>
</tr>
<tr>
<td><strong>Marital status (single)</strong></td>
<td>3.560 (98.0)</td>
<td>2.407 (97.6)</td>
<td>872 (98.5)</td>
</tr>
<tr>
<td><strong>Work status (unemployed)</strong></td>
<td>1.835 (50.5)</td>
<td>1.255 (50.9)</td>
<td>445 (50.3)</td>
</tr>
</tbody>
</table>

With the exception of age (mean, SD) figures represent number with the percentage in parentheses.

Table 2. Drug use and age at first use in total sample

<table>
<thead>
<tr>
<th>Drug</th>
<th>Lifetime prevalence</th>
<th>Previous year</th>
<th>Previous month</th>
<th>Mean age at first use, years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>2,750 (75.7)</td>
<td>1,639 (45.1)a</td>
<td>2,064 (56.8)</td>
<td>14.42 (2.81)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>3,419 (94.1)</td>
<td>3,262 (89.8)</td>
<td>2,614 (71.9)</td>
<td>13.72 (3.13)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>1,453 (40.0)</td>
<td>943 (25.9)</td>
<td>629 (17.3)</td>
<td>16.04 (2.23)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>452 (12.4)</td>
<td>288 (7.9)</td>
<td>168 (4.6)</td>
<td>17.14 (2.62)</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>474 (13.0)</td>
<td>326 (9.0)</td>
<td>198 (5.4)</td>
<td>16.63 (2.44)</td>
</tr>
<tr>
<td>Hallucinogens</td>
<td>503 (13.8)</td>
<td>364 (10.0)</td>
<td>203 (5.6)</td>
<td>16.81 (1.98)</td>
</tr>
<tr>
<td>Volatiles</td>
<td>204 (5.6)</td>
<td>128 (3.5)</td>
<td>90 (2.5)</td>
<td>15.40 (2.70)</td>
</tr>
<tr>
<td>Tranquilizers</td>
<td>357 (9.8)</td>
<td>213 (5.9)</td>
<td>125 (3.4)</td>
<td>16.47 (2.99)</td>
</tr>
<tr>
<td>Sedatives</td>
<td>91 (2.5)</td>
<td>66 (1.8)</td>
<td>56 (1.5)</td>
<td>15.74 (3.20)</td>
</tr>
<tr>
<td>Opiates (smoked)</td>
<td>134 (3.7)</td>
<td>85 (2.3)</td>
<td>54 (1.5)</td>
<td>16.38 (3.06)</td>
</tr>
<tr>
<td>Heroin</td>
<td>109 (3.0)</td>
<td>73 (2.0)</td>
<td>45 (1.2)</td>
<td>16.38 (2.80)</td>
</tr>
<tr>
<td>Other opiates</td>
<td>68 (1.9)</td>
<td>43 (1.2)</td>
<td>30 (0.8)</td>
<td>16.36 (2.82)</td>
</tr>
<tr>
<td>MDMA</td>
<td>397 (10.9)</td>
<td>284 (7.8)</td>
<td>164 (4.5)</td>
<td>17.50 (2.31)</td>
</tr>
</tbody>
</table>

With the exception of age (mean, SD) figures represent number with percentage in parentheses.

a Smoked daily for 6 months or more.
b Smoked only on weekends for 6 months or more.

Drug Use Patterns of the Total Sample
Table 2 shows prevalence of drug consumption and age of first use for the total sample. Alcohol and tobacco were the most common psychoactive substances used. The illicit drugs most likely to have ever been used by recruits included cannabis, hallucinogens, amphetamines, cocaine and MDMA. As a group, they were most likely to have used alcohol first, followed by tobacco and volatiles. In contrast, MDMA was first used at an older age.

Trends in Drug Use among Military Recruits
Figure 1 shows the lifetime, past year, and past month prevalence rates of MDMA use among military recruits in Asturias from 1995 to 1999. As reflected, all prevalence rates peaked in 1995, then dropped slightly, and finally stabilized.

Drug Use Patterns of MDMA Users
A more detailed analysis of the pattern of MDMA use during the previous month reveals that of the 164 young men (4.5% of the total sample) who had consumed it during that period of time, 49.4% (n = 81) had used it on 1–5 days per month, 17.7% (n = 29) on 6–19 days, and finally, 32.9% (n = 54) had used it on more than 19 days. The percentage of young people that consumed MDMA as the only illicit drug was very low, only 13 (4.6%) of the 164 men who had used it in the previous year.
Fig. 1. Annual evolution of prevalence of MDMA consumption. Numbers in columns indicate groups with statistically significant differences (p < 0.05).

Table 3. Drug consumption of military recruits during the previous year

<table>
<thead>
<tr>
<th>Drug use during previous year</th>
<th>Non-MDMA drug users (n = 885)</th>
<th>MDMA users (n = 284)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>639 (72.2)</td>
<td>250 (88.0)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>854 (96.5)</td>
<td>265 (93.3)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>698 (78.9)</td>
<td>245 (86.3)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>135 (15.3)</td>
<td>153 (53.9)</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>148 (16.7)</td>
<td>178 (62.7)</td>
</tr>
<tr>
<td>Hallucinogens</td>
<td>164 (18.5)</td>
<td>200 (70.4)</td>
</tr>
<tr>
<td>Volatiles</td>
<td>55 (6.2)</td>
<td>73 (25.7)</td>
</tr>
<tr>
<td>Tranquilizers</td>
<td>143 (16.2)</td>
<td>70 (24.6)</td>
</tr>
<tr>
<td>Sedatives</td>
<td>29 (3.3)</td>
<td>37 (13.0)</td>
</tr>
<tr>
<td>Opiates (smoked)</td>
<td>34 (3.8)</td>
<td>51 (18.0)</td>
</tr>
<tr>
<td>Heroin</td>
<td>30 (3.4)</td>
<td>43 (15.1)</td>
</tr>
<tr>
<td>Other opiates</td>
<td>11 (1.2)</td>
<td>32 (11.3)</td>
</tr>
<tr>
<td>Other drugs</td>
<td>96 (10.8)</td>
<td>98 (34.5)</td>
</tr>
</tbody>
</table>

Figures represent number with the percentage in parentheses.

The mean rate of consumption of illicit drugs was higher in MDMA users than non-MDMA drug users [5.155 (2.54) vs. 1.743 (1.31); p = 0.000]. Compared with non-MDMA drug users, MDMA users reported significantly higher levels of consumption of all drugs, except alcohol (higher consumption in non-MDMA users), for the previous year (table 3). The drugs preferred by both groups were similar, except that MDMA users preferred tobacco and volatiles and non-MDMA users preferred cannabis and tranquilizers.

**Personality Features and Drug Use**

**Eysenck Personality Questionnaire (EPQ-A)**

**Neuroticism.** On the Neuroticism Scale (EPQ-N), there was a direct relationship between neuroticism scores and the number of different drugs used (table 4). Similarly, an increase in scores ≥ the 85th percentile (thereby meeting the cutoff for clinically relevant neuroticism) increased according to drug use (group 1: 15.5%; group 2: 19.3%; group 3: 23.2%; p = 0.000).

**Extroversion.** In contrast to neuroticism, on the Extroversion Scale (EPQ-E), there was no obvious relationship between drug use and extroversion scores (table 4). The percentage of subjects with scores ≥ the 15th percentile (introversion) was similar in the three groups (group 1: 7.0%; group 2: 5.9%; group 3: 7.0%), while group 2 shows a greater proportion of scores ≥ the 85th percentile (clinically relevant features of extroversion) (group 1: 25.7%; group 2: 31.5%; group 3: 27.5%; p = 0.023).

**Psychoticism.** As on the Neuroticism Scale, a relationship between the extent of previous drug use and scores on the Psychoticism Scale (EPQ-P) was likewise observed (table 4). Similarly, it is striking that MDMA users (group 3) had an average score of 7.15 (SD 4.44), which falls within the 93rd percentile on this scale (relevant psychoticism features). As with the Neuroticism Scale, the percentage of subjects scoring ≥ the 85th percentile increased with the extent of drug use (group 1: 33.0%, group 2: 49.8%, and group 3: 67.6%; p = 0.000).

**Secondary Analysis without Opiate Users.** When individuals who had used opiates in the previous year were excluded from the data analysis, significant differences between groups 2 and 3 were found only in the EPQ-P [EPQ-P: non-MDMA drug user minus opiate users (n =
Table 4. Drug consumption and scores on the personality questionnaires

<table>
<thead>
<tr>
<th></th>
<th>Non-drug users (group 1)</th>
<th>Non-MDMA drug users (group 2)</th>
<th>MDMA users (group 3)</th>
<th>( p^a )</th>
<th>Groups statistically different (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPQ-A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPQ-N</td>
<td>11.04 (5.72)</td>
<td>12.03 (5.80)</td>
<td>12.88 (5.71)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
<tr>
<td>EPQ-E</td>
<td>13.74 (3.74)</td>
<td>14.14 (3.78)</td>
<td>13.83 (3.52)</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>EPQ-P</td>
<td>3.76 (2.89)</td>
<td>5.21 (3.61)</td>
<td>7.15 (4.44)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
<tr>
<td>SSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAS</td>
<td>6.21 (2.78)</td>
<td>6.95 (2.51)</td>
<td>7.04 (2.46)</td>
<td>0.000</td>
<td>1 vs. 2, 3</td>
</tr>
<tr>
<td>ES</td>
<td>4.49 (1.66)</td>
<td>5.79 (1.77)</td>
<td>6.54 (1.70)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
<tr>
<td>DIS</td>
<td>6.02 (2.05)</td>
<td>7.55 (1.77)</td>
<td>8.03 (1.72)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
<tr>
<td>BS</td>
<td>4.58 (2.11)</td>
<td>5.24 (2.11)</td>
<td>5.71 (2.03)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
<tr>
<td>Overall score</td>
<td>21.31 (5.97)</td>
<td>25.50 (5.56)</td>
<td>27.29 (5.40)</td>
<td>0.000</td>
<td>1 vs. 2 vs. 3</td>
</tr>
</tbody>
</table>

Numbers represent mean scores (SD)

\(^a\) ANOVA one-way test.

\(^b\) Post hoc Duncan test.

Discussion

This study indicates that between 1995 and 1999, more than 10% of single, young, adult men (aged 17–29) in Asturias had used MDMA at some point, making it the fifth most popular illicit drug in this group, after marijuana, hallucinogens, other amphetamines and cocaine. Notably, prevalence of MDMA use in the last year and last month were 7.8 and 4.5%, respectively, almost identical to that of cocaine (7.9 and 4.6%).

When prevalence rates of MDMA use were evaluated on a year-to-year basis in an effort to analyze trends in MDMA use, a peak was noted in 1995, followed by a slight drop and plateau. However, once exposed to MDMA for the first time, subjects were likely to use it again, regardless of the year evaluated. When the entire 5-year period was considered, 71% of those who had ever used MDMA had taken it during the previous year, which is a higher percentage than for any drug class except hallucinogens. Similarly, in a year-to-year analysis, regardless of annual lifetime prevalence, more than 70% of individuals who had ever taken MDMA had taken it within the last year.

MDMA users had a more extensive drug abuse history compared to individuals who had used other drugs (but not MDMA). They also had increased 'neurotic' and 'psychotic' personality features, as measured by the EPQ-A, as well as increased levels of sensation seeking, as measured by the SSS.
Previous attempts to estimate prevalence of MDMA use have been complicated by the rapidly changing nature of synthetic drug use and the inability of existing indicator methods to convincingly record use [16]. Though our conclusions pertain to males in northern Spain, they circumvent some of the problems associated with measurements of drug abuse. In particular, every able-bodied male in the region was necessarily evaluated, thereby eliminating potential confounds due to inadequate or biased sampling. Compliance and honesty are strongly emphasized during military training; therefore, subjects in the present study may have been more likely to honestly report previous drug use. Finally, the opportunity to utilize identical measurements longitudinally in a well-defined subgroup of the population provided a unique opportunity to accurately measure drug abuse trends over time.

Estimates of MDMA use in the 1990s showed a greater increase than for any other drug (between 5.4 and 10.4% of 20- to 29-year-old males have used it at some point) [28]. This is strikingly similar to the lifetime prevalence of 10.9% in the present study, involving males aged 17–29. Young male secondary school students in Asturias showed a prevalence rate of 5% in 1999 according to our data [29]. The lower prevalence rate is logical when taking into account the fact that they are younger. National data for the same time period also coincide with the trend towards a decrease in MDMA use, followed by a leveling off of the figures, such that males aged 20–29 had prevalence rates of 8.7% in 1997 and 6.7% in 1999 [28]. In contrast, the present data are not entirely consistent with the contention of Gamella and Alvarez [17] that MDMA and its analogues are among the first drugs to be used by Spanish youth. On the contrary, in our sample, the mean age of first MDMA use was higher than that for any other illicit drug. This may be partly due to the age range (17–29) of our sample, they may not have been exposed to MDMA until more recently, whereas more ‘traditional drugs’ have been present in Spain for decades.

Our data strongly underscore the wide variations in drug use, depending on the population evaluated. A 1995 study of ‘disco’ goers in Amsterdam reported a lifetime prevalence of 52% of MDMA use, and a previous-year use of 41% [34]. Studies in northeast Italy suggest that between 9 and 65% of nightclub goers report using it, depending on the nightclub sampled [35]. Clearly, there are subgroups of the population [36] at high risk for using drugs and, at least for MDMA, those at risk often get together at those venues where drug use takes place (i.e., clubs or raves).

As reported by other researchers in other countries, MDMA users typically use a variety of other psychoactive drugs, mainly cannabis, amphetamines, LSD, cocaine and, most frequently, alcohol. ‘Pure’ consumers of this substance are quite rare [34, 35, 37–41], and represented less than 5% of MDMA users in our study. This is relevant when attempting to interpret differences in personality features and sensation seeking found between MDMA users and other groups. In particular, it is possible that other drugs used by MDMA users may contribute to these differences. Further, preexisting personality and sensation-seeking characteristics may have been one factor that ultimately led the individual to use MDMA.

As found previously [42], MDMA users scored significantly higher on the EPQ-A Neuroticism and Psychoticism Subscales than non-MDMA drug users and nondrug users. However, when those MDMA users who had used opiates in the previous year were dropped from the analysis, differences were only seen on the Psychoticism Scale. This could be an indication that features associated with serious polydrug abuse (as opposed to MDMA abuse per se) underlie increases in neuroticism, while increases in psychoticism are distinct among MDMA users. Notably, two other studies [15] may have detected the same trait with different instruments. In particular, MDMA users, compared to non-MDMA users, scored higher on schizotypal personality features of the International Personality Disorders Inventory, suggesting the presence of odd, idiosyncratic personality traits. The same authors [15] found that MDMA users scored higher on the Multidimensional Personality Questionnaire Absorption Scale, which measures spontaneous altered states of consciousness.

As might have been predicted by their high levels of drug use (which can be viewed as an example of sensation seeking), MDMA users had the highest measurements of sensation seeking, even when subjects that had used opiates during the previous year were dropped from the data analysis. This observation is in keeping with data from other studies of MDMA users [10, 12, 13]. Data from a number of investigations not involving MDMA [26, 43–45] support the view that sensation seeking traits are related to drug abuse (as opposed to MDMA use specifically). These studies all reported a consistent relationship between scores on the SSS and extent of drug use. Therefore, it is likely that MDMA users have higher levels of sensation seeking because as a group, they use more illicit drugs than either of the other two comparison groups.
In summary, MDMA is a popular drug of abuse among young adult males in Spain, although the sharp increase in its consumption from the beginning of the 1990s appears to have leveled off at present. Once individuals have used MDMA for the first time, they are likely to use it again (more than 70% of individuals who had ever used MDMA reported having used it in the last year). MDMA users scored higher for neuroticism and psychoticism and were greater sensation seekers. However, MDMA users tend to be polydrug users, making it difficult to establish with certainty whether differences in personality features among MDMA users are related to MDMA use, other drug use, or preexisting characterological tendencies.

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References


