

Symptoms of Ecstasy Dependence and Correlation With Psychopathology in Taiwanese Adolescents

Cheng-Fang Yen, MD, PhD,*† and Sen-Yen Hsu, MD‡

Abstract: This study aimed at examining the spectrum and frequency of symptoms of ecstasy dependence and their correlation with psychopathology by controlling polysubstance use in Taiwanese adolescents. Two hundred adolescents who had used ecstasy were recruited into this study. Symptoms of ecstasy dependence that had occurred in the preceding year were determined by an interview using the Kiddie epidemiologic version of the Schedule for Affective Disorders and Schizophrenia. The adolescents' psychopathology was examined using the Symptom Checklist-90-Revised Scale. The proportion of participants who had symptoms of ecstasy dependence was calculated. The association between the number of symptoms of ecstasy dependence and psychopathology was examined by using stepwise multiple regression analysis. The results indicated that "continuing ecstasy use despite knowledge of having a problem related to ecstasy use," "spending a great deal of time in activities related to ecstasy use or to recover from its effects," and "ecstasy use tolerance" were the 3 most prevalent symptoms of dependence, and "withdrawal" was the symptom least reported. Heavy ecstasy use led to more symptoms of ecstasy dependence than light use. Symptoms of ecstasy dependence independently increased the risk of severe psychopathology after controlling the effects of polysubstance use. The results of this study indicated that adolescents were aware of the adverse effects of ecstasy use and that repeated ecstasy use would result in dependence on it. Screening the dependence symptoms of adolescent ecstasy users may help clinicians more thoroughly understand their psychopathology.

Key Words: Adolescent, drug abuse, ecstasy, psychopathology.

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Since 2002, 3,4-methylenedioxymethamphetamine, known commonly as ecstasy, has exceeded methamphetamine and became the most frequently abused illicit drug among

adolescents in Taiwan. Ecstasy use is accompanied by potentially acute and long-term neurophysiologic and neurocognitive toxicity (Baggott, 2002; Gowing et al., 2002) and has become a major public health issue among adolescents in Taiwan (Chou et al., 2006). Ecstasy dependence used to be considered rare (Solowij et al., 1992). However, a study using structured diagnostic interviews found that the rate of ecstasy dependence and abuse was surprisingly high among adolescents and adults evaluated for DSM-IV criteria (Cottler et al., 2001). Because the first encounter and becoming addicted to ecstasy often takes place in adolescence (Schwartz and Miller, 1997), further studies are needed to evaluate the symptoms of ecstasy dependence in adolescents.

Ecstasy users have been found to be at greater risk of developing psychological disturbances (Lieb et al., 2002; MacInnes et al., 2001; Schifano, 2000). Previous studies found that the more ecstasy tablets taken during a lifetime (de Win et al., 2004; Parrott et al., 2000; Topp et al., 1999) or on a typical occasion (Thomasius et al., 2003), the more severe depressed moods and other psychopathology occurred. However, polysubstance use often confounds the association between severity of ecstasy use and psychopathology (Parrott et al., 2000; Thomasius et al., 2003). Symptoms of ecstasy dependence are a more accurate indicator of the physiologic and psychological effects induced by taking ecstasy than the number of tablets or times ecstasy is used. There has been no study examining the association between the symptoms of ecstasy dependence and psychopathology by controlling the effect of polysubstance use. This study aims at examining the spectrum and frequency of symptoms of ecstasy dependence in Taiwanese adolescents and correlation with psychopathology by controlling polysubstance use.

METHODS

Sample

Taiwan's juvenile justice act requires adolescents arrested for illicit drug use to undergo a 1 to 2 month detoxification program at an abstinence center sponsored by the Ministry of Law. The Ministry of Justice invites psychiatrists to gather psychological, behavioral, and familial information from juvenile drug users to determine the risk of relapse and when appropriate, to intervene in the management of deviant behavior. In this study, 200 adolescent ecstasy users (128 men and 72 women; mean age, 16.8 ± 1.1 year; mean duration of education, 9.3 ± 0.7 years) were recruited consecutively from a juvenile abstinence center in southern

*Department of Psychiatry, Faculty of Medicine, College of Medicine, Kaohsiung Medical University; †Department of Psychiatry, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; and ‡Department of Psychiatry, Chimei Medical Center, Liouying Campus, Tainan, Taiwan. Supported by a grant from the Chi-Mei Medical Center and Kaohsiung Medical University Research Foundation (94-CM-KMU-16).

Send reprint requests to Sen-Yen Hsu, MD, Department of Psychiatry, Chimei Medical Center, Liouying Campus, 201, Taikang Village, Liouying Township, Tainan County, Taiwan. E-mail: 779002@mail.chimei.org.tw.

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Taiwan from September 2003 to December 2005. Those who refused an interview ($n = 3$) and those unable to complete all assessments at discharge ($n = 4$) were excluded. Most participants (62.5%) were light ecstasy users (20 times).

Assessment

A child psychiatrist assessed the participants' symptoms of ecstasy dependence that had occurred during the preceding year by using the Kiddie epidemiologic version of the Schedule for Affective Disorders and Schizophrenia (K-SADS-E) (Puig-Antich and Chambers, 1978). The K-SADS-E has been modified for use in the Taiwanese population by adding colloquial expressions (Gau and Soong, 1999). Because the K-SADS-E did not have diagnostic questions for ecstasy dependence, we used the questions for amphetamine dependence on the K-SADS-E to evaluate the symptoms of ecstasy dependence according to the taxonomies of DSM-IV (APA, 1994).

We also invited participants to complete questionnaires to examine their psychopathology and individual, family, and peer characteristics. Participants' psychopathology was examined using the Symptom Checklist-90-Revised Scale (SCL-90-R) (Derogatis et al., 1973). The Chinese version of the SCL-90-R was used to measure mental health status with a 5-point rating scale ranging from "not at all" (0) to "extreme" (4) (Tsai et al., 1978). Its validity in assessing the psychopathology of adolescents in Taiwan has previously been established (Hsu et al., 2002). A higher total score on the SCL-90-R indicates that the subject has a poorer mental health status. The Questionnaire for Experience in Substance Use was used to examine whether participants had ever used alcohol, areca quid, hypnotics or sedatives, glue, marijuana, ketamine, methamphetamines, or heroin in the preceding year (Yen et al., 2005). In this study, the participants who had used 3 or more substances apart from ecstasy in the preceding year were classified as "polysubstance users." We used the subscales on the Adolescent Family and Social Life Questionnaire to examine participants' levels of family conflict, rank within and subjective perception of their peer group, and active interaction with peers. Cronbach [α] ranged from

0.66 to 0.82 (Yen and Shieh, 2005). Higher scores indicated less family conflict, higher ranking within and increased satisfaction of status in the peer group, and more active interaction with peers. We also ascertained participants' salient demographic factors, including sex, age, and education. The past experiences of employment, dropping out of school, and parents' marital status were also collected.

Procedure and Statistical Analysis

Written informed consent was obtained from all participants before study commencement. All participants received a K-SADS-E-based diagnostic interview conducted by a child psychiatrist to determine their symptoms of ecstasy dependence that had occurred during the preceding year. The participants also completed all questionnaires on the basis of explanations of the research assistants and under their direction. The proportion of participants who had symptoms of ecstasy dependence that had occurred during the preceding year was calculated. The association between the number of symptoms of ecstasy dependence and psychopathology was examined by using the multiple regression analysis, controlling the effects of polysubstance use, individual, family, and peer factors on psychopathology. A p value of less than 0.05 was considered statistically significant.

RESULTS

The proportion of participants who had symptoms of ecstasy dependence are shown in Table 1. The results indicated that 37% of participants had the symptom of "continuing ecstasy use despite knowledge of having a physical or psychological problem caused or exacerbated by ecstasy" in the preceding year. The second prevalent symptom of ecstasy dependence was "spending a great deal of time in activities necessary to obtain or use ecstasy, or recover from its effects" (29.5%), followed by "ecstasy use tolerance" (23.5%). "Withdrawal" was the symptom least reported by participants (6.5%). A total of 44 participants (22%) reported having 3 or more symptoms of ecstasy dependence and 72 (36%) declared that they had no symptoms of ecstasy dependence that

TABLE 1. Frequency of Symptoms of Ecstasy Dependence

	Total N (%)	Light Users N (%)	Heavy Users N (%)	χ^2
Ecstasy use tolerance	47 (23.5)	19 (15.2)	28 (37.3)	12.773*
Withdrawal symptoms when quitting ecstasy use	13 (6.5)	3 (2.4)	10 (13.3)	9.220**
Taking ecstasy in larger amounts and over a longer period than was intended	19 (9.5)	6 (4.8)	13 (17.3)	8.565**
Persistent desire or unsuccessful efforts to cut down or control ecstasy use	34 (17)	12 (9.6)	22 (29.3)	12.936*
Spending a great deal of time in activities necessary to obtain or use the ecstasy, or recover from its effects	59 (29.5)	32 (25.6)	27 (36)	2.438
Giving up or reducing important social, occupational, or recreational activities because of ecstasy use	37 (18.5)	13 (10.4)	24 (32)	14.505*
Continuing ecstasy use despite knowledge of having a physical or psychological problem caused or exacerbated by ecstasy	74 (37)	33 (26.4)	41 (54.7)	16.067*

* $p < 0.001$.

** $p < 0.01$.

TABLE 2. Correlations Between the SCL-90-R Scores and Symptoms of Ecstasy Dependence: The Multiple Regression Analysis

	β	t
Symptoms of ecstasy dependence	0.197	2.712*
Polysubstance use	0.243	3.364*
Demographic and behavioral characteristics		
Sex (male)	0.020	0.253
Age	-0.078	-0.912
Education	0.094	1.129
Having ever dropped out of school	0.068	0.885
Having ever been employed	0.012	0.151
Family and peer characteristics		
Disruptive parenting	-0.017	-0.237
Family conflict	-0.036	-0.470
Ranking within and subjective perception of their peer group	-0.083	-1.178
Active interaction with peers	0.032	0.419

* $p < 0.01$.

had occurred during the preceding year. Heavy ecstasy use was more likely to lead to symptoms of ecstasy dependence than light use, except for the symptom of “spending a great deal of time in activities necessary to obtain or use ecstasy, or recover from its effects.” Heavy ecstasy use also led to more symptoms of ecstasy dependence than light use (2.2 ± 1.6 vs. 0.9 ± 1.2 , $t = -5.828$, $p < 0.001$).

The correlation between the SCL-90-R scores and symptoms of ecstasy dependence was examined by multiple regression analysis (Table 2). The results indicate that adolescent ecstasy users who reported more symptoms of ecstasy dependence and were polysubstance users were more likely to have higher SCL-90-R scores ($F = 2.885$, $p = 0.002$). Demographic, behavioral, family, or peer characteristics were not associated with SCL-90-R scores in the multiple regression analysis.

DISCUSSION

This study found that “continuing ecstasy use despite knowledge of having a problem caused or exacerbated by ecstasy” and “ecstasy use tolerance” were common symptoms of ecstasy dependence. This is in line with the results of previous studies (Cottler et al., 2001; Topp et al., 1997). The results further support that adolescents are aware of the adverse effects of ecstasy use, and that repeated ecstasy use can result in tolerance. Incongruent with the results of previous studies (Cottler et al., 2001; Topp et al., 1997) is that “withdrawal symptoms when quitting ecstasy use” was seldom reported when compared with other dependence symptoms. This might be because of the fact that many of the adolescents in this study were light ecstasy users. Heavy ecstasy use is more likely to lead to symptoms of ecstasy dependence than light use, except the symptom of “spending a great deal of time in activities necessary to obtain or use ecstasy, or recover from its effects,” we found that few participants reported spending a great deal of time obtaining ecstasy but many reported that it took a great deal of time to

recover from its effects, regardless of whether this involved light or heavy use. Heavy ecstasy use also led to more symptoms of ecstasy dependence than light use. Therefore, those who are heavy ecstasy users should be observed for the risk of developing ecstasy dependence. However, because many symptoms of dependence do not occur in the same 12-month period and the dysfunction caused by ecstasy use was not examined in this study, we could not make the diagnosis of ecstasy dependence defined by the DSM-IV on the basis of the data from this study.

We found that the adolescent ecstasy users who reported more symptoms of ecstasy dependence were more likely to have more severe psychopathology, even after controlling polysubstance use. Ecstasy can bind to the serotonin transporter, prevent reuptake, and stimulate release of serotonin (Kish et al., 2000). Serotonin is related to many psychological regulations, such as affect control, impulsivity, and obsession-compulsion. Thus, adolescents who have more symptoms of ecstasy dependence may have more severe serotonin dysregulation in their neuropsychological system resulting in more severe psychopathology.

Some limitations of this study should be kept in mind. The cross-sectional nature of this study has limited our ability to draw conclusions about the causal relationship between symptoms of ecstasy dependence and psychopathology. Symptoms of ecstasy dependence and psychopathology in this study were determined according to the information provided by the subjects at interview. Contextual information, such as parental observations, was not obtained.

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