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Substance use disorders and treatment utilization among MDMA users: Results from The National Epidemiologic Survey on Alcohol and Related Conditions

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Abstract

The study examined the prevalence and correlates of substance use disorders and treatment utilization among lifetime MDMA users. Secondary analyses were conducted on data from the 2001–2002 NESARC, a nationally representative survey of adults in the United States. Lifetime MDMA use was assessed, and MDMA users ($n = 562$) were compared to a matched sample of non-MDMA users. Substance use diagnoses were made using the AUDADIS – DSM-IV, and data on treatment utilization were collected. MDMA use was significantly related to lifetime and past year substance use disorders as well as treatment utilization in bivariate analyses. Multivariate analysis, however, showed that MDMA use was not related to lifetime substance use diagnosis or to treatment utilization. MDMA use still had the strongest association with past year substance use disorders.

Introduction

Over the last decade, 3,4-methylenedioxymethamphetamine (MDMA), also known as Ecstasy, has gained popularity in the United States and abroad. According to the 2007 U.S. National Survey on Drug Use and Health, an estimated 5% of Americans age 12 and older had used MDMA in their lifetime and 0.9% had used it in the past year¹. The U.S. 2005 Monitoring the Future survey reported that 15% of adults aged 19–30 reported lifetime MDMA use². It is estimated that almost 8.5 million Europeans (2.6% of adults) have tried ecstasy, and almost 3 million (1% of adults) reported use in the past year³. In 2006, among young adults in Europe ages 16–34 years, 5.2% had lifetime experience with MDMA and 1.9% had used in the last year³. In 2004, 7.5% of the Australian population ages 14 and over had used MDMA at least once in their lifetime and 3.4% of the population had used it within the last year⁴. Community level data from NIDA's Community Epidemiology Work Group highlights the widespread diffusion of ecstasy from a club drug into mainstream settings, including college campuses⁵, and reports indicate that MDMA use has spread beyond predominantly white youth and has become more common among minorities and older demographics⁶.

Despite the substantial prevalence of MDMA use, there are limited data regarding associated substance use disorders and substance use treatment utilization. There are relevant data from clinical studies, local and regional surveys, and large, population-based samples which unequivocally demonstrate that the majority of ecstasy users are polydrug users and that MDMA use is associated with increased risk of other illicit drug use⁷⁻¹¹. However, the relationship between MDMA use and substance use *disorders* is far less clear as most studies on MDMA have not included a diagnostic interview. An exception is a large study conducted in Munich with a representative sample of adolescents and young adults¹². This study found that compared to those who had used other illicit substances and those who had never used illicit substances, those who had used MDMA or related compounds reported significantly higher rates of alcohol use disorders (52.6% vs. 40.3% vs. 15.6%) and nicotine dependence (53.2% vs. 37.1% vs. 10.4%)¹². The MDMA group was also more likely to meet criteria for an illicit substance use disorder compared to those who used illicit substances other than MDMA (43.7 vs. 11.7%; OR = 6.4). It has been suggested that MDMA use may serve as a marker for a more severe subtype of drug use⁷. However, further understanding of the relationship between MDMA use and misuse of specific substances is needed before MDMA can be utilized as a clinical marker.

Determination of the rates of mental health and drug and alcohol services used by MDMA users and the settings in which they receive treatment is useful to clinical administrators and policymakers as such information can guide prevention and assessment efforts. Only two studies have examined treatment utilization in this population thus far. In regard to substance abuse treatment utilization, it has been reported that MDMA users have a greater likelihood of utilizing drug treatment services than non-MDMA drug users⁷. Lieb et al.¹² also reported that MDMA users were more likely to seek the help of a psychologist; however, the reason for such treatment was not specified. MDMA users did not differ from other illicit drug users or the no drug use group in regard to services received from a general practitioner, internist, neurologist or psychiatrist.

The goal of this study is to better understand the relationship between MDMA use and substance use disorders and treatment utilization. Specifically, the study goals are: (1) to estimate the prevalence of polysubstance use and substance use disorders among MDMA users compared to non-users, (2) to examine the rates of treatment utilization of MDMA users compared to non-users in different treatment settings, and (3) to investigate whether MDMA use is associated with substance use disorders and treatment utilization after controlling for demographic variables, family history and polysubstance use.

Methods

Study Design

We conducted secondary data analysis of the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a representative sample of the United States, sponsored by the National Institute on Alcohol Abuse and Alcoholism. The target population of the NESARC was the civilian, non-institutional population of the United States, including adults living in non-institutional group quarters such as group homes, shelters, and college quarters. Respondents were selected to participate in NESARC using a multistage cluster sampling design, and all NESARC respondents provided written informed consent. Trained interviewers administered the standardized, computerized, face-to-face interviews to 42,093 respondents, and the overall survey response rate was 81%. African Americans, Hispanics and young adults (ages 18 – 24 years) were over-sampled, with data adjusted for over-sampling and household- and person-level non-response. The weighted data were then adjusted to represent the U.S. civilian population based on the 2000 census. Further details regarding the NESARC are provided by Grant et al.¹³

Participants

Survey participants were asked if they had “ever used ecstasy or MDMA” and responded yes or no. The present study includes the 562 individuals who indicated they had used ecstasy in their lifetime (MDMA users) and 562 individuals who had never used ecstasy (MDMA non-users). The MDMA non-users were randomly selected and matched to the MDMA users by age and gender. Age was matched because MDMA is considered a club drug generally used by younger people, and gender was matched because gender differences have been reported in the prevalence of a number of the dependent variables examined, including alcohol, cannabis and opioid abuse and dependence^{14–19}.

Measures

DSM-IV Substance Use Disorders—Substance use diagnoses were made using the Alcohol Use Disorders and Associated Disabilities Interview Schedule – Diagnostic and Statistical Manual of Mental Disorders – Fourth Revision (AUDADIS-IV), a structured diagnostic interview designed for use by lay interviewers²⁰. The AUDADIS-IV includes an extensive list of symptom questions that separately operationalizes DSM-IV criteria for abuse and dependence for nicotine, alcohol, and nine different drug categories (amphetamines, cannabis, cocaine, hallucinogens, inhalants, heroin, other opioids, sedatives and tranquilizers). For each substance category, dichotomous variables were used to classify each individual as meeting criteria for abuse and for dependence. Consistent with the DSM-IV, lifetime diagnoses of abuse required participants to meet at least 1 of 4 abuse criteria, and lifetime dependence diagnoses required at least 3 of the 7 DSM-IV dependence criteria to be met. Diagnoses of dependence prior to the past year were required to satisfy the time-clustering criteria defined in the DSM-IV; that is, in order to meet dependence criteria, at least 3 dependence symptoms must have occurred within the same 1-year period. Numerous studies conducted with clinical and general population samples have demonstrated good-to-excellent reliability and validity of the AUDADIS-IV substance use diagnoses.^{21–22}

Family history of substance use disorders—A history of family substance use disorders included any self-reported, positive family history of alcohol or drug use problems among any of the respondent’s biological family members (i.e., natural parents, sons, daughters, grandparents, full brothers, and full sisters). Each study participant was categorized as either having a positive or negative family history of substance use disorders.

Substance abuse treatment—A history of substance abuse treatment was defined as having ever received any treatment or services for problems related to alcohol or drug use at any location (e.g., an inpatient ward, outpatient clinic, emergency room, addiction treatment program, mental health treatment program, self-help group, jail, or church).²³ Participants responded yes or no to having received treatment in each of the settings assessed.

Data analysis

Data were weighted and analyzed with SUDAAN software²⁴, which applies a Taylor series linearization method to account for NESARC’s complex design effects. T-tests (for continuous measures) and chi-square tests (for categorical measures) were conducted to examine differences between MDMA users and non-users in regard to sociodemographic characteristics, substance use diagnoses, and treatment utilization. Logistic regression models were used to specify associations between MDMA use and substance use disorders and treatment utilization while adjusting for demographic variables, family history and polysubstance use. To control for Type I error due to multiple tests, the significance level was set at $p < .01$ to be conservative. Weighted percentages are reported in the results.

Results

Sociodemographic Characteristics of MDMA Users and Non-Users (see Table 1)

Lifetime MDMA use was reported by 562 respondents (weighted estimate of 1.6% of the U.S. adult population). MDMA users were less likely to be Hispanic or African American and were more likely to be White compared to non-users. Significant differences in family history of substance use were also found with MDMA users more likely to report a family history of both alcohol and drug use disorders compared to non-users. The two groups did not differ in education, marital status, work status, income or geographic location.

Lifetime and Past Year Substance Use of MDMA Users and Non-Users (see Table 2)

In both their lifetime and in the past year, MDMA users were more likely to have used alcohol and all nine drugs examined compared to non-users. In their lifetime, they used an average of 5.5 ± 0.1 substances (including alcohol) while non-users used an average of 1.5 ± 0.1 substances. In the past year, MDMA users used an average of 2.6 ± 0.1 substances while non-users used an average of 1.7 ± 0.1 substances. MDMA users were also more likely to be current tobacco users (65.4%) compared to those who had never tried MDMA (32.5%) ($\chi^2 = 51.7, p < .001$).

Lifetime and Past Year Prevalence of Substance Use Disorders of MDMA Users and Non-Users (see Table 3)

Overall, 90.6% of MDMA users met criteria for a lifetime substance use disorder compared to 34.3% of non-users ($\chi^2 = 79.0, p < .001$). MDMA users also had a significantly greater number of lifetime substance use diagnoses (2.8 ± 0.5) than non-MDMA users (0.5 ± 0.1) ($t = 16.6, p < .001$). Among MDMA users, 9% had no lifetime substance use disorder, 46% had 1–2, 27% had 3–4, and 18% had 5 or greater. In comparison, 66% of non-users had no lifetime substance use disorder, 32% had 1–2, 2% had 3–4, and less than 1% had 5 or greater ($\chi^2 = 93.7, p < .001$). Compared to non-users, MDMA users were more likely to have experienced lifetime abuse or dependence of every class of substance examined.

In the past year, 56% of MDMA users met criteria for a substance use disorder compared to 13% of non-users. Similar to the lifetime analyses, MDMA users also experienced a greater number of past year disorders with 44% of them meeting criteria for 1–2 disorders, 10% meeting criteria for 3–4 disorders, and 3% meeting criteria for 5 or more disorders. In contrast, 87% of non-users had no past year psychiatric diagnoses, 13% had 1–2, and no one had 3 or greater ($\chi^2 = 76.8, p < .001$). Compared to non-users, MDMA users were more likely to have experienced lifetime abuse or dependence of every class of substance examined except for inhalants and heroin.

Regression Analysis Predicting Substance Use Diagnoses

Logistic regression analyses were conducted to control for the potentially confounding influences of sociodemographic variables, family history and polysubstance use on the prevalence of substance use disorders. The covariates included in the model were age, gender, marital status, ethnicity, census region, family history of alcohol problems, family history of drug problems, and total number of substances ever used. With these covariates in the model, MDMA use was no longer significantly related to meeting criteria for any lifetime substance use disorder ($OR = 1.3; p = .51$). However, a logistic model including the same covariates showed that MDMA use was strongly related to having a past year substance use disorder ($OR = 4.1; p < .001$).

Substance Use Treatment Utilization (see Table 4)

Substance use treatment utilization was examined among the 510 MDMA users and 177 MDMA non-users who met criteria for a lifetime substance use disorder. Among those with a lifetime substance use diagnosis, MDMA users were significantly more likely than MDMA non-users to have sought help for their drinking or drug use in their lifetime (31.6% vs. 14.5% respectively; $\chi^2 = 13.0, p < .01$). They were significantly more likely to receive alcohol/drug detoxification and rehabilitation, family services, and emergency room and outpatient services. They were also more likely to see a private physician, psychiatrist, clergyman or priest.

Past-year treatment utilization was also examined, however, individual treatment settings were not examined due to small sample sizes. Among those with a lifetime substance use diagnosis, MDMA users were significantly more likely than MDMA non-users to have sought help for their drinking or drug use in the past year (12.2% vs. 3.8% respectively; $\chi^2 = 10.4, p < .01$).

Regression Analysis Predicting Substance Use Treatment Utilization

Logistic regression analyses were conducted to control for the potentially confounding influences of sociodemographic variables and severity of substance use disorders on substance use treatment utilization among individuals with a lifetime substance use disorder. Severity of substance use disorders was defined as total number of lifetime substance use diagnoses. The covariates included in the model were age, gender, marital status, ethnicity, census region and total number of lifetime substance use diagnoses. MDMA use was not related to lifetime treatment utilization for substance use problems ($OR = 1.8; p = .09$). Analysis of past-year treatment utilization yielded similar results. MDMA use was not related to past-year treatment utilization for substance use problems ($OR = 1.5; p = .48$).

Discussion

Among adults in a U.S. national sample, approximately 1.6% reported lifetime ecstasy use. Consistent with prior research reporting the polysubstance use of MDMA users, our findings indicated that MDMA users had used on average 5.5 different classes of substances in their lifetime compared to 1.5 for the non-MDMA users. In both their lifetime and in the past year, MDMA users were more likely to have used every class of substance examined compared to non-users. Notably, nearly all MDMA users (98%) had used cannabis in their lifetime and over half (53%) had used it in the past year. This is consistent with prior findings that 93% of MDMA users reported cannabis use.¹²

MDMA use was associated with a considerably increased prevalence of all lifetime substance use disorders studied, and 91% of MDMA users met criteria for at least one lifetime substance use disorder compared to 34% of MDMA non-users who met this criteria. The pattern was similar for past year substance use disorders with 56% of MDMA users meeting criteria for a past year substance use disorder compared to 13% of non-users. Given these findings, it is not surprising that MDMA users were more likely to have sought help for their drinking and drug use and to have utilized a variety of substance abuse services compared to MDMA non-users.

Despite the strong findings regarding lifetime substance use disorders and lifetime treatment utilization in the bivariate analyses, MDMA use was no longer associated with either of these in the multivariate analyses. The multivariate analysis suggests that MDMA users' increased treatment utilization is driven by the polysubstance use associated with MDMA use rather than MDMA use itself.

In contrast to the findings regarding lifetime substance use disorders, MDMA use was the strongest individual predictor of having a past year substance use disorder. Given our lack of data regarding initiation of MDMA use, we can only hypothesize as to why this inconsistency in findings occurred. According to the Monitoring the Future survey, rates of annual MDMA use among college students and young adults rose sharply between 1998 and 2001 after which they began to decline.² Hence, rates of MDMA use were at an all time high during data collection for this study. It is, therefore, plausible that a large number of the MDMA users in our study initiated MDMA use in the period just prior to and during data collection for this study, thereby strengthening the relationship between MDMA use and past year substance use diagnoses while not impacting the relationship between MDMA use and lifetime substance use diagnoses.

Although illicit polysubstance use is regularly recognized as being associated with MDMA use, nicotine use among MDMA users has not received as much attention. The findings indicated that current nicotine use among MDMA users was high (65.4%) and twice that of MDMA non-users. More troubling, given the negative health consequences of smoking, was the finding that 41.6% of MDMA users met criteria for nicotine dependence in the past year which is nearly three times the rate of dependence among MDMA non-users.

A limitation of this study is the lack of detailed information regarding MDMA use (i.e., age of first use, frequency and amount of use, etc.). Inclusion of such variables in future research would allow for a better understanding of how dosage and frequency of use relate to substance use disorders and treatment utilization, although it is notable that such dramatic associations were observed with a simple question about lifetime ecstasy use. The association between MDMA use and substance use disorders was assessed for lifetime prevalence; therefore, we cannot discern temporal ordering or whether they occurred concurrently. The findings indicate an association between MDMA use and abuse or dependence of all classes of substances examined. However, it cannot be determined if MDMA use causes or exacerbates these disorders, or if alternatively, the presence of a substance use disorder increases the likelihood of MDMA use.

The study findings suggest the importance of addressing potential substance use disorders among individuals who have a history of MDMA use. Although causal inferences cannot be made, MDMA use may serve as a useful clinical marker that has consistently been associated with polysubstance use and has been shown to be related to past year substance use disorders in this study. Screening for substance use disorders and nicotine dependence may be warranted among adults who report lifetime MDMA use to help identify treatment needs and provide proper referrals.

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Table 1

Sociodemographic Characteristics

	MDMA use (n = 562)	No MDMA use (n = 562)	t-test or ²
Age (SD) ¹	27.5 (0.4)	27.7 (0.5)	
Gender (% male) ¹	332 (63.4)	332 (64.3)	
Ethnicity (%)			28.4 *
Hispanic	93 (9.2)	154 (17.7)	
Asian/Hawaiian/Pacific Islander	20 (4.7)	19 (4.7)	
American Indian/Alaskan Native	16 (3.3)	10 (2.4)	
African American	22 (2.5)	101 (12.1)	
White	411 (80.4)	278 (63.2)	
Marital status (%)			9.2
Married	171 (33.4)	233 (44.6)	
Widowed/divorced	61 (9.2)	53 (6.7)	
Never married	330 (57.4)	276 (48.7)	
Education (%)			1.7
<12th grade	66 (11.8)	92 (13.1)	
HS grad/GED	128 (24.6)	161 (28.2)	
Some college	368 (63.6)	309 (58.7)	
Any work in past year (%)	530 (94.7)	497 (90.4)	5.8
Personal income in last 12 months (SD)	29261 (3195)	22126 (1236)	2.0
Family income in last 12 months (SD)	51391 (3498)	44313 (2154)	1.7
Census region (%)			13.0
Northeast	110 (22.0)	94 (16.7)	
Midwest	83 (14.2)	117 (21.8)	
South	172 (31.3)	207 (36.0)	
West	197 (32.5)	144 (25.5)	
Family history of alcohol problems (%)	374 (69.1)	233 (40.9)	38.9 **
Family history of drug problems (%)	200 (35.7)	74 (34.4)	29.1 **

Note: Unweighted frequencies and weighted percents are reported.

¹ Matching variables – no statistical tests conducted.

* $p < .01$;

** $p < .001$

Table 2

Substance Use (Lifetime and Past Year)

	Lifetime Use			Past Year Use		
	MDMA use	No MDMA use	t-test or ²	MDMA use	No MDMA use	t-test or ²
Total # of substances used (SD)	5.5 (0.1)	1.5 (0.1)	27.8 *	2.6 (0.1)	1.7 (0.1)	15.3 *
Total # of substances used (%)			105.0 *			88.0 *
0	0 (0.0)	88 (14.2)		32 (5.9)	148 (26.0)	
1	0 (0.0)	327 (57.7)		162 (31.3)	368 (65.4)	
2-3	103 (19.3)	105 (20.1)		227 (36.9)	43 (8.1)	
4-5	198 (36.9)	22 (3.8)		101 (17.7)	3 (0.5)	
6+	261 (43.8)	20 (4.2)		40 (8.2)	0 (0.0)	
Alcohol (%)	557 (98.9)	473 (85.8)	38.4 *	519 (92.1)	411 (73.4)	36.1 *
Amphetamines (%)	238 (41.4)	24 (5.2)	60.5 *	63 (10.5)	2 (0.5)	35.3 *
Cannabis (%)	547 (97.7)	137 (26.3)	98.3 *	311 (53.0)	39 (7.4)	75.8 *
Cocaine (%)	370 (61.4)	28 (5.2)	81.8 *	98 (16.9)	1 (0.3)	45.5 *
Hallucinogens (%)	562 (100.0)	42 (9.2)	107.1 *	147 (27.7)	2 (0.2)	64.3 *
Inhalants (%)	146 (24.6)	13 (2.4)	48.6 *	23 (4.3)	0 (0.0)	16.2 *
Opioids - heroin (%)	31 (5.1)	5 (0.6)	15.3 *	5 (1.3)	0 (0.0)	3.6 *
Opioids – other (%)	251 (44.7)	38 (7.7)	75.4 *	117 (21.5)	11 (1.6)	52.0 *
Sedatives (%)	214 (38.7)	26 (5.0)	59.1 *	75 (14.6)	3 (0.3)	35.3 *
Tranquilizers (%)	224 (39.0)	20 (4.3)	72.3 *	76 (14.4)	3 (0.7)	39.2 *

Note: Unweighted frequencies and weighted percents are reported.

*
p < .001

Table 3

Prevalence of Substance Use Diagnoses (Lifetime and Past Year)

	Lifetime Diagnosis			Past Year Diagnosis		
	MDMA use	No MDMA use	t-test or ²	MDMA use	No MDMA use	t-test or ²
Any SUD (%)	510 (90.6)	177 (34.3)	79.0**	305 (55.9)	70 (12.9)	69.5**
Total # of SUD (SD)	2.8 (0.5)	0.5 (0.1)	16.6**	1.0 (0.1)	0.1 (0.0)	12.1**
Total # of SUD (%)			93.7**			76.8**
0	52 (9.4)	385 (65.7)		257 (44.1)	492 (87.1)	
1–2	255 (45.7)	164 (31.9)		239 (43.5)	70 (12.9)	
3–4	159 (26.6)	9 (1.8)		51 (9.7)	0 (0.0)	
5+	96 (18.3)	4 (0.6)		15 (2.8)	0 (0.0)	
Alcohol (%)	453 (80.4)	167 (31.8)	70.1**	256 (47.5)	63 (11.6)	62.5**
Amphetamines (%)	109 (19.0)	7 (1.6)	40.3**	23 (4.0)	0 (0.0)	15.1**
Cannabis (%)	354 (61.7)	51 (10.3)	95.4**	146 (26.1)	12 (2.1)	58.3**
Cocaine (%)	186 (31.7)	6 (1.3)	68.3** (7.5)	41	0 (0.0)	27.1**
Hallucinogens (%)	202 (37.3)	9 (1.8)	92.1**	44 (7.6)	0 (0.0)	30.7**
Inhalants (%)	27 (4.9)	2 (0.1)	18.7**	5 (1.1)	0 (0.0)	3.5
Opioids - heroin (%)	24 (4.1)	1 (0.1)	15.9**	3 (1.0)	0 (0.0)	2.5
Opioids – other (%)	83 (16.7)	8 (1.4)	37.9**	21 (3.8)	1 (0.1)	13.7**
Sedatives (%)	64 (12.2)	2 (0.3)	29.3**	10 (2.2)	0 (0.0)	8.0*
Tranquilizers (%)	65 (11.8)	4 (0.7)	30.9**	16 (3.0)	0 (0.0)	9.8*
Nicotine (%)	283 (51.3)	99 (19.8)	42.1**	228 (41.6)	76 (14.6)	43.8**

Note: Unweighted frequencies and weighted percents are reported.

* $p < .01$;** $p < .001$

Table 4

Lifetime Treatment Utilization for Substance Use

	MDMA use (n = 510)	No MDMA use (n = 177)	² value
Sought help because of drinking	115 (22.4)	21 (10.4)	8.5 *
Sought help because of drug use	98 (19.3)	9 (5.2)	18.7 **
Sought help because of drinking or drug use	161 (31.6)	26 (14.5)	13.0 *
Alcohol/drug detox	63 (13.2)	5 (2.2)	17.6 **
Alcohol/drug rehab	78 (15.8)	8 (17.8)	17.5 **
Methadone maintenance program	6 (1.1)	0 (0)	5.3
12 step program	105 (20)	18 (10)	7.3
Family Services	37 (7.8)	5 (2.1)	7.6 *
Emergency room	40 (7.6)	3 (1.9)	7.7 *
Inpatient ward	47 (9.4)	5 (3.4)	5.9
Outpatient services	65 (13.0)	9 (4.2)	10.4 *
Private physician/psychiatrist	84 (17.6)	11 (5.5)	15.0 **
Clergyman/priest	24 (4.4)	2 (0.5)	11.9 *
Employment assistance program	7 (1.4)	0 (0)	6.6
Halfway house	16 (3.8)	2 (0.6)	5.5
Crisis center	12 (3.7)	0 (0)	6.3
Other agency	28 (5.7)	3 (0.9)	10.4 *

Note: Unweighted frequencies and weighted percents are reported.

*
p < .01;

**
p < .001