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Is the Use of Ecstasy and Hallucinogens Increasing?

Results from a Community Study

Key Words

Ecstasy
Stimulants
Amphetamines
Hallucinogens
Substance abuse
Prevalence

Abstract

This report presents findings of a community survey of 3,021 adolescents and young adults aged 14–24 years in Munich, Germany, carried out to determine the prevalence of use and abuse of and dependence on ecstasy, amphetamines and hallucinogens. The response rate was 71 %. **Results:** (1) In 1995, 4% of the male and 2.3% of the female respondents aged 14–24 reported the use of ecstasy. Ecstasy-related substances (amphetamines and chemically related substances) were reported by 3.6% of men and 1.6% of women. Hallucinogens were reported slightly less frequently by 3% of men and about 2% of women (LSD combined with others). (2) Compared to findings from a 1990 survey this constitutes a substantial, at least twofold, increase in consumption rate of both types of substances. (3) Among lifetime users of both ecstasy and related substances as well as hallucinogens about two thirds could be regarded as regular users. (4) The prevalence of DSM-IV abuse and dependence on ecstasy and related substances is about 1%, identical to rates of hallucinogen abuse and dependence. Findings also point to a significant dependence potential for both substances. (5) Furthermore, considerable overlap between the two substances was found. **Conclusion:** Our study suggests a substantial increase in both the use of ecstasy and related substances as well as hallucinogens. The data further suggest that the increase is strongest in younger age groups, but the risk of first use of these substances continues to be present up to the age of 24 years. The higher proportion of women contributing to this increase is noteworthy.

Introduction

In most Western industrial countries reports in the 1990s have suggested increasing rates of stimulant use among adolescents and young adults. One of this fairly

broad class of substances, the ‘designer drug’ ecstasy (also named XTC, E or by hundreds of other street names) [1] has gained particular attention in both the lay press as well as among experts. This paper reports data on the use of ecstasy and related substances as well as various forms of hallucinogens, because the latter are not only frequently chemically associated with certain types of drugs named ecstasy, but also seem to be used concomitantly with ecstasy.

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The term 'ecstasy' covers a considerable number of fairly heterogeneous substances on the market. The most frequent main active ingredients of ecstasy are the derivatives of the amphetamine molecule MDE (3,4-methylenedioxy-N-ethylamphetamine) and MDMA (3,4-methylenedioxy-N-methamphetamine). Furthermore, various other derivatives of the amphetamine molecule have been identified as active ingredients in substances sold under the term 'ecstasy' in Germany and in other countries MDA (3,4-methylenedioxyamphetamine), MBDB (N-methyl-1-(1,3-benzodioxol-5-yl)-2-butanamine) DOB (2,5-dimethoxy-4-bromamphetamine) [1]. Ecstasy is available in tablet form under a wide heterogeneity of different names, colors, weight and forms with a tremendous variation of active ingredients. Active dosages can range from placebo to extremely high dosages or combinations with other substances, mostly of other amphetamines and hallucinogens. For the potential buyer neither the name nor the weight and form of the tablet used allows reliable identification of the active ingredients. Although amphetamine and its derivatives (similar to heroin and cocaine) are classified among the so-called 'hard drugs', lay people and people in the ecstasy scene widely regard this drug as a 'safe drug' without any risks of complications and no dependence potential. This is in sharp contrast to numerous reports of (a) several significant physiological effects (loss of appetite, nausea, muscle ache, tachycardia, hypothermia), (b) more severe cardiological and regulatory complications), (c) psychological complications (anxiety, panic attacks, recurrent acute paranoid psychotic experiences, cognitive deficiencies and depression associated with suicidal behavior) [2–7], (d) increasing number of reports about ecstasy-related deaths [8, 9], and (e) severe internal medical and psychiatric complications [3, 10].

Epidemiological evidence, however, about prevalence, incidence and increasing rates of ecstasy and related substance use and disorders are quite meager in Germany as well as in other countries. Reports refer mainly to questionnaire studies and selected observations, which do not provide sufficiently reliable information about how large and serious the problem is in the population. In 1995 the Institute for Therapy Research, Munich [11], conducted a telephone survey in a representative sample of 18- to 59-year-olds ($n = 2,023$) and found that only 0.2% of the sample reported having used ecstasy at least once in their lifetime. Although rates among subjects aged 15- to 25-year-olds were considerably higher, the rates nevertheless seem to be a serious underestimate of the size of the problem. Higher rates were reported by Hurrelmann [12] in a survey of adolescents in Northrhine-Westfalia in Germany in

which 0.8% of 12- to 17-year-olds reported having used designer drugs and stimulants at least once. Indications for a significant increase in the availability of ecstasy are available from the statistics of the Federal Criminal Office (BKA 1994, personal note), that reported considerable increases in confiscated ecstasy tablets from 1993 to 1994 of several hundred percent. Outside Germany, the Institute for the Study of Drug Dependence (1992) [13] reported an increase of 650% in ecstasy users in England between the years 1990 and 1992, whereas no such increase was found, for example, for heroin. More recent data from the US among 8th, 10th and 12th graders in the years 1994 to 1996 indicate that among 8th graders stimulant use increased from 12.3 to 35%, among 10th graders from 51 to 70.7%, whereas fairly stable rates were reported between 1994 and 1996 for 12th graders with rates ranging between 15.3 and 15.7%. Increases were also reported for hallucinogens among 10th and 12th graders, whereas rates for heroin, crack and cocaine showed no great change [14]. For MDMA substances, the Monitoring the Future Study [14] reported a sharp rise in the use among college students and young adults during the 1990s. The percentage of users increased among 8th, 10th and 12th graders from a low of 3.3% to a high of 6.1%.

Aims

The aim of the current study is to determine by standardized personal interviews the frequency of the use and abuse of ecstasy and hallucinogens among 14- to 24-year-old respondents in the greater Munich area. The focus of the study is a detailed description of the type of substance use as well as its frequency and the amount used. We will also compare our data with a previous survey conducted in 1990 with a comparable methodology, to examine the increase of the use of ecstasy and related substances over the years. Specifically, we will address the following questions:

- 1 How prevalent is the use of ecstasy, hallucinogens and related substances?
- 2 What are typical patterns of use?
- 3 How prevalent is DSM-IV abuse and dependence of ecstasy?
- 4 Is there an increase in the use of ecstasy?
- 5 What is the age of onset of ecstasy use?

Methods

Design and Sample

Sampling and design of this study have been described elsewhere in detail [15]. Briefly, data presented here are from the first wave of the Early Developmental Stages of Psychopathology study (EDSP), funded by the German Ministry of Research and Technology. The study is designed to collect data on the prevalence, risk factors, comorbidity and course of mental disorders with specific emphasis on early developmental stages of mental disorders, including substance use disorders. The overall design of the study is prospective, consisting of a baseline survey and two follow-up surveys at approximately 15 and 30 months after the baseline. Separate face-to-face interviews with the respondents' parents have also been carried out. The follow-up assessments investigate symptom and syndrome progression, incidence and remission as well as helpseeking and the development of impairments. The assessment of drug use is based on the drug module of the M-CIDI, supported by memory aids to identify the type and content of the named substance. The EDSP community sample includes 3,021 subjects aged 14–24 years at the time of the baseline investigation, conducted in 1995.

To estimate the increase in drug use data were used from the Bavarian Infratest-Biogram-Study 1990 [16], which is comparable with regard to sampling and questions used for assessing drug use. This study was commissioned by the Bavarian Ministry of Work and Social Affairs with emphasis on a representative sample of young community members of the city of Munich and its rural surroundings in 1990. In total, 2,105 persons aged between 14 and 25 years participated in this study in 1990.

Assessment of Substances

The wide range of names used for ecstasy as well as the user's lack of precise knowledge about the chemically active ingredients makes the assessment quite difficult. Just asking for 'ecstasy' might lead to an underestimation of its use. Therefore, we assessed respondents capable of making reasonably clear indications about specifically using ecstasy and also those using other terms or other types of stimulants likely to be ecstasy-like substances. Thus, the expression 'ecstasy' is used throughout this paper if the person has undoubtedly used ecstasy. If the interviewed subject was not quite sure, but convinced that the substance belonged to the group of ecstasy-like stimulants, respondents were grouped under ecstasy-related substances and amphetamines. As a result we will report data on ecstasy alone as well as data about related substances. The same procedure was applied to hallucinogens, by separating LSD use from other hallucinogens, although the reliability of these reports did not pose such serious problems in our study.

Statistical Methods

Diagnoses of abuse and dependence are computed by the M-CIDI-DSM-IV-diagnostic algorithm [17]. Analyses are based on weighted data to reflect the different probability of each subject to be selected for inclusion as well as to adapt for nonresponse. (For more detailed information see [15].) Group differences were tested by using the χ^2 . Age-dependent odds ratios for the first use and first appearance of abuse and dependence features were estimated by Hazard rates.

Results

How Prevalent Is the Use of Ecstasy and Related Substances as well as Hallucinogens in Adolescents and Young Adults in 1995?

Table 1 reports the weighted prevalence rates for use of ecstasy and hallucinogens and related substances in 14- to 24-year-old respondents of Munich in 1995. Included are all persons who had tried the substances at least once in their lifetime. The figure differentiates between (a) respondents who were sure about having used ecstasy or LSD, and (b) probands who did not explicitly use the terms 'ecstasy' or 'LSD' but had used other, related substances (such as speed or amphetamines), or other hallucinogens (mescaline, peyote, psilocybin).

In 1995, 4% of men and 2.3% of women reported having used ecstasy at least once in their life. Lifetime use of other amphetamines was only slightly lower (3.5% men and 1.6% women). LSD had been used by 2.8% of men and 1.4% of women. Other hallucinogen use was reported by 1.2% of respondents (lifetime). Across age groups there are significant gender differences for the use of ecstasy ($\chi^2 = 7.46$, $p = 0.006$), related substances ($\chi^2 = 11.78$, $p = 0.001$) and LSD ($\chi^2 = 6.92$, $p = 0.009$). No significant difference was found for the use of other hallucinogens, although women show only half the use rates as compared to men.

Use rates in men for ecstasy and related substances increase steadily with age, from fairly low rates of 0.4% in 14- to 15-year-olds to a high of 7.6% in 22- to 24-year-olds. For LSD and other hallucinogens use rates peak among 18- to 19-year-olds with slightly lower rates among respondents older than 20 years.

It should be noted that there is also considerable overlap in the use of these two substances. Only 2.6% of the users consumed exclusively ecstasy (table 2); 97.4% of all lifetime ecstasy users use or have used also cannabinoids, 58.9% cocaine, 48.2% related substances, 46% hallucinogens and 26.2% opiates.

How Prevalent Are Clinically Significant Amphetamine- and Hallucinogen-Related Substance Use Disorders?

Table 3 shows that 0.8% of the sample fulfilled the diagnostic criteria for a DSM-IV amphetamine-related substance use disorder with 0.4% qualifying for abuse and 0.4% for dependence (with or without abuse). This indicates that every fifth ecstasy/amphetamine user between the ages of 14–24 years is developing a clinically relevant substance use disorder. 0.6% of the respondents fulfilled

Table 1. Lifetime prevalences for the use of ecstasy, related substances, LSD and other hallucinogens

		Age groups					
		14–15 % ¹	16–17 % ¹	18–19 % ¹	20–21 % ¹	22–24 % ¹	total % ¹
Ecstasy	men	0.2	3.5	3.3	5.1	5.6	4.0
	women	0.0	2.5	2.0	1.8*	3.5	2.3*
	total	0.1	3.0	2.6	3.3	4.5	3.1
Related substances ²	men	0.2	1.3	4.4	4.2	5.3	3.5
	women	0.2	1.4	1.1*	1.8	2.3*	1.6*
	total	0.2	1.3	2.7	2.9	3.8	2.5
Total amphetamines	men	0.4	3.8	4.7	6.7	7.6	5.3
	women	0.2	3.0	2.0	2.8*	4.8	3.0*
	total	0.3	3.4	3.3	4.6	6.2	4.1
LSD	men	0.5	1.2	4.3	3.0	3.8	2.8
	women	0.0	2.2	2.0	1.1	1.6*	1.4*
	total	0.2	1.7	3.1	2.0	2.7	2.1
Other hallucinogens ³	men	0.0	0.4	0.9	3.4	2.3	1.6
	women	0.2	0.5	1.8	0.7*	0.9	0.8
	total	0.1	0.5	1.4	2.0	1.6	1.2
Total hallucinogens	men	0.5	1.9	4.3	6.0	4.7	3.7
	women	0.4	3.3	3.4	1.5*	2.6	2.2*
	total	0.4	2.6	3.8	3.6	3.6	3.0

* p < 0.05 (gender difference).

¹ Weighted.

² Such as speed, amphetamines.

³ Such as mescaline, peyote, psilocybin, DMT.

Table 2. Use of other substances by lifetime ecstasy users

	% among ecstasy users reporting other substance groups		
	men	women	total
Cannabinoids ¹	98.8	95.0	97.4
Opioids ²	24.3	29.4	26.2
Cocains ³	61.0	55.3	58.9
Hallucinogens ⁴	50.3	38.5	46.0
Related substances ⁵	54.0	38.0	48.2

¹ Cannabis, hashish.

² Heroin, opium, methadone, morphium.

³ Cocaine, coca leaves, crack.

⁴ LSD, mescaline, peyote, psilocybin, DMT.

⁵ Amphetamines, khat, betel nut, speed.

Table 3. Lifetime prevalence of DSM-IV abuse or dependence on ecstasy, related substances, LSD and other hallucinogens

	Men %	Women %	Total %
<i>Ecstasy and related substances</i>			
Abuse	1.2	0.3	0.8
Abuse without dependence	0.8	0.0	0.4
Dependence	0.4	0.4	0.4
<i>LSD and other hallucinogens</i>			
Abuse	0.9	0.3	0.6
Abuse without dependence	0.6	0.0	0.3
Dependence	0.3	0.4	0.4

Fig. 1. Frequency of ecstasy and related substance use among regular users.

DSM-IV criteria for abuse (0.4%) or dependence (0.3%) of hallucinogens, indicating that 1 of 4 male lifetime users and 1 of 8 female users develop abuse or dependence, or both, of this type of substance.

Pattern of Use

For the purpose of this study we define subjects who used a substance once in their life as 'experimental users' and subjects with a use of about 2–4 times as 'nonregular users'. Subjects who have used a substance at least 5 times are defined as 'regular users'. Among all lifetime users 24.2% had used ecstasy or related substances and 30.3% LSD or hallucinogens just once up to the point of our investigation. Nonregular use was reported by 35.2% (ecstasy or related substances) and 25% (LSD or hallucinogens). Regular users form the largest group with 47.3% of the ecstasy or related substance users and 44.7% of the LSD or hallucinogen users.

Figure 1 shows the frequency of use of ecstasy or related substances among regular users. Only 3% used the substance every day and 14% three to four times a week. Most of the users (63%) used ecstasy or related substances once or twice a week or one to three times a month. Quite similar to almost identical patterns were reported for hallucinogens (not reported in figure 1).

Was There an Increase in Use from 1990 to 1995:

Evidence for Age Cohort Specific Increases

Figure 2 shows that the 1995 lifetime use prevalence rates for ecstasy and related substances as well as for hallucinogens are at least 2 times higher than those found in 1990. Men seem to show a steeper increase in the use of

Fig. 2. Increase of the use of ecstasy and related substances, LSD and other hallucinogens between 1990 and 1995 in Munich.

LSD/other hallucinogens (1.3–3.8%) and ecstasy or related substances (2–5.2%) than women (1.3–2.3%; 2–3%). In summary, in 1995 men had about three times and women had about twice the rate for use of these substances they had in 1990.

In our study, the subjects were asked about the age they used each type of substance for the first time in their life. Figure 3 shows relatively dissimilar birth-cohort-specific cumulative hazard estimates of ecstasy or related substances, and LSD or hallucinogen use. The younger birth cohort reports a significantly earlier and considerably more frequent use of ecstasy as well as hallucinogens up to the age of 17 years, compared to the older cohort. The age-of-first-use curve among respondents born between 1971 and 1976 shows a slow but steady increase for ecstasy use up to the age of 24 years: for hallucinogens this increase levels off after the age of 22 years.

Discussion

Unlike previous German studies investigating the prevalence of ecstasy and hallucinogen use by self-report questionnaires, the results of the present study are based on standardized personal interviews in a representative community sample of 3,021 subjects from the greater Munich area. Furthermore, the assessment is based on a standardized, internationally compatible diagnostic interview, the M-CIDI, providing detailed and standardized information on patterns of use, diagnosis of abuse and dependence according to DSM-IV criteria, along with information about the onset of use and duration.

Fig. 3. Cohort effects of the age of onset of ecstasy and related substances, LSD and hallucinogens use.

Nevertheless, despite these advantages over earlier studies some limitations need to be taken into account.

(1) It is relatively complicated to get reliable and valid information about the specific chemical structure of the substances used. The terms ‘ecstasy tablets’ or ‘designer drug’ alone usually do not allow the determination of what type of substance was actually used because of the extreme heterogeneity and variability of active ingredients in the tablets. Although we tried to assess this issue in more detail, it became evident that detailed and exact information about dosages and the quality of the substance used might only be feasible when such studies in the future are combined with specific pharmacological assays. Obviously, however, most of our respondents’ descriptions suggest that ecstasy and related drugs often consist of a mixture of metamphetamine and hallucinogenic components, not allowing us to make a clear distinction between ecstasy in its strict sense and hallucinogens.

(2) The data reported focus exclusively on 14- to 24-year-olds in the metropolitan area of Munich that is usually considered by experts to be a fairly low-prevalence area compared to other metropolitan areas such as Hamburg and Berlin with regard to drug use. Thus, the reader should take into account that the reported prevalence rates cannot be used to estimate the size of the problem throughout Germany. We can expect that rates from other metropolitan cities are considerably higher, whereas rates from more rural areas might be considerably lower.

(3) In this article we focus specifically on determining the size of the present problem as well as the question whether ecstasy and hallucinogen use is on the rise. At the

same time we do not report more detailed findings with regard to the associated risks and complications as well as the type of dependence and abuse patterns found in our study. This type of data will be made available as soon as the subsequent wave of reexamination becomes available, together with information about the stability, the remission and the progression of these patterns of use.

(4) Furthermore, the base rates of our study are fairly low, not allowing us to describe physical and psychological short- and long-term effects of the use of these substances in detail. A recent report by Thomasius et al. [7] has comprehensively reviewed the various complications reported for ecstasy and related substances.

In summary, regular ecstasy users in pure form are very rare because of the remarkable overlap between substances used. The results rather show that 97.4% of all lifetime ecstasy users also use cannabinoids, 58.9% cocaine, 48.2% other substances, 46% hallucinogens and 26.2% opiates. Furthermore, in spite of the above-mentioned limitations, our study clearly supported the hypothesis that there has been a considerable increase in the use of ecstasy, related substances as well as hallucinogens. Compared to a similar regional review conducted in 1990 in the Munich area [16], the prevalence of use of ecstasy has been found to be three times higher in men and two times higher in women. Such an increase is also supported by other sources, such as the increasing rate of confiscated ecstasy substances by the German police (BKA) as well as a more recent survey of the Institute for Therapy Research [18]. Further evidence for a considerable increase in the use of ecstasy and hallucinogens also comes from

our age cohort analysis. Younger birth cohorts show considerable and highly significant higher cumulative incidence lifetime rates and, furthermore, the age of onset for the first use of these substances has been found to be considerably lower in younger birth cohorts compared to older cohorts. This is strong evidence for a continuing 'ecstasy' epidemic. By extrapolating the use rates for the young cohorts we can assume that use rates will at least double over the course of the next 2 years. In addition, our data also suggest that the increasing rates after the age of 17 years can be expected to contribute to further increasing rates of ecstasy and related substance use. Obviously, the attractiveness of ecstasy and related substances continues to be high even among people in their twenties, a trend is not apparent in a similar way for hallucinogens. For the latter we find increasing rates among respondents up to the age of 19 years, but after this age only few new cases report the first use of hallucinogens. These findings compare well with more recent reports from the National Comorbidity Survey [19, 20].

Both ecstasy as well as hallucinogens seem to be almost always used as weekend drugs, whereas the daily or almost daily use of these types of substances is the exception rather than the rule. However, daily use is frequent among those with a dependence syndrome. This supports the typical 'scene' description [7] that links the use of ecstasy and related substances to rave parties and other music and socially related activities.

Ecstasy as well as hallucinogens are frequently perceived by the users as so-called 'safe drugs' with no addiction potential, although this does not match the experts' view that classify these substances as so-called 'hard drugs' because of their chemical properties. Our data support the latter, because of a serious substance disorder risk potential by these types of substances among lifetime users. Every fifth person having used either sort of substance at least once is likely to fulfil criteria for the abuse of or dependence on this substance later on. These findings are remarkable, given the young age of our respondents as well as the short period of use reported by the vast majority of our respondents. Future research should examine in more detail whether this high substance disorder potential is due to specific compounds of ecstasy and hallucinogens, whether it is related to the concomitant use of other substances or to the fact that both of these substances often contain other ingredients that contribute to this high substance disorder risk potential.

The reasons for this increase in the use of both ecstasy and hallucinogens are at this point not easy to identify. In an earlier publication by Schuster and Wittchen [1], we

suggested that the availability as well as the increasing popularity of the rave scene are probably among the most important factors contributing to the observed ecstasy and hallucinogen epidemic. Why, however, people who have tried ecstasy and hallucinogens for the first time continue to use them, which is true for almost two thirds of our respondents, is less clear. In the above-mentioned publication we studied the different motivational patterns for use and continued use in more detail, suggesting that the lack of knowledge or awareness about the risks of severe adverse effects or the risk of becoming dependent on these drugs might be important factors. The evaluation of this issue remains to be complicated because we also have shown that motivation patterns for first use differ considerably from those for continued use [1]. One key finding in this context was that after some time many users of ecstasy do not find the effects of ecstasy attractive enough anymore and turn to mixtures containing hallucinogens or directly demand hallucinogens. This switch from ecstasy-like substances to hallucinogens is also supported by our age-of-onset analysis that suggests that hallucinogen use is usually secondary to ecstasy use. As this study indicates that also a multiple use of substances in combination to ecstasy becomes very common in adolescents and young adults, it is noteworthy that further investigations are necessary.

To conclude, our representative community survey clearly supports previous reports about a considerable increase in the use of both ecstasy-like substances as well as hallucinogens. This ongoing and obviously continuing increase should be a serious concern from a public health perspective and stresses the need for the designation of specific prevention activities. A critical issue in designing such preventive trials will probably be to design activities aimed at a reduction in first-time users by giving information about the adverse effects of these substances and the associated risks, as well as preventive actions for the regular user. For the latter there seems to be a considerable need for information about the association with hallucinogen as well as the additional risk associated with the concomitant use of both types of substances, in order to prevent the progression from initial stages of use on to abuse and dependence. Our upcoming 5-year follow-up investigation will probably allow us to provide the scientific community with more specific information about the further development of this cohort and will also be able to identify those factors associated with progression and remission for ecstasy-like hallucinogenic substances and the multiple use of other substances in combination with ecstasy.

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