

PLENARY SESSION I
Emerging trends in recreational drug use

**Changes in MDMA/ecstasy use over 30 months among 402 young adult
polydrug users in Ohio**

Robert Carlson, Jichuan Wang, Peichan Shi and Russel Falck
Wright State University, USA

The use of MDMA (3,4-methylenedioxymethamphetamine), commonly referred to as "ecstasy" and structurally related to amphetamine and mescaline, began to increase across the United States in the mid-1990s. Although epidemiologic data show a decline in prevalence of use among some groups, MDMA remains a widely used drug. The purpose of this study is to describe changes in MDMA use over 30 months among 402 young adults recruited using respondent-driven sampling in Columbus, Ohio. Participants who completed baseline interviews completed follow-up structured assessments every six months. A group-based logit model was applied to identify distinct latent groups in regard to patterns of MDMA use over 30 months. Three latent trajectory groups were identified: Group 1- Low probability of MDMA/ecstasy use in the initial 6-month observation period and remained low over time; Group 2- Higher probability of MDMA/ecstasy use in the initial 6-month observation period and had a dramatic decline over time; and Group 3- Higher probability of MDMA/ecstasy use in the initial 6-month observation period and remained high over time. Factors that predict group membership were examined, and a profile of the individual sociodemographic characteristics as well as other drug use, was described by trajectory group at baseline and 30 months.



Changes in MDMA/Ecstasy Use Over 30 Months among 402 Young Adult Polydrug Users in Ohio

**Robert G. Carlson, Jichuan Wang, Peichan Shi,
Deric Kenne, and Russel Falck**

**Center for Interventions, Treatment, and
Addictions Research
Boonshoft School of Medicine
Wright State University
Dayton, Ohio**

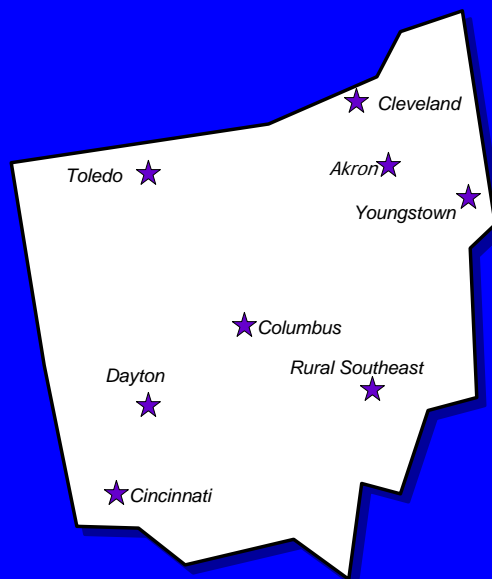
INTRODUCTION

- **Use of MDMA, commonly referred to as “Ecstasy,” rose sharply in the US in the late 1990s.**
- **Since 2002, use has generally decreased, but lifetime prevalence has continued to increase slightly among young adults not in college.**
- **Declines in use are associated with a decline in raves, but use has spread to other venues.**
- **Ecstasy continues to be a fascinating substance, given opposing views regarding its various proposed adverse effects as well as benefits.**

PURPOSE OF THE STUDY

- Most studies of Ecstasy users are cross-sectional and/or have relatively small sample sizes.
- Purpose of this study is to describe changes in Ecstasy use over 30 months among 402 young adults as well as their relationship to sociodemographic characteristics and drug use.

Study Location: Columbus, OH



METHODS

- I. “MDMA/Club Drug Use and STD/HIV Sex Risk Behavior in Ohio.” 5-year study funded by the National Institute on Drug Abuse (Grant #R01 DA14488).**
- II. May 2002 – June 2003 recruited 402 young adult Ecstasy users using respondent-driven sampling (RDS). (Self-reported use of Ecstasy in the past 6 months.)**
- III. RDS, modified form of chain-referral in which participants are compensated for recruiting peers. 28 initial sampling “seeds” recruited through ethnographic research.**
- IV. Participants completed structured interviews every 6 months over 36 months. Structured interviews complemented with ethnographic research.**

Statistical Methods

- Group-based logit model applied to identify distinct latent groups in regard to the patterns of change in trajectories of Ecstasy use. (SAS Proc Traj macro was used for modeling.)**
- The number of latent growth groups and the shape of the trajectory in each group were identified, by comparing a series of models with different number of latent groups and shapes of trajectories.**
- Individual Ecstasy users in the sample were classified into appropriate trajectory groups.**

Statistical Methods

- Predictors of group membership were examined, using multinomial logit models, which were run simultaneously with latent group identification.
- Individual profiles of sociodemographics and drug use at both baseline and the end of the observation period were created based on the posterior group membership.
- Of the 402 participants, those who had at least one follow-up interview (n=371) were included in the trajectory analysis.

Results: Characteristics of the Baseline Sample

- Mean Age: 20.9 years (18-30)
- About 64% Male
- 81.6% White Ethnicity
- 50% taking college courses
- 22% less than high school education
- 97% heterosexual
- 10% lifetime history of injection

MDMA/Ecstasy Use at Baseline

Lifetime Occasions of Ecstasy Use

1-10	49.7% (200)
11-50	35.6% (143)
>50	14.7% (59)

- 54.3% took 1 – 1.5 Ecstasy tablets on average
- 35.2% took 2 – 2.5 tablets
- 0.4% took 3 or more tablets

- 28.2% had taken 1 – 1.5 Ecstasy tablets on at least one occasion of use
- 29.2% had taken 2 – 2.5 tablets
- 16.7% had taken 3 – 3.5 tablets
- 25.9% had taken 4 or more tablets

Polydrug Use Practices in the Past 6 Months at Baseline

• Cocaine	199	(49.5%)
• NP Opioids	207	(51.0%)
• Psilocybin	173	(43.0%)
• Tranquilizers	138	(34.3%)
• Ketamine	112	(27.9%)
• Other Amphet.	103	(25.6%)
• Methamphetamine	91	(22.6%)
• OxyContin	67	(16.2%)
• LSD	58	(14.5%)
• Heroin	27	(6.2%)
• DXM	24	(6.0%)

Latent Class Study

(Carlson, Wang et al. 2005. [Drug & Alcohol Dependence](#))

Class I: "Limited Range" (Based on past 6 months)

Fairly restricted to alcohol and non-daily marijuana use. No use of amphetamines, tranquilizers, or inhalants. Low probabilities of days of drunkenness above mean, daily marijuana use, cocaine, hallucinogens, and opioids.

Class II: "Moderate Range"

Moderate probabilities of using a range of substances, compared to Groups I and III.

Class III: "High Range"

Ecstasy users in this class had high probabilities of opioids, hallucinogens, cocaine, amphetamines, tranquilizers, and inhalants. More than 50% daily marijuana users. Over 60% drank to intoxication more than the average number of days (6.4%).

MODEL RESULTS

Table 1. Model Comparison (n=371)

No. of Groups	BIC	$2\log(B_{10})$	P_j
1	-912.16	0	0
2	-808.77	206.78	0
3	-799.17	19.20	0.98**
4	-803.50	-8.66	0.02

Notes

$2\log(B_{10})$: The log of the Bayes factor, which is approximated by 2 times the difference in BIC ($2(\Delta BIC)$) between the alternative and null models. Interpretation of $2\log(B_{10})$: 0-2: Not worth mentioning; 2-6: Positive; 6-10 - Strong; >10: Very strong (see Jones, Nagin, and Roeder, 2001).
 P_j : Posterior probability that model j is correct model.

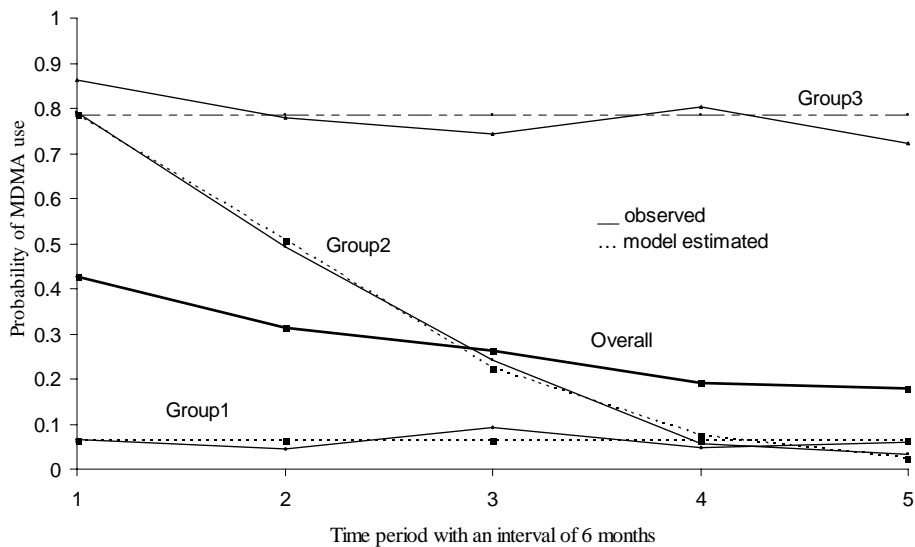


Figure 1: Observed and model estimated trajectories in MDMA/ecstasy use in a period of 30 months.

Table 2. Average Trajectory Group Membership Probability Based on Maximum Posterior Probability.

(n=371)	Low Probability Group 1	Declining Probability Group 2	High Probability Group 3
Group 1 (n=177)	0.86	0.13	0.01
Group 2 (n=124)	0.10	0.82	0.08
Group 3 (n=70)	0.01	0.14	0.85
Sample Membership Classification ¹	47.7%	33.4%	18.9%
Estimated Population Proportion ²	44.8%	36.3%	19.0%

1. Percentages of participants classified into the trajectory groups
2. Model estimated population proportions by trajectory group.

Notes on the Next Slide (Table 3)

1. A multinomial logit model, in which trajectory group 1 was treated as the reference group, was used to predict trajectory group membership simultaneously in the modeling.
2. Age was coded as deviations from the sample mean age.
3. Typology of drug use at baseline identified by latent class analysis (LCA) (Carlson, Wang, et al., 2005).

Table 3. Results of Group-Based Logit Model with Three Trajectory Groups (n=371)

Parameter	Estimate	P-value
Group 1		
Intercept	-3.13	0.0000
Group 2		
Intercept	1.75	0.032
Linear	-0.96	0.0024
Group 3		
Intercept	1.33	0.0000
Group Membership Prediction		
Group 2	Odds Ratio	95% C.I.
Female	-	-
Male	0.62	(0.31, 1.27)
Black	-	-
White	0.45	(0.12, 1.60)
College Student		
No	-	-
Yes	0.59	(0.29, 1.20)
Age ²	1.02	(0.88, 1.19)
Drug Use Class		
Limited range	-	-
Moderate range	4.68	(1.50, 14.66)*
Wide range	9.80	(2.58, 32.21)*

(Table 3 Continued)

Group 3	Odds Ratio	95% C.I.
Female	-	-
Male	1.10	(0.50, 2.45)
Black	-	-
White	0.15	(0.05, 0.49)**
College Student		
No	-	-
Yes	0.20	(0.08, 0.50)**
Age	1.08	(0.91, 1.19)
Drug Use Class		
Limited range	-	-
Moderate range	4.55	(1.33, 15.53)**
Wide range	13.33	(3.49, 70.00)**

Table 4. Baseline Socio-Demographic Characteristics and Typology of Drug Use by Trajectory Group (n=371)

Variables	Group 1 (n=177)	Group 2 (n=124)	Group 3 (n=70)	P-value
Female	59(44%)	55(41%)	20(15%)	0.0506
Male	118(50%)	69(29%)	50(21%)	
White	154(50%)	107(35%)	44(15%)	0.0001
Black	23 (35%)	17(26%)	26(39%)	
Age				0.0874
<20	99(46%)	77 (36%)	38(18%)	
20-25	70(54%)	36 (28%)	23(18%)	
>25	8 (29%)	11(39%)	9(32%)	
College Student				0.0001
Yes	112(57%)	68 (34%)	18 (9%)	
No	65(38%)	56 (32%)	52 (30%)	
Drug Use Class				0.0001
Limited range	50 (68%)	10 (14%)	13 (18%)	
Moderate range	98 (49%)	70 (35%)	32 (16%)	
Wide range	29 (30%)	44 (45%)	25 (25%)	

(Table 4 continued) Baseline Drug Use Status in the last 6 months

	Low Probability Group 1	Declining Probability Group 2	High Probability Group 3	P-value
Alcohol				0.2169
Daily use	8(38%)	6(29%)	7(33%)	
Non daily use	169(48%)	118 (34%)	63(18%)	
Marijuana				0.2588
Daily use	65(43%)	57(37%)	30(20%)	
Non daily use	112(51%)	67(31%)	40(18%)	
Cocaine				<0.0001
Yes	110(58%)	45(24%)	33(18%)	
No	67(37%)	79(43%)	37(20%)	
Amphetamine				0.1016
Yes	38 (39%)	40 (41%)	20(20%)	
No	139(51%)	84(31%)	50(18%)	

(Table 4 contin.) Baseline Drug Use Status in the last 6 months

	Group 1	Group 2	Group 3	P-value
NP Opioids				
Yes	28(38%)	30(41%)	15(21%)	0.1824
No	149(50%)	94(32%)	55(18%)	
MDMA occasions				
1-10	108(56%)	55(29%)	28(15%)	0.0075
11-50	54(41%)	50(37%)	29(22%)	
>50	15(32%)	19(40%)	13(28%)	
Perceived memory loss				
Yes	35(46%)	23(30%)	18(24%)	0.4687
No	142(48%)	101(34%)	52(18%)	
Tranquilizers				
Yes	48(39%)	49(40%)	27(21%)	0.0482
No	129(52%)	75(30%)	43(18%)	

Table 5. Observed Individual Characteristics at the End of the 30- Month Observation Period by Trajectory Group.

Socio-Demographic Characteristics (n=274)				
Variables	Group 1 (n=134)	Group 2 (n=89)	Group 3 (n=51)	P-value
Female	44(42%)	44(42%)	16(16%)	0.0246
Male	90(53%)	45(26%)	35(21%)	
White	116(51%)	76(33%)	35(16%)	0.0113
Black	18(38%)	13(28%)	16(34%)	
Age				
<20	80(47%)	61(36%)	28(17%)	0.1943
20-25	48(55%)	23(26%)	17(19%)	
>25	6(35%)	5(30%)	6(35%)	
College Students				
Yes	48(57%)	26(31%)	10(12%)	0.0955
No	86(45%)	63(33%)	41(22%)	
Drug Use Class				
Limited range	36 (66%)	9 (17%)	9 (17%)	0.0001
Moderate range	79 (53%)	48 (32%)	21 (15%)	
Wide range	19 (26%)	32 (44%)	21 (30%)	

(Table 5 continued) Observed Individual Characteristics at the End of the 30- Month Observation Period by Trajectory Group (n=274)

	Group 1	Group 2	Group 3	P-value
Alcohol				
Daily use	6(46%)	4(31%)	3(23%)	0.9141
Non daily use	128(49%)	85(33%)	48(18%)	
Marijuana				
Daily use	25(41%)	21(34%)	15(25%)	0.2719
Non daily use	109(51%)	68(31%)	36(18%)	
Cocaine				
Yes	29(29%)	42(42%)	28(28%)	<0.0001
No	105(60%)	47(27%)	23(13%)	
Amphetamine				
Yes	14(48%)	8(27%)	7(25%)	0.6792
No	120(49%)	81(33%)	44(18%)	

(Table 5 continued) Observed Individual Characteristics at the End of the 30- Month Observation Period by Trajectory Group.

	Group 1	Group 2	Group 3	P-value
NP Opioids				
Yes	4(16%)	10(40%)	11(44%)	0.0003
No	130(52%)	79(32%)	40(16%)	
MDMA occasions				
1-10	83(56%)	42(29%)	22(15%)	0.0284
11-50	41(44%)	33(36%)	18(20%)	
>50	10(29%)	14(40%)	11(31%)	
Perceived memory loss				
Yes	16(33%)	20(41%)	13(26%)	0.0386
No	118(52%)	69(31%)	38(17%)	
Tranquilizers				
Yes	23(40%)	21(36%)	14(24%)	0.2456
No	111(52%)	68(31%)	37(17%)	

Discussion

- Study clearly shows that over time, Ecstasy use declined among the sample as a whole.
- Analyses identified 3 distinct groups:
 - Group 1. Low probability of Ecstasy use over time
 - Group 2. Probability of Ecstasy use started high and declined significantly over time.
 - Group 3. Probability of Ecstasy use remained high over time.

Limitations

- Study is based on self-report data.
- We had no means to verify that the Ecstasy tablets participants consumed were indeed MDMA.
- Limits to the statistical methods.

THANK YOU!