ABSTRACT

Title of dissertation: AN EXAMINATION OF FACTORS THAT DISTINGUISH GROUPS OF YOUNG ADULT ECSTASY USERS

Kira Beth Levy, Doctor of Philosophy, 2006

Dissertation directed by: Associate Professor Kevin E. O'Grady
Department of Psychology

This study examined Ecstasy use in 322 young adults between the ages of 18 and 25 years who participated in an Internet study regarding their history of substance use. The primary goal of this study was to increase our understanding of what factors differentiate between different 'types' of Ecstasy users. Specifically, this study examined potential factors that distinguish between young adults who experiment with the use of Ecstasy and then quit ("Experimenters"); become active users of Ecstasy and continue use ("Users"); and become active users of Ecstasy and then quit ("Quitters"). In addition, a non-ecstasy using polydrug using group served as a "Control" group. The following primary outcome variables were examined: age of first use of Ecstasy; patterns of Ecstasy consumption; Ecstasy use by peers; levels of social conformity, sensation seeking, risk appraisal, and risky behaviors; motivations for initial use of Ecstasy; motivations for continued use of

Ecstasy; psychological addiction to Ecstasy; testing of Ecstasy pills; use of 5-HTP and vitamins; reasons reported by non-Ecstasy users for lack of experimentation with Ecstasy; and, general knowledge and beliefs about Ecstasy. Results indicated that Ecstasy Users (Experimenters, Users, and Quitters) were similar in the following characteristics: history of polydrug use; social conformity; sensation-seeking; appraisal of risky activities; history of engaging in risky activities; and self-report of reasons for first using Ecstasy. In addition, findings revealed the following characteristics to be distinguishing factors among the three groups (Users, Experimenters, and Quitters): extent of polydrug use; age of first use of ecstasy; patterns of ecstasy use; number of peers who currently use Ecstasy; and reasons for continued use of ecstasy. Notably, all of the participants in this study self-reported polydrug use, and Users were found to be significantly more likely to report having used a greater number of substances during the past 90 days than Experimenters, Quitters, and Controls. Furthermore, results suggest that young adults who have peers who use Ecstasy are at great risk for either the initiation of or continuation of current Ecstasy use. Implications for prevention and intervention are discussed.

AN EXAMINATION OF FACTORS THAT DISTINGUISH GROUPS OF YOUNG ADULT ECSTASY USERS

by

Kira Beth Levy

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Advisory Committee:

Associate Professor Kevin O'Grady, Ph.D., Chair
Associate Professor Jack Blanchard, Ph.D.
Professor Karen O'Brien, Ph.D.
Professor Barry Smith, Ph.D.
Associate Professor Eric Wish, Ph.D.

DEDICATION

This dissertation is dedicated to my mother and father, Joy and Stuart Levy, my sister, Dawn, my brother, Adam, and my brother-in-law, Glen, for their endless love and support throughout this challenging process. Thank you for believing in me and seeing me through these stages of professional and personal growth.

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Overview

The terms, MDMA and Ecstasy, are often used interchangeably in the substance use literature. However, in the following literature review, MDMA will be used to refer to the chemical substance (3,4-Methylenedioxymethamphetamine) and research conducted using MDMA within the context of laboratory or human clinical trials. The term "Ecstasy" will be used to refer to the street drug sold as MDMA, which may or may not actually contain MDMA.

Substance abuse among young adults has created a national crisis and continues to be an area of heightened concern and active research among medical and mental health professionals. Over the past ten years, the use of club drugs, a class of synthetic compounds that have various stimulant and hallucinogenic properties, has become more prominent among the spectrum of drugs used by young adults in the United States (Rivas-Vazquez, & Delgado, 2002). Club drugs such as ketamine hydrochloride (a derivative of phencyclidine hydrochloride or PCP), lysergic acid diethylamide (LSD), Gamma-hydroxybutyrate (GHB), and Ecstasy are often used recreationally to enhance social, physiological, and psychological experiences.

One of the significant trends in the use of illicit club drugs in the US has been the abuse of Ecstasy among young adults. The use of Ecstasy in the United States has been particularly followed by researchers throughout the past decade. A nationally representative survey of more than 14,000 college students from 119 4-year colleges in the United States (*1997 and 1999 Harvard School of Public Health College Alcohol Study*) found that the prevalence of past year Ecstasy use had risen from 2.8% in 1997 to 4.7% in 1999, an increase of 69%. Results of a follow-up study of the same sample

showed that the trend of increased ecstasy use continued through 2000 (Strote, Lee, & Wechsler, 2002). The *Monitoring the Future Study* found that the lifetime and annual prevalence of Ecstasy use among college students in 2001 was 14.7% and 9.2%, respectively (Johnston, O'Malley, & Bachman, 2003). According to the 2001 *National Household Survey on Drug Abuse*, young adults between the ages of 18 and 25 represented the majority (2-3 million) of the past year Ecstasy users (Substance Abuse and Mental Health Services Administration, 2002). More recently, past year use of Ecstasy among young adults declined from 5.8% in 2002 to 3.7% in 2003, and to 3.1% in 2004 (*National Survey on Drug Use and Health,* 2004). Although the number of Ecstasy users remained relatively constant between 2003 and 2004, study findings indicated that approximately 450,000 individuals had used Ecstasy during 2004, which is still of significant concern, and documents the continued use of Ecstasy among young adults (Substance Abuse and Mental Health Services Administration, 2005).

With the widespread use of Ecstasy has come an increase in research on both its physiological and psychological characteristics. However, studies of Ecstasy use have tended to focus on examining the pharmacology and toxicology of Ecstasy; the demographics/characteristics of Ecstasy users; and the psychological and physiological effects of Ecstasy use. To date, researchers have not looked at what factors distinguish groups of young adult Ecstasy users. For example, why does one individual experiment with Ecstasy and then quit, while another tries Ecstasy and continues using Ecstasy?

Notably, past research has found that there is predictive utility in differentiating types of drug users. Specifically, McCusker, Roberts, Douthwaite, and Williams (1995) examined illicit drug use among teenagers, and two of the groups they investigated

included two groups of users (experimental and repeated). Findings indicated that the two user groups differed on key variables identified by the authors as potential risk factors for escalation of drug use, including using a greater number of drugs and having a greater percentage of friends who used drugs.

With regard to Ecstasy, McCusker et al. (1995) suggest that there may be different factors that are associated with continued use of Ecstasy in comparison to experimental (transient) use. Consistent with McCusker et al. (1995), prior research suggests that polydrug use and peer drug use are associated with intensity of Ecstasy use among young adults (Boys & Marsden, 2003). The McCusker et al. (1995) study demonstrates the utility of examining different types of Ecstasy users rather than viewing them as a homogenous group. Therefore, a significant contribution could be made to the Ecstasy literature by examining the following: (1) why and under what circumstances young adults use Ecstasy; (2) what factors contribute to young adults beginning use of Ecstasy; and (3) what factors contribute to young adults quitting use of Ecstasy.

The goal of the current study was to increase our understanding of what factors differentiate between different 'types' of Ecstasy users. Specifically, what factors distinguish individuals who simply experiment with Ecstasy and cease use from individuals who initially experiment with Ecstasy and become regular users? Secondly, what factors distinguish individuals who become regular users of Ecstasy and eventually quit from individuals who continue to use?

In the literature review which follows, I will discuss relevant literature pertaining to: (1) history of MDMA; (2) pharmacology of MDMA; (3) neurotoxicity of MDMA; (3) descriptions of the Ecstasy experience/"trip;" (4) polydrug use among Ecstasy users;

(5) risk factors for substance use among adolescents and young adults, with a focus on Ecstasy; and, (6) motivations for substance use among adolescents and young adults, with a focus on Ecstasy. Following the literature review, I will state the problem of interest for this study and provide an explanation of hypotheses. Next, the Methods section will provide a detailed description of the design, recruitment of participants, methodology for collecting data, survey measures, and specific procedures. The Methods section will conclude with a description of how the data were analyzed, and the Results section will explain the findings of the study. Finally, the Discussion section will examine the implications of this research, study limitations, and directions for future research.

Introduction

History of MDMA

Although MDMA (3,4-Methylenedioxymethamphetamine) has only received mass media attention in the last two decades, its history dates back to the early 1900s when it was first synthesized as an intermediate chemical in the development of a styptic medication by Merck. In 1976, Dr. Alexander Shulgin, a chemist who synthesized MDMA, thought this rediscovered drug could be a legal adjunct to the psychotherapeutic process. In 1978, Drs. Shulgin and Nichols published the first human pharmacological study of MDMA in which they described its ability to produce a heightened sense of emotional awareness and sensual overtones without interfering with normal thought processes (Shulgin & Nichols, 1978).

Sales of MDMA as "Ecstasy" to recreational users appears to have begun in 1981 (Cohen, 1998). The expansion of the market for Ecstasy took off in 1983 when a distribution group in Texas (Texas Group) began large-scale marketing to the public. Because the drug was then legal, it was even available at bars and nightclubs. In 1984, with rampant production, marketing, and recreational use of Ecstasy, the Drug Enforcement Agency (DEA) recommended adding Ecstasy to the list of Schedule 1 substances based on the Controlled Substances Act. With this foreknowledge, the Texas Group allegedly mass-produced and sold over two million Ecstasy pills just prior to the emergency scheduling (Beck & Rosenbaum, 1994).

The ban of Ecstasy took effect in 1985 but was later challenged and temporarily overturned by the federal courts. Meanwhile, the excitement in the courtroom led to extensive media coverage and recreational use of Ecstasy continued to rise in the mid-

1980s. Finally, after multiple court appeals, Ecstasy was permanently listed as a Schedule 1 drug in 1988. The penalty for possession, delivery, and manufacturing Ecstasy can include a fine as high as $100,000 and up to a 99 year or life in prison sentence, depending on the amount seized (Holland, 2001).

Pharmacology of MDMA

MDMA (3,4-Methylenedioxymethamphetamine) is a synthetic drug that has both stimulant (amphetamine-like) and hallucinogenic properties and is structurally similar to methamphetamine (stimulant) and mescaline (hallucinogen) (Holland 2001; Leshner, 2002; O'Leary, Nargiso, & Weiss, 2001). MDMA causes neurotransmitters (serotonin, dopamine, and norepinephrine) to be released from presynaptic neurons and prevents their metabolism by inhibiting monoamine oxidase. The net result is a surplus of these neurotransmitters available at the synapse, disruption of their synthesis, and depletion. Compared to the very potent stimulant, methamphetamine, MDMA causes greater serotonin release than dopamine release. Notably, the use of MDMA results in the disruption of the serotonin system which plays a significant role in regulating mood, sleep, sensitivity to pain, aggression, emotion, appetite, and sexual behavior (Kalant, 2001; Leshner, 2002). Consequently, the examination of the use of Ecstasy by young adults has become an important part of biomedical and psychological research.

Neurotoxicity of MDMA

The heated debate regarding the classification of MDMA as a neurotoxin continues as a result of limitations in research methodology (Cole, Bailey, Sumnall, Wagstaff, & King, 2002; Green, Mechan, Elliott, O'Shea, & Colado, 2003; Murray, 2001). Alarmingly, MDMA has been found to produce dose-dependent hyperthermia in rodents,

primates, and humans that is potentially fatal (Kalant, 2001; Mechan, O'Seah, Colado, & Green, 2001). Studies of MDMA have also detailed serotonin neurodegeneration that lasts for months in rats and years in primates (Malberg, & Seiden, 1998; Ricaurte, Irwin, Forno, DeLanney, & Langston, 1987). Furthermore, research of MDMA administration in mice has found evidence of a selective long-term loss of dopamine in nerve endings (Stone, Merchant, Hanson, & Gibb, 1987). However, caution must be taken in generalizing findings from neurotoxicity studies in animals to humans. Some argue that these animal studies are not representative of human consumption, particularly of recreational users of MDMA (e.g., Cole et al., 2002). Experts in the field of human MDMA pharmacology and pharmacokinetics have concluded that non-linear pharmacokinetics make it very difficult to rely on interspecies scaling to determine human-equivalent doses on the basis of studies in animals (de la Torre & Farre, 2004).

Furthermore, human studies of Ecstasy use have often been problematic. Potential confounds may result from using subjective reports of drug use, variability in the composition, and simultaneous use of other drugs (Cole et al., 2002; McCann, Ricaurte, & Molliver, 2001; Rivas-Vazquez & Delgado, 2002). For example, several studies have examined memory deficits in recreational users of Ecstasy (Morgan, 1999; Parrott, 2000; Parrott, Buchanan, Schooley, Heffernan, Ling, & Rodgers, 2002; Taffe, Davis, Yuan, Schroeder, Hatzidimitrious, Parsons, et al., 2002; Thomasisus, Petersen, Buchert, Andresen, Zapletalova, Wartberg et al., 2003; Verkes, Gijsman, Pieters, Schoemaker, de Visser, & Kuijpers, 2001; Zakzanis, & Young, (2001), and recent studies suggest that diminished serotonergic neurotransmission may interfere with memory and learning processes (Buhot, Martin, & Segu, 2000); however, the findings from this line of research

have been contradictory. Dafters, Hoshi, and Talbot (2004) examined memory performance in participants who were users of both Ecstasy and cannabis. Findings revealed an association between low memory performance and extent of concomitant use of cannabis rather than use of Ecstasy. Furthermore, Gouzoulis-Mayfrank et al. (2005) examined memory performance in Ecstasy users over the course of 18 months. Results showed that participants who discontinued the use of Ecstasy after the baseline assessment did not improve in memory performance. However, memory performance of participants who continued the use of Ecstasy did not deteriorate. These findings do not support, but they also do not rule out, memory decline following the use of Ecstasy. Further research is clearly needed to clarify the impact of Ecstasy use on cognitive functioning.

Recently, researchers have been using various brain imaging techniques to examine the effects of MDMA on brain functioning. Studies comparing current Ecstasy users with former users and polydrug users have found a slight but significant decrease in numbers of serotonin transporter sites in current, but not former, Ecstasy users (Buchert et al., 2003; Buchert et al., 2004), suggesting that a risk of reduced serotonin system function following repeated Ecstasy use appears to resolve after prolonged abstinence. Notably, two studies have found that current female Ecstasy users evidenced a greater reduction in serotonin transporter sites than males (Buchert et al., 2004; Reneman et al., 2001), suggesting that female users of Ecstasy may be at greater risk of incurring changes in serotonin system function than males.

The Ecstasy Experience

Beck and Rosenbaum (1994) conducted a remarkable study in which they interviewed 100 users of Ecstasy and detailed the common stages of the Ecstasy high. When an average dose of Ecstasy (100-125mg) was ingested orally on an empty stomach, its effects were usually experienced after 20 to 60 minutes, and were often described as a sudden and intense high, a perfect euphoria. However, for some users, this "rush" was far from perfect, as trepidation, tension, stomach tightness, and/or nausea ensued. Following this initial period, users generally reported a relatively stable and enjoyable period that tended to last between 2 and 3 hours. Finally, the "coming down" phase hit approximately 3 to 4 hours after ingestion. Users reported using other substances such as alcohol, tranquilizers, or marijuana to ease the comedown.

Not surprisingly, the Ecstasy experience is often associated with varying undesirable side-effects (Hammersley, Khan, & Ditton, 2002; Maxwell, 2003). Physical effects can include the following symptoms: loss of appetite, nausea, vomiting, blurred vision, increased heart rate and blood pressure, muscle tension, faintness, chills, sweating, tremor, insomnia, convulsions, and a loss of control over voluntary body movements (Beck & Rosenbaum, 1994; Kalant, 2001). Some psychological difficulties may include agitation, confusion, depression, insomnia, drug craving, and paranoia during and sometimes weeks after use (Kalant, 2001). Because Ecstasy is typically produced in clandestine laboratories, pills often contain various adulterants (methamphetamine, caffeine, cough suppressants with PCP-like effects, and cocaine) that increase the risks associated with use (Hansen, Riddle, & Sandoval, 2002; Drug Enforcement Administration, 2001). For example, Kalasinsky, Hugel, and Kish (2004)

examined hair samples of individuals who believed they had only taken Ecstasy. Although MDMA was detected in most of the hair samples, MDA (90%) and either amphetamine or methamphetamine (57%) were also detected in the hair samples.

Polydrug Use and Ecstasy

Polydrug use has become very common among young adult drug users, and numerous research studies have found that Ecstasy users tend to be polydrug users (Boys, Lenton, & Norcross, 1997; Morgan, 1998; Morgan, 1999; Parrott, Sisk, & Turner, 2000; Shifano, 2000; Boys, Marsden, & Strang, 2001). Yacoubian (2003) conducted an analysis of data collected in 1999 through the *Monitoring the Future* survey and found that high school seniors who had used Ecstasy in the past year were significantly more likely to have engaged in polydrug use within that past year. According to a report by the Drug Enforcement Administration (2001), Ecstasy is often used in combination with alcohol, other club drugs (GHB and ketamine), marijuana, methamphetamine, psilocybin mushrooms, and LSD. Consistent with the report by the DEA (2001), Strote et al. (2002) recently analyzed the data on Ecstasy use of college students from the 1997 and 1999 Harvard School of Public Health College Alcohol Study and found that the variable with the strongest correlation with Ecstasy use was marijuana use in the past year (91.2% of students who used Ecstasy in the past year also used marijuana).

Prior research also suggests that the concurrent use of drugs is commonplace among young adults as a means to improve the effects of other drugs and/or to help manage negative effects (Boys et al., 2001; Boys & Marsden, 2003). A recent study by Scholey et al. (2004) examined polydrug usage patterns reported by non-Ecstasy users, novice Ecstasy users (1-9 occasions), moderate Ecstasy users (10-99 occasions), and

heavy Ecstasy users (100+ occasions). Findings revealed that Ecstasy users reported significantly greater psychoactive drug usage than non-Ecstasy users. In addition, increased use of Ecstasy was associated with more intensive patterns of Ecstasy intake as well as a greater use of illicit CNS stimulants and hallucinogens.

Consistent with the findings of Scholey et al. (2004), Arria, Yacoubian, Fost, and Wish (2002) found that Ecstasy users recruited from rave settings were more likely to report past experiences with marijuana, cocaine, and other drugs than their non-Ecstasy using counterparts. More recently, Ter Bogt and Engels (2005) conducted a study of Ecstasy use at rave settings in the Netherlands. As in the United States, Ecstasy users were found to be polydrug users. Of the rave attendees who reported Ecstasy use, 74% reported (at least) monthly use of cannabis, 15% of psilocybin mushrooms, 27% of speed and 36% of cocaine. Consistent with the above findings, Yacoubian, Arria, Fost, and Wish (2002) and Wish, Fitzelle, O'Grady, Hsu, and Arria (in press) reported similar findings in a sample of juvenile offenders and college students, respectively. Furthermore, in a recent study of Ecstasy use in college students, Levy, O'Grady, Wish, and Arria (2005) found that all of the Ecstasy using participants reported a history of polydrug use. Finally, Butler and Montgomery (2004) conducted a study of undergraduate Ecstasy users in London. Results revealed that Ecstasy users were more likely to have used amphetamines, cocaine, LSD, and magic mushrooms than participants who were non-Ecstasy using polydrug users. In summary, the literature clearly indicates that one of the key characteristics of Ecstasy users is that they tend to be polydrug users. Therefore, the current study will examine the relationship between Ecstasy use and polydrug use among the sample population.

Risk Factors for Ecstasy Use among Young Adults

Overview

The literature pertaining to risk factors for substance use, in general, among young adults will be examined, and parallels will be drawn to explore risk factors for Ecstasy use. Specifically, five factors will be examined: prior drug experience; substance use by peers; social conformity; sensation seeking; and risk taking.

Prior Drug Experience

One factor that has been consistently cited in the literature as a predictor of future substance abuse among young adults is prior substance use. Individuals who experiment with illicit drugs at an early age are at greater risk for later drug abuse (Hawkins, Catalano, & Miller, 1992). For example, Petraitis, Flay, Miller, Torpy, and Greiner (1998) examined results of prospective studies of illicit substance use among adolescent and young adults and found that those with a history of using a variety of substances, particularly cigarettes, alcohol or marijuana, were at risk for future use of illicit substances, particularly marijuana. Notably, results of the 2004 *National Survey on Drug Use and Health* indicate that the mean age of first use of marijuana for individuals aged 12 or older was 18. In contrast, the mean age of first use of Ecstasy was 19.5 (20.5 for males and 18.3 for females). These findings are consistent with the above mentioned findings that the majority of Ecstasy users tend to have a history of marijuana use.

Recently, Boys and Marsden (2003) examined the use of alcohol, cannabis, Ecstasy, amphetamine and cocaine hydrochloride in a non-treatment sample of young polysubstance users (age 16-22). Results indicated that age of first use was negatively associated with current intensity of use for all five substances. However, initiating use at

a younger age was only significantly associated with more intensive use for Ecstasy, cannabis, and cocaine. With regard to Ecstasy, age of first use of Ecstasy accounted for 22% of the variance in predicting intensity of current use. These results suggest that individuals who begin using Ecstasy at a young age are at greater risk for more intense use in the future. Although this relationship is not of primary interest in the current study, the correlation between age of first use of Ecstasy and current intensity of Ecstasy use was examined in the sample population.

Substance Use by Peers

Extensive research has been conducted examining the influence of peers as a risk factor for substance use among adolescents and young adults. Prior research has consistently found that involvement in a substance-using peer group tends to be associated with various forms of both licit and illicit substance use (Chassin, Presson, Sherman, Montello, & McGrew, 1986; Hawkins et al., 1992). Dating back to 1978, Kandel found that associating with drug-using peers was a significant risk factor for initiating illicit drug use. In line with the above findings, Petraitis et al. (1998) conducted a meta-analysis of 58 prospective studies of illicit substance use among adolescents and young adults (younger than 27 years old) and found that peer role models were particularly influential. They drew three important conclusions regarding illicit substance use: (1) illicit substance use tends to occur after exposure to other substance users; (2) illicit substance users tend to have friends who approve of and have used illicit substances; and, (3) bonding with deviant peers typically precedes illicit substance use. Consistent with this prior research, according to Hussong (2002) and supported by numerous studies (e.g., Copeland & Martin, 2004; Hawkins et al., 1992; Oetting &

Beauvais, 1986), the peer context is possibly the most salient, robust predictor of an adolescent's substance use.

Furthermore, researchers not only postulate that friends can influence drug use but also that drug use itself can influence the selection of friends (Bauman & Ennett, 1996; Dishion & Owen, 2002; Kandel, 1978). The former, the peer selection hypothesis, suggests that individuals select their friends based on their substance use, implying that individual use precedes use within the peer context. The latter, the peer socialization process, indicates that having friends who use substances influences use, suggesting that individual use follows that within the peer context.

Recent research by Dishion and Owen (2002) lends support to both of the above interpretations. They found that substance use in young adulthood was determined by both friendship selection processes and friendship influence. In line with prior research (Dishion, 2000; Dishion, Capaldi, & Yoerger, 1999), results indicated that the strongest proximal correlate of adolescent substance use was the tendency to cluster into peer groups that used substances. Furthermore, relationships within these peer groups appeared to shape attitudes and behavior, indicating a bi-directional relationship. In their longitudinal analysis of young adult drug use, Dishion and Owen found that overall levels of substance use predicted marijuana abuse, dangerous drug use, and drug injection.

Consistent with the above findings, Boys and Marsden (2003) found that participants' perception of substance use by their peers was a significant predictor of their own intensity of use for all 5 substances (alcohol, cannabis, Ecstasy, amphetamine, and cocaine hydrochloride). Similarly, Ter bogt and Engels (2005) found that among rave attendees, Ecstasy use by friends was associated with quantity of own Ecstasy use,

suggesting that peer pressure to use or to abstain from Ecstasy use does exist; however, participants tended to deny that conformism played a role in their drug use. Notably, individuals who were not using Ecstasy tended to use fewer drugs than those with peers using Ecstasy; they also tended to have a circle of friends who predominantly were not using Ecstasy. Ter bogt and Engels (2005) made an important point regarding conformity and drug use among young adults when they stated, "In a multivariate set-up, conformism was not related to quantity of Ecstasy use, while Ecstasy use by friends was, suggesting that Ecstasy use by friends is a better indicator of conformism than conformism itself. Young people deny they are motivated to do what their friends do; in fact they seem to conform to rules on drug use in their circle of friends" (p. 1495). In summary, the literature highlights the significant influence of peer substance use on own use. Accordingly, the current study will examine the association between participants' current use of Ecstasy and the use of Ecstasy by their peers.

Social Conformity

As noted by Petraitis et al. (1998), results of their meta-analysis strongly support one particular theory of illicit substance use, Jessor and Jessor's (1977) theory of problem behavior. This theory purports that adolescents who hold certain personal values, particularly unconventional social norms, are at risk for illicit substance use. In line with this theory, Petraitis et al. found that illicit substance use was more common among individuals who had the following characteristics: (1) were nonconforming and sought independence from their parents; (2) held untraditional or unconventional values; (3) were critical of and tolerated deviance from mainstream society; (4) were detached from

politics or lacked conservative ideals; (5) were detached from religion; (6) lacked commitment to school; and (7) were rebellious.

Furthermore, Stein, Newcomb, and Bentler (1987) analyzed data obtained from a study of young adults junior high school students) who participated in an 8-year longitudinal study of adolescent development and drug use (Huba & Bentler, 1982; Newcomb & Bentler, 1986). In this study, social conformity was measured using a modified form of the Bentler Psychological Inventory (Bentler & Newcomb, 1978; Huba & Benter, 1982). Three traits were used as indicators of a Social Conformity latent construct: law abidance, (lack of) liberalism, and religious commitment (Huba & Bentler, 1982, 1984). Stein et al. found that Social Conformity at Year 1 was predictive of both drug use (b = -.31, $p \leq .001$) and peer drug use (b = -.22, $p \leq .001$) at Year 5; the less conforming students were at Year 1, the more likely they were to use drugs and to have peers who used drugs at Year 5. The strong influence of the Social Conformity latent construct on other latent variables illustrates the need to consider intrapersonal factors when examining drug use among young adults (Stein et al., 1987).

In another study of adolescents and young adults, Newcomb and Bentler (1989) also found an association between social conformity and risk-taking behaviors. They examined social conformity in terms of degree of religiosity, law abidance, and conservatism. Results indicated that individuals who received low scores on measures of social conformity were more likely to engage in socially proscribed activities such as drug use. These results suggest that social conformity may be an important variable in examining Ecstasy use among young adults and is a primary focus in the current study.

Sensation Seeking, Risk Appraisal, and Risky Behavior

Definition of sensation seeking. One personality variable that has been found to be associated with substance use is sensation seeking (Zuckerman, & Bone, 1972). Taking a biosocial approach, Zuckerman initially defined the sensation seeking trait as "the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience" (Zuckerman, 1979, p. 10). He later modified his definition of sensation seeking to be "a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994, p. 27). One who is a sensation seeker has a preference for engaging in activities that provide greater, rather than less, stimulation or arousal (Zuckerman, 1971).

Development of the Sensation Seeking Scale (SSS). In the early 1960s, the first form of the Sensation Seeking Scale (SSS) was developed as a measure of individual differences in optimal levels of stimulation and arousal as a peripheral line of research in sensory deprivation (Zuckerman, Kolin, Price, & Zoob, 1964). Data obtained through the SSS has been associated with various traits, cognitive and perceptual styles, and types of experience. For example, Zuckerman and Link (1968) found that high sensation seekers were more oriented to body sensation, extraverted, impulsive, antisocial, non-conformist, and less anxious than low sensation-seekers. A high sensation seeker tends to be very aware of internal sensations and selects external stimuli that maximize them (Zuckerman, 1979). The expression of sensation seeking has been associated with participation in a variety of risky activities including: potentially risky experiments, sports, vocations, criminal activities, sexual behavior, smoking, heavy drinking, drug use and abuse,

reckless driving and driving under the influence of alcohol, and gambling (Arnett, 1996; Zuckerman, 1979, 1994).

Sensation seeking and drug use. Zuckerman (1979) identified three aspects of drug use that attracted sensation-seekers in the 1960s. First, because using drugs was socially unconventional, it was likely that other people who were also using drugs would be unconventional in other ways and appealing to the sensation-seeker. Second, there were bodily risks from using drugs as well as legal risks of being caught which may have added to the excitement. Third, using drugs allowed for new types of sensations and experiences and enhanced more mundane activities. Therefore, it is easy to see how high sensation-seekers would be attracted to a drug such as Ecstasy, which is a social drug that enhances bodily sensations.

Since the 1970s, many studies have been conducted examining the relationship between sensation seeking and drug use, particularly among young adults (Galizio, Rosenthal, & Stein, 1983). Zuckerman, Neary, and Brustman (1970) administered a drug questionnaire to undergraduate students who were selected from the extreme ranges on the SSS (high and low) and found that 74% of the high verses 23% of the low sensation seekers had used at least one illegal drug. Results suggest that high sensation-seekers are more likely than low sensation-seekers to try any drug (Zuckerman, 1979). Zuckerman and colleagues (Zuckerman, Bone, Neary, Mangelsdorff, & Brustman, 1972) later conducted a second study using the same drug questionnaire but examined three groups of sensation-seekers (high, middle. and low). Again, drug experimentation (used one or more of the drugs on the list) was the highest in the high sensation group (67%), in comparison to only 36% of the middle group, and 31% of the low group. Approximately

two decades later, Kumar, Pekala and Cummings (1993) conducted a similar study among university students in the same geographic region and found that 69% of high and 23% of low sensation seekers had used an illegal drug. Furthermore, in a longitudinal study of individuals from adolescence to young adulthood, Newcomb and McGee (1991) examined the effects of sensation seeking on later deviant behavior and attitudes. They found robust associations between sensation seeking and both licit and illicit drug use. The results of these studies clearly indicate that high sensation seekers are at significant risk for drug experimentation.

Sensation seeking and polydrug use. Studies indicate that high sensation-seekers who abuse drugs tend to be polydrug users (Zuckerman, 1999). In examining scores on the SSS, particularly on the Experience Seeking (ES) and Disinhibition (Dis) subscales, polydrug users tended to score in the high range of sensation seeking (Galizio et al., 1983). Ball, Carroll, and Rounsaville (1994) found a similar relationship between sensation seeking and polydrug use in their study of cocaine abusers. Specifically, in contrast to low sensation seeking cocaine abusers, high sensation seekers were more likely to be polysubstance abusers and had an earlier age of onset for substance use and abuse. In addition, the high sensation-seekers exhibited more severe symptoms of substance abuse and psychosocial impairment. Furthermore, a recent study was conducted by Gerra et al. (2004) which examined substance use among Italian high school students (ages 14-19). Consistent with prior studies, findings revealed that alcohol abusers, cannabis users, and particularly polydrug users, had significantly higher total scores on the SSS compared to abstinent participants (M = 19.17, $S.D.$ = .45; M = 19.38, $S.D.$ = .49; M = 24.47, $S.D.$ = .98; and M = 15.96, $S.D.$ = .29, respectively). Based upon

these findings, and the previously mentioned literature which suggests that Ecstasy users tend to be polydrug users, it is likely that Ecstasy users are also high sensation-seekers.

Sensation seeking and Ecstasy use. Unfortunately, there has been very little research examining the relationship between the use of Ecstasy and sensation seeking, especially in the United States. Four studies of non-US samples are of particular interest, all indicating that users of Ecstasy tend to score in the high range on measures of sensation seeking. First, a study of secondary students aged 13-30 years old was conducted in Oviedo, Spain during the 1998-1999 school year (Martinez et al., 2001). The SSS was administered and Ecstasy users were found to have a psychological profile characterized by high levels of sensation seeking and psychoticism. Second, another study conducted in Spain examined drug use in young males (mean age of 20.19 years) entering compulsory military service in Asturias, Spain between 1995 and 1999 (Bobes et al., 2002). Results indicated that users of Ecstasy had more extensive drug abuse histories than those who had never used Ecstasy as well as higher levels of sensation seeking. In addition, they also had higher scores on the Neuroticism and Psychoticism Subscales of the Eysenck Personality Questionnaire-A. Third, Daumann, Pelz, Becker, Tuchtenhagen, and Gouzoulis-Mayfrank (2001) examined the relationship between the psychological profiles of abstinent recreational Ecstasy users (aged 18-29 years old with concomitant use of cannabis only) in Germany and the patterns of their drug use. Findings indicated that former users of Ecstasy had elevated scores on sensation seeking, impulsiveness, anxiety, somatic complaints, obsessive-compulsive behavior and psychoticism. These elevated scores were also associated with heavier use of Ecstasy and cannabis. Finally, Butler and Montgomery (2004) found that Ecstasy users and polydrug (non-Ecstasy)

users had higher levels of impulsivity, venturesomeness (individual is aware of the risk, but engages in the behavior for the thrill of it), and novelty seeking behavior compared to non-drug users. Furthermore, they found that high Ecstasy users (>20 occasions) scored higher on a measure of novel risk-taking than low Ecstasy users (<20 occasions) and non-drug users. Although one cannot determine the direct effect of each drug consumed, the above literature appears to support an association between heavier use of Ecstasy and higher levels of sensation seeking. Therefore, this line of research suggests that users of Ecstasy not only tend to be high sensation-seekers but that there is also an association between degree of sensation seeking and intensity of use. Consequently, the relationship between Ecstasy use and sensation seeking will be examined in the current study.

Disinhibition. As mentioned above, individuals who tend to engage in risk-taking behaviors, such as using drugs, often score highly on measures of sensation seeking. One aspect of sensation seeking that has been highly correlated with both licit and illicit substance use is disinhibition (seeking release in uninhibited social activities) (Newcomb & McGee, 1991). In addition, disinhibition has been found to be negatively associated with law abidance as well as religiosity. Newcomb and McGee (1991) hypothesize, "drugs may serve as a 'releaser' for normally restrained social behaviors by providing access to the desired disinhibited states." Based upon these findings, it is not surprising that users of Ecstasy tend to receive high scores on measures of sensation seeking and low scores on indices of law abidance and religiosity, suggesting a lack of social conformity (Strote et al., 2002). Accordingly, the current study will also explore the relationship between social conformity and sensation seeking within the study sample.

Risk Appraisal and Risky Behaviors. Zuckerman (1979) defined risk as "the appraised likelihood of a negative outcome" (p. 11). For example, drug abusers may think about the possibility of their drug use leading to negative outcomes such as addiction, overdose, and financial or legal problems versus their expected pleasurable experience of getting "high" (Zuckerman & Kuhlman, 2000). A characteristic of high sensation seekers is to evaluate risk as lower and to anticipate experiencing less anxiety than low sensation seekers. This differential in appraisal of risk increases the likelihood that high sensation seekers will engage in behaviors that low sensation seekers would view as too risky (Horvath & Zuckerman, 1993; Zuckerman, 1979).

Horvath and Zuckerman (1993) investigated correlations between risk appraisal and risky behaviors for self and for peers across four areas of risk (criminal, minor rule-violations, financial, and sports) in a sample of college students. In this study, risk appraisal was defined as "a cognitive trait specific to particular areas of risky behavior" (p. 50). Findings suggest that there are individual differences in how people perceive the likelihood of negative consequences for various behaviors that they may or may not choose to engage in. Not surprisingly, participants who tended to evaluate risk for themselves as low were more likely to report having engaged in those risky behaviors. In this study, sensation seeking was found to be strongly correlated with participants' appraisal of risk for themselves and their actual engagement in risky behaviors. Specifically, there was a significant negative correlation between sensation seeking and participants' appraisal of risk for themselves for all areas of risk except financial; high sensation seekers typically appraised risk for activities as lower than low sensation seekers. In addition, a positive correlation was found between sensation seeking and

experience in risky behaviors in all four areas of risk. Possibly, it is the greater willingness of sensation-seekers to accept risks that puts them at greater risk through their behavior (1993). Expanding upon Horvath and Zuckerman's study (1993), the current study will examine risk appraisal and risky behaviors among young adult Ecstasy users.

Perceived Motivations for Substance Use

Perceived Motivations for Initial Use

Johnston and O'Malley (1986) examined data pertaining to reasons given by high school seniors for the use of licit and illicit substances. This data was part of a larger project, the *Monitoring the Future* survey (1978, 1984), which surveyed American high school students. The most commonly reported reasons for drug use were experimentation, social/recreational, and relaxation. With respect to Ecstasy, results of a study of Ecstasy use at rave parties in the Netherlands, conducted by Van de Wijngaart, et al. (1999), indicated that Ecstasy was typically taken for the first time because of curiosity and a desire to "try out" the drug. More recently, Levy et al. (2005) questioned college students about the reason(s) they took Ecstasy the first time, and a variety of responses were given: 1) positive effects on mood; 2) "social pressure" rather than peer pressure ("You see friends having a great time and you want to join in"); 3) curiosity ("You hear friends talking about it and see them on it so you're curious what it's like"); 4) availability ("Was there so I tried it"); 5) boredom ("Something to do"); 6) desire for an altered state of mind ("Desire to get screwed up"); 7) desire to escape ("It's like a vacation. Nothing bothers you. Take it and chill"); 8) self- medication – some participants reported that Ecstasy enabled socially anxious individuals and/or those with low self-esteem and confidence to fit in with others and to have a good time, while others

reported it provided temporary relief from depressive symptoms; 9) desire to have fun; and, 10) ease of use of Ecstasy in comparison to other drugs. The above studies suggest that curiosity and a desire for experimentation play an important role in the initiation of Ecstasy use. The current study examined how reasons for first use of Ecstasy vary among young adults with a history of Ecstasy use.

Perceived Motivations for Continued Use

Newcomb, Chou, and Bentler (1988) examined the motivations for alcohol and cannabis use among high school students in the 10th, 11th and 12th grades. In analyzing the 15 reasons that were assessed, results reflected four general motivations for drug use (Enhance Positive Affects and Creativity; Reduce Negative Affect; Social Cohesion; and Addiction). In trying to understand adolescents and young adults' motivations for using drugs, it is important to examine how motivations may differ depending on the type of substance (Newcomb et al., 1988). For example, if the desired effect is increased nervous system arousal, stimulants such as amphetamines, Ecstasy or cocaine may be used. In contrast, if the desired effect is nervous system depression, depressants such as alcohol or cannabis may be used (Boys, Marsden, & Strang, 2001).

With regard to Ecstasy, Van de Wijngaart, et al. (1999) found that, following initial use which was typically driven by curiosity, Ecstasy users reported different motivations for subsequent use of Ecstasy, including the following: (1) “the pleasant feeling XTC evokes;” (2) “being able to dance all night;” (3) get into the music;” (4) “easier contact with others;” (5) “euphoria;” (6) “self-insight;” and (7) “forgetting problems.” In examining the responses from the above study, one way to evaluate motivations for substance use is to think of what functions use of a particular substance

serve. Boys et al. (2001) defined function as "the primary or multiple reasons for, or purpose served by, the user of a particular substance in terms of the actual gains that the user perceives that they will attain" (p. 458). In interviewing adolescents and young adults (ages 16-21) in the United Kingdom, Boys et al. (1999) examined perceived functions (mood and social/contextual) and actual use of four target substances (alcohol, cannabis, amphetamines, and Ecstasy). For Ecstasy users, higher scores on the Mood Function scale were associated with more frequent use of Ecstasy in the 3 months prior to the assessment. This scale consisted of 3 items: (1) “make yourself feel better when you were low or depressed;” (2) “to help you to relax;” and (3) “to help make an everyday activity less boring.” Therefore, it appears that participants who used Ecstasy as a mood altering drug tended to use it more frequently.

In a more recent study of substance use by polydrug users (ages 16 to 22) in the United Kingdom, Boys et al. (2001) found that the most popular functions for substance use among six substances (cannabis, amphetamine, Ecstasy, LSD, cocaine hydrochloride, and alcohol) included the following functions: to relax (96.7%), to become intoxicated (96.4%), to keep awake at night while socializing (95.9%), to enhance an activity (88.5%), and to alleviate depressed mood (86.8%). Seven of the 17 function items were endorsed by over half of those who had used Ecstasy in the past year. The most common functions for using Ecstasy were to keep going (91.1%); to enhance activity (79.6%); to feel elated/euphoric (77.7%); to stay awake (72%); to get intoxicated (68.2%); to enjoy the company of friends (63.1%); and to enhance feeling when having sex (63.1%).

Most recently, Ter Bogt and Engels (2005) examined motives for the use of Ecstasy at different types of dance parties in the Netherlands. They developed a scale for

motivations for the use of Ecstasy at rave parties by incorporating the findings reported by Van de Wijngaart et al. (1999) as well as a model of motivations for alcohol use developed by Cox and Klinger (1988). Cox and Klinger had characterized motives for alcohol use into four areas: (1) drinking to get into a positive mood (enhancement); (2) drinking to obtain social rewards (need for sociability); (3) drinking to deal with negative emotions (coping); and (4) drinking to avoid social rejection (conformism). Drawing upon the works of Van de Wijngaart et al. (1999), Cox and Klinger (1988) Ter bogt and Engels (2005) measured motives for the use of Ecstasy at a rave using 28 items relating to enhancement, sociability, coping, and conformity. A seven-factor scale was developed, which was supported by factor analysis. Results were indicative of a hierarchy of motivations for the use of Ecstasy by rave attendees: (1) energy (82%); (2) euphoria (62%); (3) sociability/flirtatiousness (27%); (4) sexiness (21%); (5) self-insight (17%); (6) coping (14%); and (7) conformism (4%). Notably, the only significant gender differences on these seven scales were that males were more highly motivated by "sexiness" and reported being more susceptible to peer pressure than females. The results of the study by Ter bogt and Engels (2005) suggest that the motivations for the use of Ecstasy can be categorized in a similar manner to the motivations for the use of alcohol: enhancing, social, coping, and conformism.

The above research studies have helped to increase researchers' understanding of the reasons why young adults use Ecstasy. The current study will expand this knowledge base to examine how the reasons for Ecstasy use may differ among different types of Ecstasy users.

Gender Differences in Consumption Patterns of Ecstasy

There have only been a few published studies examining gender differences among Ecstasy users and findings have been inconsistent. Results of the 2001 National Household Survey on Drug Abuse indicated that among young adults (ages 18-25), males were more likely to have used Ecstasy than females. In contrast, a study of young adults (ages 18-29) recruited in London, Manchester, Padua, and Rome (Milani, Parrott, Turner, & Fox, 2004) failed to find significant gender differences in lifetime consumption of Ecstasy; however, the "usual amount" of Ecstasy tablets taken in one occasion tended to be greater for males than females. Verheyden, Hadfield, Calin, and Curan (2002) conducted a study of recreational Ecstasy users recruited from a nightclub and also found significant gender differences. Males reported taking an average of one more Ecstasy tablet per occasion than females, had used Ecstasy for an average of 2 years longer than females, and therefore, generally had higher cumulative lifetime use rates than females. However no gender differences were found for frequency of Ecstasy use.

Consistent with Verheyden et al. (2002), Fingeret, Moeller, and Stotts (2005) conducted a study in the US of Ecstasy users (ages 16 to 52) and found that males were more likely than females to be heavier users of Ecstasy. However, in contrast to Verheyden et al. (2002), males were also more likely than females to use Ecstasy with greater frequency. Ter Bogt and Engels (2005) also found significant gender differences; males were more likely than females to report a history of Ecstasy use. In addition, males reported using Ecstasy more frequently, taking more pills per occasion, and having used for a longer period of time.

Notably, Liechti, Gamma and Vollenweider (2001) found that equal doses of Ecstasy per kilogram body weight produced stronger responses in females than males, suggesting that females are more susceptible to the 5-HT-releasing effects of MDMA. Possibly, these differential gender effects of MDMA help to explain the above gender differences in consumption patterns of Ecstasy. The lack of consistency in the findings from the literature examining gender differences among Ecstasy users is indicative of the great need for further research and will be thoroughly examined in the current study.

Statement of the Problem and Hypotheses

Statement of the Problem

One of the significant emerging trends in the use of illicit substances among young adults has been the increased use of Ecstasy. Use of this drug appears to be associated with psychological and psychiatric problems, and its long-term negative effects are still being studied. For example, some researchers have classified MDMA as a neurotoxin based upon serotonin neurodegeneration in animals. Young adults who use Ecstasy regularly tend to be polydrug users, and often engage in concurrent drug use to improve the effects of other drugs or to help mange negative effects. Thus, it is difficult to isolate the effects of MDMA separate from the use of other illicit substances in this population.

Unfortunately, although research on the use of Ecstasy has increased over the years, there are still significant gaps in the literature. First, in exploring predictors of Ecstasy use, only one study has expanded the traditional Ecstasy user versus non-user dichotomy to include non-users; users (light, moderate, and heavy); and ex-users (McMillan et al., 2003). Consistent with the literature regarding the association between normative influence and substance use (e.g., Hussong, 2002; Kandel, 1978), McMillan et al. (2003) found that normative influence differentiated the following: (1) heavy users from both moderate and light users and (2) light users from moderate users. However, it is important to note a second limitation of the literature; it lacks a standard classification system for types of users. For example, McMillan et al. defined *light users* as individuals who had used Ecstasy once or twice; *moderate users* as Ecstasy users who had used Ecstasy three or more but less than 20 times; and *heavy users* as Ecstasy users who had used Ecstasy 21 or more times. In contrast, Parrott et al. (2002) made the following

distinctions among Ecstasy users: *novice users* (1-9 occasions); *moderate users* (10-99 occasions); and *heavy users* (+100 occasions). Problematically, no two studies in the literature have divided Ecstasy users into groups by the same criteria.

Another limitation regarding the Ecstasy literature is that research has tended to focus on the following topics: (1) pharmacology and toxicology of Ecstasy (Parrot et al., 2002; Thomasius et al., 2003); (2) demographics/characteristics of Ecstasy users (Strote et al., 2002); and (3) psychological and physiological effects of Ecstasy use (Kalant, 2001). Although the aforementioned literature has been useful in broadening general knowledge regarding Ecstasy, researchers have yet to gain a clear understanding of the following important areas: (1) why and under what circumstances young adults use Ecstasy; (2) what factors contribute to young adults beginning the use of Ecstasy; and (3) what factors contribute to young adults quitting the use of Ecstasy.

Although scarce, some studies have examined specific risk factors for the active use of Ecstasy among young adults. First, individuals who begin using Ecstasy and other illicit substances at a young age are at greater risk for more intensive use in the future (Boys & Marsden, 2003; Hawkins et al., 1992; Petraitis et al., 1998). Therefore, it is likely that those who become active users of Ecstasy have a history of early experimentation with Ecstasy and other illicit substances. Second, the literature indicates that young adults' perceptions of Ecstasy use by their peers is a significant predictor of their own intensity of use of Ecstasy (Boys & Marsden, 2003; McMillan et al., 2003). Based upon this line of research, active users of Ecstasy are likely to perceive that the use of Ecstasy among their peers is normative which increases their likelihood of use. Third, researchers have found that young adults who score in the low range on measures of

social conformity (religiosity, law abidance, and conservatism) are more likely to engage in socially proscribed activities such as drug use (Petraitis et al., 1998). With regard to Ecstasy specifically, research suggests that young adults with a history of Ecstasy use value the arts and parties more than religion (Strote et al., 2002). Although very little research has explored the association between Ecstasy and social conformity, it is likely that active users of Ecstasy would score in the low range.

In addition to prior substance use, perceived substance use by peers, and social conformity, researchers have also examined the associations between sensation seeking, risk taking, and substance use among young adults; results support strong positive correlations between sensation seeking and risk taking and substance use (Zuckerman, 1979, 1994). Specifically, young adults who are high-sensation seekers tend to appraise risk in three areas (criminal behavior, minor rule-violations, and engaging in sports) as lower than low-sensation seekers and are more likely to participate in these risky activities (Horvath & Zuckerman, 1993). Furthermore, young adults who abuse drugs tend to score in the high range on measures of sensation seeking (Zuckerman, 1979, 1994, 1999). In examining the literature regarding Ecstasy and sensation seeking, among those who use Ecstasy, higher scores on sensation seeking appear to be related to heavier use of Ecstasy (Bobes et al., 2002; Daumann et al., 2001). Notably, one aspect of sensation seeking that has been highly correlated with illicit drug use is disinhibition (Newcomb & McGee, 1991). Disinhibition has been found to be negatively associated with law abidance and religiosity, two aspects of social conformity. Therefore, it appears that active users of Ecstasy are likely to be very high-sensation seekers who score in the low range on measures of social conformity.

Finally, another important variable to examine in studying young adults' use of Ecstasy is motivation for use. What functions does the use of Ecstasy serve? Prior research (Boys & Marsden, 2003; Boys et al., 1999) indicates that the most common reasons young adults give for using Ecstasy are to keep going, enhance activity, feel elated/euphoric, stay awake, get intoxicated, enjoy the company of friends, and enhance feeling when having sex. The question of interest in the current study is how does the primary motivation for using Ecstasy differ between the three groups (Experimenters; Users; and Quitters). It is logical that all three groups would share many of the above motivations for use of Ecstasy that are social in nature. Accordingly, Boys and Marsden (2003) did not find support for a relationship between social functions for Ecstasy use and intensity of use.

In contrast to the expected similarities among the three groups in the endorsement of social functions for the use of Ecstasy, the literature suggests an association between intensity of Ecstasy use and the endorsement of mood functions (Boys & Marsden, 2003). Because the use of Ecstasy is associated with depressive symptomatology, it is likely that more frequent users of Ecstasy would experience more frequent negative mood symptoms and may continue to use to alter their mood. Therefore, it is likely that young adults who are active users are likely to endorse mood functions when questioned about their motivation(s) in using Ecstasy.

The aforementioned research examines specific variables that are likely to be associated with young adult users of Ecstasy. In integrating all of the above research, it is likely that, *in general*, active users of Ecstasy have the following characteristics: (1) began using Ecstasy and other illicit substances at a young age; (2) perceive that the use

of Ecstasy is normative among their peers; (3) score in the low range on measures of social conformity (religiosity, law abidance, and conservatism); (4) score in the high range on measures of sensation seeking; (5) appraise little risk with regard to potentially risky activities; (6) engage in a variety of potentially risky activities; (6) endorse functions for Ecstasy use relating to mood; and (7) have a history of polydrug use.

Although the McMillan et al. study is a good start, research has yet to examine factors predictive of quitting the use of Ecstasy after active use. Therefore, based largely upon conjecture, it is likely that, *in general*, quitters will have the following characteristics which are also, *in general*, similar to those of active users: (1) began using Ecstasy and other illicit substances at a young age; (2) perceive that the use of Ecstasy is somewhat normative among their peers (quitters are likely to still have some peers who use Ecstasy but are less likely to have as many peers who use Ecstasy as active users); (3) score in the low range on measures of social conformity (religiosity, law abidance, and conservatism); (4) score in the high range on measures of sensation seeking; (5) appraise little risk with regard to potentially risky activities; (6) engage in a variety of potentially risky activities; (6) endorse functions for Ecstasy use relating to mood; and (7) have a history of polydrug use (although they have quit using Ecstasy, because they are likely to be high sensation seekers based upon their history of Ecstasy use, they are also likely to engage in polydrug use).

Although literature exists examining the differences between users and non-users of Ecstasy (Strote et al., 2002), researchers have not explored what characteristics distinguish young adults who experiment with Ecstasy and then quit from those who experiment and continue to use. Again, based largely upon conjecture, it is likely that, *in*

general, experimenters will have the following characteristics: (1) began using illicit substances at a young age; (2) perceive that the use of Ecstasy is somewhat normative among their peers (the normative influence is what likely impacts their decision to experiment); (3) score in the low range on measures of social conformity (religiosity, law abidance, and conservatism); (4) score in the high range on measures of sensation seeking; (5) appraise little risk with regard to potentially risky activities; (6) engage in a variety of potentially risky activities; (6) primarily endorse social functions for Ecstasy use; and, (7) have a history of polydrug use (because they are experimenting with an illicit substance, they are likely to be high sensation seekers; therefore, they are also likely to engage in polydrug use).

In summary, researchers to date have not examined what factors distinguish between young adults who: (1) experiment with the use of Ecstasy and then quit (Experimenters); (2) become active users of Ecstasy and continue use (Users); and (3) become active users of Ecstasy and then quit (Quitters). The goal of this study is to examine how these three groups differ on key variables established through prior studies. Results of this study will aid in the development of appropriate intervention programs targeting young adults who actively use Ecstasy.

Hypotheses

All the hypotheses below are based on comparisons of means among three groups of users of Ecstasy ("Experimenters," "Users," and "Quitters"). Specifically, hypotheses are based on relative comparisons between Users and Experimenters and Users and Quitters. (Although I am quite interested in the comparisons of how Experimenters and Quitters might differ from each other, I don't believe there is sufficient literature or

research on which I can base hypotheses.) For example, because participants in all three groups would likely receive relatively high scores on a measure of sensation seeking simply based upon their prior experiences with Ecstasy, it is, nevertheless, the case that the three groups of Experimenters, Users, and Quitters would differ on their mean scores. Therefore, because sensation seeking is positively associated with level of drug use, it is hypothesized that Users and Quitters will display higher sensation seeking scores than will Experimenters.

Table 1 provides a summary of the expected relative comparisons among the three groups. Signs represent relative mean comparisons among the three groups to a normative sample of young adults. The type of sign (plus or minus) indicates whether the group mean is thought to be larger (plus) or smaller (minus) than that of a normative sample. (Scores of the three groups will not be compared to any normative sample(s) on any of the dependent measures. The use of + and – is simply to indicate that the three groups under study are unlikely to be similar to a normative group, and to indicate how I think they might differ from the 'average' young adult.) Groups with the same quantity of signs are hypothesized to have similar means (+/+ or –/–), while groups with a greater number of signs are hypothesized to have larger (++) or smaller (– –) means than those groups with the corresponding single sign (+/–).

Table 1

Relative Comparisons among Three Groups of Young Adult Users of Ecstasy

Criterion Variables	Experimenters	Users	Quitters
Polydrug Use (past 90 days)	+	++	+
Normative Influence	+	+ +	+
Social Conformity	–	– –	– –
Sensation Seeking	+	+ +	+ +
Risk Appraisal (self)	–	– –	– –
Risk Taking Behaviors (self)	+	+ +	+ +
Functional Use of Ecstasy to Alter Mood (past 90 days)	+	+ +	+ +

Note. Signs represent relative mean comparisons among the three groups to a normative sample of young adults. The type of sign (plus or minus) indicates whether the group mean is expected to be larger (plus) or smaller (minus) than that of a normative sample. Groups with the same quantity of signs are hypothesized to have means that are similar in magnitude (+/+ or –/–), while groups with a greater number of signs are hypothesized to have larger (++) or smaller (– –) means than those groups with the corresponding single sign (+/–).

+ (large)

+ + (larger)

– (small)

– – (smaller)

Hypothesis 1: Polydrug Use (Number of Substances Used in Past 90 Days)

There will be significant group differences in the number of substances used in the past 90 days. Specifically, Hypothesis 1 predicts the following:

(a) Users will, on average, have used a greater number of substances in the past 90 days than Experimenters.

(b) Users will, on average, have used a greater number of substances in the past 90 days than Quitters.

Hypothesis 2: Normative Influence

There will be significant group differences in level of normative influence. Specifically, Hypothesis 2 predicts the following:

(a) Users will, on average, have higher scores on normative influence than Experimenters.

(b) Users will, on average, have higher scores on normative influence than Quitters.

Hypothesis 3: Social Conformity

There will be significant group differences in level of social conformity. Specifically, Hypothesis 3 predicts the following:

(a) Users will, on average, have lower scores on social conformity than Experimenters.

(b) Users will, on average, have similar scores on social conformity to Quitters.

Hypothesis 4: Sensation Seeking

There will be significant group differences in level of sensation seeking. Specifically, Hypothesis 4 predicts the following:

(a) Users will, on average, have higher scores on sensation seeking than Experimenters.

(b) Users will, on average, have similar scores on sensation seeking to Quitters.

Hypothesis 5: Risk Appraisal

There will be significant group differences in level of risk appraisal (for self). Specifically, Hypothesis 5 predicts the following:

(a) Users will, on average, have lower scores on risk appraisal than Experimenters.

(b) Users will, on average, have similar scores on risk appraisal to Quitters.

Hypothesis 6: Risk Taking Behaviors

There will be significant group differences in level of risk taking behaviors (for self). Specifically, Hypothesis 6 predicts the following:

(a) Users will, on average, have higher scores on risk taking behaviors than Experimenters.

(b) Users will, on average, have similar scores on risk taking behaviors to Quitters.

Hypothesis 7: Functional Use of Ecstasy to Alter Mood

There will be significant group differences in the functional use of Ecstasy to alter mood. Specifically, Hypothesis 7 predicts the following:

(a) Users will, on average, endorse having used Ecstasy to alter mood more frequently than Experimenters.

(b) Users will, on average, endorse a similar frequency of having used Ecstasy to alter mood as Quitters.

Expected Patterns among Group Means

The hypotheses stated above indicate two expected patterns among the group means on the following dependent variables:

(1) Users, on average, will have *higher/lower* (depending on the dependent variable) scores than Experimenters and *similar* scores to Quitters for sensation seeking, social conformity, risk appraisal, risk taking behaviors, and functional use of Ecstasy to alter mood.

(2) Users, on average, will have higher scores than Experimenters and Quitters for normative influence and number of substances used in the past three months.

Alternative Hypotheses

Prior research has not examined differences between the specific types of Ecstasy users defined in this study (Users, Experimenters, and Quitters). Although the stated hypotheses are based upon the available literature, there are alternative hypotheses, particularly regarding the comparisons between Users and Quitters. For example, possibly those individuals who are Quitters have not only quit using Ecstasy but also drugs in general and have become more socially conforming than Users. In contrast, it is also possible that Quitters are no longer using Ecstasy but are using other substances. In this case, Quitters, on average, would be expected to have used a similar number of substances in the past three months in comparison to Users. Unfortunately, due to the limitations of the current literature, the hypotheses in this study are partially based on conjecture.

Method

Design

The basic design of this study can best be characterized as a five-group one-way design with concomitant variables. The primary focus of the analyses was on comparisons among five groups of young adults with a history of polysubstance use ("Experimenters," "Users," "Quitters," "Infrequent Users," and "Controls") as described below. Because this study used convenience sampling, it should be considered a quasi-experimental design.

Participants

Recruitment of participants. Numerous studies of Ecstasy users have been conducted using the Internet (e.g., Gamma et al., 2005; Parrott et al., 2001; Scholey et al., 2004). As noted by Fernández et al. (2004, p.954), "The Internet's intermediary position between a mass medium and an interpersonal source of communication makes it an ideal venue for explaining a study, creating interest and even screening a large number of potential participants efficiently." Fernández et al. (2004) also highlighted the utility of the Internet in recruiting "at-risk" groups of participants who may be less willing to respond to more conventional approaches such as person-to-person interviews. Notably, prior Internet studies of Ecstasy users have employed "purposive sampling," recruiting participants from sources where a large number of Ecstasy users are likely to be drawn (Degenhardt, Copeland, & Dillon, 2004). Recent research has found that the characteristics and drug use patterns of Ecstasy users recruited through purposive sampling were similar to those of participants recruited in a general population household survey (Topp, Barker, & Degenhardt, 2004).

Based upon the above success of prior recruitment of Ecstasy users via the Internet, participants for this study were also recruited through the Internet. Recruitment notices providing a link to the study website were posted on Internet sites including drug and non-drug related forums, message boards, and chat rooms. (A copy of the recruitment posting can be found in Appendix A). The recruitment procedure involved the following tasks. First, a link to the study survey and key words (Ecstasy, MDMA, drug, research, survey, marijuana, amphetamines, LSD, cocaine powder, psilocybin mushrooms, heroin, prescription drugs, etc.) were submitted to a popular Internet search engine, Google. Consequently, when Internet users conducted a search using any of the above key words, the survey webpage appeared on a list of relevant websites, which was generated by Google. This strategy enabled a wide range of participants to be recruited; recruitment targeted anyone searching the Internet rather than individuals from a particular website.

Next, the experimenter employed a second strategy for recruitment. She conducted searches for drug and non-drug related Internet community forums. First, the search for drug-related community forums was conducted by using the key words mentioned above. Second, the experimenter conducted a general search for "community forums" and advertised on these sites as well. This strategy was used to target two types of participants: (1) participants who engaged in drug-related Internet communication within an Internet community forum of substance users; and, (2) participants with a history of substance use who engaged in Internet communication within an Internet community forum which was not drug-oriented. Finally, postings were made within drug and non-drug related chat rooms and message boards of large internet service providers such as American Online and Yahoo. Overall, this methodology allowed for the possible

recruitment of a large, broad sample of individuals with a history of substance use, which would not have been plausible without the use of the Internet. (See *Drug History Questionnaire* for a review of the validity of Internet surveys).

Inclusion criteria for five participant groups. Participants included young adults in the United States between the ages of 18-25 who had taken Ecstasy at least once in their lifetime or had not used Ecstasy but were using at least two of the following substances: marijuana, amphetamines, LSD, cocaine powder, psilocybin mushrooms, heroin, or prescription drugs in a non-prescribed manner. Participants were recruited to fill one of four groups. The first group was composed of individuals who had used Ecstasy 12 or more times in the past year and intended to continue using Ecstasy in the future (Users). The second group consisted of individuals who had used Ecstasy three or fewer times, had not used Ecstasy in the past six months, and did not intend to use Ecstasy in the future (Experimenters). The third group was composed of individuals who had used Ecstasy 12 or more times, had not used Ecstasy in the past six months, and did not intend to use Ecstasy in the future (Quitters). Finally, the fourth group consisted of polysubstance users who had never used Ecstasy but were using at least two of the following substances: amphetamines, LSD, cocaine powder, psilocybin mushrooms, heroin, or prescription drugs in a non-prescribed manner. They also indicated that they intended to continue using these two substances or others on the list in the future (Controls).

In examining the data following collection and prior to any analyses, it became apparent that there were 19 participants who had used Ecstasy 8-11 times in the past year, but who did not meet the criteria for the User group (12 or more times in the past year).

Therefore, the cutoff for the User group was lowered to 8 times in the past year. This cutoff estimates the use of Ecstasy approximately once every six weeks. In addition, there was a large number of Ecstasy users (32) who had an extensive history of use, but who did not meet the criteria for a User as they has not used 12 or more times in the past year. This group appeared to be distinct from the User group in that they had a history of extensive use, but were currently using less frequently. This decrease in use may be accounted for by the development of a tolerance and/or the experience of negative side effects, thus necessitating longer periods of time between usages. Therefore, a fifth group was created (Infrequent Users). The cutoff for this group of Infrequent Users was set to the use of Ecstasy 4 or fewer times in the past year, with a lifetime history of use greater than or equal to 20 times. This cutoff provides for a clear differentiation between the two groups of Users, with Infrequent Users using half as often as Users in the past year. A summary of the criteria for each of the five groups can be found in Table 2.

Table 2

Inclusion Selection Criteria for the Five Ecstasy Use Groups

Group	*n*	Inclusion Selection Criteria
User	56	• Have used ecstasy 8 or more times in the past year • Intend to continue using ecstasy in the future
Experimenter	55	• Have used ecstasy 3 or fewer times • Have not used ecstasy in the past 6 months • Do not intend to use ecstasy in the future
Quitter	64	• Have used ecstasy 12 or more times in lifetime • Have not used ecstasy in the past 6 months; and • Do not intend to use ecstasy in the future
Infrequent User	46	• Have used ecstasy 4 or fewer times in the past year • Have used ecstasy 20 or more times in lifetime • Intend to continue using ecstasy in the future
Control	101	• Have never used ecstasy • Are using at least 2 of the following substances amphetamines, LSD, cocaine powder, psilocybin mushrooms, heroin, or prescription drugs in a non-prescribed manner • Intend to continue using the 2 substances or others on the list in the future
Total Sample	322	

Participant screening. Initially, prospective participants were screened based on five criteria: (1) country of origin (United States); (2) age (18-25); (3) history of Ecstasy use including the number of separate occasions during which they had consumed Ecstasy); (4) intent to use Ecstasy in the future; and (5) use of at least two substances not including Ecstasy (amphetamines, LSD, cocaine powder, psilocybin mushrooms, heroin, and prescription drugs in a non-prescribed manner) and intent to use in the future. First, participants were asked to review two statements about their country of residence ("I currently live in the United States of America") and age ("My age falls into the category of 18-25 years old including 18 and 25") and to consider whether or not both of these statements were true. If their response was "Yes," they were asked to click "Next" to continue with the survey. If their response was "No," they were asked to click on a link which forwarded them to a web page explaining that they did not meet the criteria for this study and thanking them for their time. This web page for non-participants contained educational information about Ecstasy and a list of educational Internet sites about Ecstasy. Next, participants were asked to read and respond "Yes" or "No" to four additional questions intended to assess if they met the criteria for one of the four groups (Users, Experimenters, Quitters, or Controls). Participants were then instructed to review their responses. If they had answered "Yes" to any of the questions (the four screening items), they were to click "Next" which connected them to the Informed Consent Page. If they had responded "No" to all of the screening questions, they were instructed to click on a link which forwarded them to the non-participant debriefing web page.

As data were collected during the first four days, it became apparent that 3 of the 11 participants had endorsed items indicating that they met the criteria for two or more

mutually exclusive groups or did not meet the criteria for any of the four groups, but had failed to click on the link which would exit them from the survey because they did not meet the study criteria. Since it was plausible that at least some of the remaining 8 participants had also responded in a manner to gain entry into the study, the data from these 11 participants were excluded from all analyses. In order to decrease the likelihood of participants deliberately responding in a manner so that they would meet the study criteria, the screening methodology for inclusion in the study was modified. Prospective participants were only screened for country of origin (United States) and age (18-25). Prospective participants who did not meet these two criteria were forwarded to the web page explaining that they did not meet the criteria for this study and thanking them for their time. All other participants were directed to continue with the survey by clicking "NEXT" at the bottom of the page. The resulting information regarding participants' history of Ecstasy or non-Ecstasy polysubstance use as well as intent to use in the future was used to determine eligibility for one of the five groups.

Exclusion criteria. After completion of data collection, the data were reviewed and inclusion/exclusion criteria (see Table 3) were applied to select the final sample of 322 participants. First, the data was reviewed for multiple submissions. After completing the survey, participants were asked to click "Done" to submit their data. Some participants clicked on the done button several times, resulting in multiple submissions of their data. Multiple submissions were identified by sequential identical responses to free- response questions. There were 35 second (or, third etc.) submissions which were excluded from the data set. Second, participants' responses for their state of residence were reviewed, and data from 3 participants were excluded because they lived outside of the United

States. Third, responses to the screening questions were reviewed, and data from 36 participants were excluded because they had endorsed items indicating that they met the criteria for two or more mutually exclusive groups. Fourth, responses to the five items of the infrequency scale (described below) were examined, and 17 participants who had endorsed two or more items with an infrequent response were excluded. Fifth, 51 participants were excluded due to inconsistent data. For example, participants who (a) had endorsed being a Quitter for the screening but later responded that they had not quit using Ecstasy, and (b) had endorsed being a User for the screening but later responded that they had quit using Ecstasy were all excluded. Sixth, incomplete data from 5 participants were excluded (3 participants had provided incomplete data for concomitant variables and 2 participants had failed to respond to an entire scale). Seventh, 107 participants endorsed being high while taking the survey and 47 of these high participants had provided invalid data; therefore, data from all of the high participants were excluded. Eighth, 195 participants who produced valid profiles but who did not meet the specific criteria for any of the five groups were excluded. Ninth, 11 participants who produced valid data but had taken the survey prior to revisions of the screening measure were excluded. Tenth, 17 participants who produced valid data but had taken the survey prior to revisions of the Reasons for Use of Ecstasy Scale: AMPS were excluded (see Measures for details). Finally, participants' drug histories were reviewed for endorsement of polythenzine, a fictitious substance included to detect socially desirable responding such as the tendency to over-report drug use (McMillan, Sherlock, & Connor, 2003) as well as random responses; no subjects had endorsed using polythenzine. The application

of these exclusion criteria reduced the screening sample from 799 respondents to the final sample of 322 participants.

Table 3

Exclusion Criteria for Sample Selection

Exclusion Criteria	*n*
Valid Data	
Failed to meet inclusion criteria for a specific Ecstasy Use group	195
Collected prior to revision of screening	11
Collected prior to revision of Reasons for Use of Ecstasy Scale: AMPS	17
Invalid Data	
Multiple submissions	35
Non-U.S.	3
Screening (endorsed criteria for 2 or more mutually exclusive groups)	36
Infrequency Scale	17
Inconsistent data	51
Incomplete data for concomitant variables	5
"High" while taking survey	107
Initial Sample Recruited	799
Total Excluded	477
Final Sample	322

Participant compensation. As an incentive to participate in the study, individuals were offered the opportunity to be part of a lottery for monetary compensation ($50) for their participation. Following completion of the survey, at the bottom of the debriefing page, participants were offered the opportunity to click on a link which connected them to a webpage of the experimenter (hosted by the University of Maryland, College Park Internet server). Participants were asked to enter an email address with which they wanted to be contacted by PayPal (see below) if they were a winner in the lottery. These email addresses were sent to the experimenter's university email account, which was password protected, and downloaded into a Microsoft Excel file. The random number function was used to assign each email address a random number. The data was then sorted by random number, and the first five email addresses were selected as winners.

Pay-Pal payment. PayPal, an Internet payment service, was used to award the five payments. The only participant information needed to use PayPal was an email address. Participants were provided the opportunity to click on a link to Yahoo (www.yahoo.com) to create a free email account. The method of payment through PayPal (see Appendix B) was explained on the informed consent page as well as on the lottery page (see Appendix C). In addition, a link to the PayPal website was provided on the lottery page for participants to obtain further information.

The experimenter used her PayPal account to send an email to each lottery winner. The email explained to the recipient that he/she had received a payment from the experimenter through PayPal. If the recipient was not an existing PayPal member, he/she received instructions explaining how to open a free account in order to receive the payment. Existing PayPal members were instructed to log into their account. The

payment was sent to the recipient's PayPal account, and he/she could then choose to transfer the funds to a checking account, request a check, or send the funds to someone else.

Internet Data Collection Using the University of Maryland Questionnaire Tool Survey Website (http://cgi.umd.edu/survey/display?UMD/SURVEY*)*

The Office of Information Technology (OIT) at the University of Maryland, College Park maintains a secure website which enables faculty and staff with a valid University ID number and PIN to construct an internet survey which is accessible via a web browser. The experimenter created the survey using the OIT software. Access to the survey data required the experimenter's university ID and PIN. Response data were stored as a file, and only the experimenter and employees of OIT who maintain the website had access to this data file, thus ensuring data integrity.

Participant anonymity. Participants were never asked to provide any identifying information. After completing the survey, they were instructed to click on the button, "Done," which automatically submitted the data to the secure OIT database. Participants were then connected to another web site (the experimenter's secure University of Maryland home page) to provide an email address for the lottery. Two separate databases were generated on two separate secure web sites, one database consisting of the email addresses for the lottery and another consisting of the survey data. Therefore, survey data were never linked with ***any*** identifying information.

Measures

Participant Screening Questionnaire

Participants were asked to provide information regarding the following: (1) country of origin; (2) age; (3) history of Ecstasy use (number of separate occasions during which they consumed Ecstasy); (4) intent to use Ecstasy in the future; and (5) polysubstance use not including Ecstasy and intent to use in the future. A copy of this questionnaire can be found in Appendix D.

Demographics Questionnaire

Participants were asked to provide the following demographic information: (1) age; (2) sex; (3) sexual orientation; (4) level of completed education; (5) household income; (6) ethnicity; (7) history of attending substance use related counseling or support group (treatment); (8) and referral source for the survey (how did they hear about the study). A copy of this questionnaire can be found in Appendix E.

Drug History Questionnaire

Based upon interview items assessing past consumption patterns (Maudsley Addiction Profile [MAP]; Marsden, Gossop, Stewart, Best, Farrell, Lehmann, et al., 1998) and lifetime use (Boys & Marsden, 2003; Boys, Marsden, & Strong, 2001), the Drug History Questionnaire was constructed for the proposed study to assess participants' history of drug use for the following substances: alcohol; marijuana; amphetamine; Ecstasy; LSD; cocaine powder; psilocybin mushrooms; prescription drugs in a non-prescribed manner; and polythenzine. For each substance, participants were asked questions pertaining to the following information: (1) age of first use; (2) number of

times used in the past 30 days; (3) number of times used in the past 90 days; (4) number of times used in the past year; and (5) number of times used in lifetime.

Boys and Marsden (2003) found that age of first use of Ecstasy was a significant negative predictor of consumption intensity of Ecstasy. Specifically, initiating use of Ecstasy at a younger age was associated with more intensive use when controlling for the following: age; gender; peer use; functions; and negative effects. In addition, results demonstrated that the perceived functions that drug use fulfills have a consistent, positive association with patterns of consumption. These results are consistent with previous research indicating an association between reasons for substance use and more intensive consumption (Johnston & O'Malley, 1986; Newcomb et al., 1988; Simons, Correia, & Carey, 2000).

The Drug History Questionnaire (see Appendix F) is partially modeled after the substance use section of the MAP, a brief (60-item), interviewer-administered questionnaire that measures substance use, health risk, physical/psychological health and personal/social functioning (Marsden et al., 1998). In their study of treatment outcomes for people with drug and/or alcohol problems, Marsden et al. (1998) defined the recall period for the MAP as the 30-day period before intake to substance treatment. The assessment of substance use (illicit heroin, methadone, benzodiazepines, cocaine and alcohol) was conducted in the following manner: (1) the participant is shown a response card with seven frequency patterns (ranging from *one day per week* to *every day* and is asked to select the response that best summarizes their frequency of use (the corresponding number of days is recorded); (2) if a substance is only used periodically or when there is no typical pattern of use, the interviewer shows a calendar to prompt recall

of the last day the substance was used (this last day and any previous days during the recall period is recorded); (3) the participant is asked to report the amount of substance consumed on a typical day in the past month (self-reports are recorded verbatim) to assess intensity of substance use; (4) if the quantity of the substance consumed has varied in the past month, the participant is asked to recall the amount used on the 2-3 most recent days of use (self-reports are recorded verbatim and averaged). As reported by Marsden et al., participants had few problems in estimating the frequency and intensity of their substance use.

Overall, internal consistency reliability and concurrent validity assessments of these scales have been highly satisfactory (Marsden et al., 1998). Concurrent validity for self-reported drug use was assessed by adding items from relevant instruments to the researcher-administered interview. In order to assess the accuracy of self-reported drug use, 64 drug users were asked if they had used heroin, methadone, benzodiazepines, or cocaine during the 48-hour period prior to treatment intake. Urinalyses were conducted and concordance rates for heroin (morphine), methadone, cocaine and benzodiazepines and their metabolites averaged 90% (average $\kappa = .74$). To assess test-retest reliability, MAP interviews were re-administered after 3.1 days ($SD = 2.7$). The intraclass correlation coefficient (ICC) was used as an index of test-retest reliability (Bartko, 1966). ICCs for the assessed substances were high (averaging .94 overall and .88 for subjects reporting use), indicating good test-retest reliability.

Although the proposed study did not use an interviewer-administered questionnaire, results of the Marsden et al. study (1998) suggest that self-report substance use data can be valid and reliable. Notably, Van de Wijngaart et al. (1997) examined the

validity of self-reports for Ecstasy use by comparing urine samples taken from participants with self-reported drug use. Results indicated that, in 93% of the cases, self-report matched the outcome of the urine analysis, 3% had overestimated their use of Ecstasy, and 4% had underestimated their use of Ecstasy. Furthermore, because participants completed the proposed questionnaires on their private computers via the Internet (increased privacy and anonymity), the veracity of their self-report data for substance use may be greater than if interviewed directly by a researcher. Accordingly, past research indicates that disclosure of high-risk sexual behaviors, HIV infection, as well as alcohol and tobacco misuse may be enhanced by Web-based assessments (Gerber et al., 1999; Turner et al., 1998).

In addition to reporting general history of drug use, participants who reported a history of Ecstasy use were asked questions pertaining to the following areas: (1) whether or not they had quit using Ecstasy; (2) largest number of Ecstasy pills taken in one occasion; (3) whether they currently were or once were psychologically addicted to Ecstasy; (4) testing of Ecstasy pills for content; (5) drugs or substances taken to prevent unwanted Ecstasy side-effects from Ecstasy; and (6) estimate of the quantity of Ecstasy consumed (number of pills) on a "typical using day" (Boys, & Marsden, 2003).

Finally, participants who had never used ecstasy were first asked to respond “True” or “False” to a list of possible reasons for why they had never used ecstasy. Second, they were asked to list any additional reasons why they had *never* used ecstasy. Last, they were asked to list the main reason why they had never used ecstasy.

Normative Influence

As developed by McMillan et al. (2003) and modified for the current study, participants were asked to estimate how many of their friends currently used Ecstasy (the original scale targeted six substances) based upon a 6-point scale (coded 0-5). Response options ranged from *none*, *a few*, *some*, *about half*, *most* to *all*. Friends were defined as people with whom participants regularly (i.e., at least once a month) spent time (Boys & Marsden, 2003). As stated previously, McMillan et al. found that normative influence was positively associated with level of Ecstasy use and differentiated between three types of users as defined in their study: (1) light (used Ecstasy once or twice and intended to do so in the future); (2) moderate (used Ecstasy three or more but less than 20 times and intended to do so in the future); and (3) heavy (used Ecstasy 21 times or more and intended to do so in the future). Specifically, McMillan et al. found that higher levels of normative influence were associated with a greater likelihood of (1) being a moderate or heavy user rather than a light user or (2) being a heavy user rather than a moderate user.

S*ocial Conformity Scale (SCS)*

Stein, Newcomb, and Bentler (1987) analyzed data obtained from a study of young adults (junior high school students) who participated in an 8-year longitudinal study of adolescent development and drug use (Huba & Bentler, 1982; Newcomb & Bentler, 1986). In this study, social conformity was measured using a modified form of the Bentler Psychological Inventory (Bentler & Newcomb, 1978; Huba & Benter, 1982). The Social Conformity Scale is a 12-item measure of social conformity which contains three subscales: law abidance, liberalism, and religiosity. Each of the subscales is composed of four self-description items. A Total score for social conformity was obtained by summing

the 12 items (scored 0-4). Items were displayed in a five-choice semantic differential format with opposite adjective phrases at each end (Huba & Bentler, 1982).

For the Social Conformity Scale, participants were asked to select one choice for each subscale-item which best described them most of the time. The first subscale, the Law Abidance scale, consists of the following four items: (1) return incorrect change─willing to keep extra change (coded 4-0); (2) might use a false ID─afraid of getting caught (coded 0-4); (3) might shoplift─wouldn't know how or want to (coded 0-4); and (4) goodie-goodie honest type─not quite so honest (coded 4-0). As indicated, items 1 and 4 were reverse scored where 4 indicates the highest score for law abidance. The second subscale, the Liberalism scale, consists of the following four items: (1) support women's liberation─don't feel women need or want it (coded 4-0); (2) see cops as law enforcers─see cops as "pigs" (coded 0-4); (3) think police should carry guns─think cops shouldn't carry guns (coded 0-4); and (4) approve of many protests─approve of few protests (coded 4-0). As indicated, items 1 and 4 were reverse scored where 4 indicates the highest score for liberalism. Finally, the third subscale, the Religiosity scale, consists of the following four items: (1) Am not religious─am a religious person (coded 0-4); (2) believe in religion or the Bible─believe in science (coded 4-0); (3) feel that prayers are answered─feel that praying is a waste (coded 4-0); and (4) think religion is outdated─think religion is not outdated (coded 0-4). As indicated, items 2 and 3 were reverse-scored where 4 indicates the highest score for religiosity. Cronbach's internal consistency reliability (α) was reported to equal .72 for each of the subscales of the Social Conformity Scale (Huba & Bentler, 1982).

Sensation Seeking Scale Form V (SSS-V)

This 40-item scale was used to assess participants' levels of sensation seeking. Research conducted by Jaffe and Archer (1987) found that out of five self-report assessment measures, the SSS was typically the most powerful predictor of substance use and abuse. Form V of the SSS uses a Total Score based on the sum of four factor scores (Zuckerman, Eysenck, & Eysenck, 1976). Each of the four factors is composed of 10 items: (1) Thrill and Adventure Seeking (TAS) is composed of items reflecting desires to engage in sports or activities involving some degree of physical danger or risk; (2) Experience Seeking (ES) consists of items expressing the desire to seek new experiences through the mind and senses by living in a nonconforming lifestyle with unconventional friends and through travel; (3) Disinhibition (Dis) contains items that describe the need to disinhibit behavior in the social environment by drinking, partying and seeking variety in sexual partners; and (4) Boredom Susceptibility (BS) consists of items that suggest an aversion for repetitive experience of any kind, routine work, or dull/predictable people. In addition, it includes items indicating a restless reaction when things are unchanging (Zuckerman, 1994). Form V is the most widely used version of the SSS and has been found to have high criterion-related validity and adequate internal reliability (Gilchrest et al., 1996).

Table 4 shows the scale reliabilities for the SSS-V based on American participants, as reported in Zuckerman (1979). Each subscale will be summed to obtain a factor score. In addition, a Total score will be obtained by summing the four subscale scores.

Table 4

Internal Consistency α for the Sensation Seeking Scale (SSS-V)

Reported by Zuckerman (1979)

	Internal Consistency Coefficients		Re-test Reliabilities (3-week interval)
	Male (N = 97)	Female (N = 122)	
TAS	.77	.77	.94
ES	.61	.61	.89
Dis	.74	.76	.91
BS	.57	.56	.70
Total	.84	.85	.94

General Risk Appraisal Scale (GRAS)

This 120-item measure was used to assess participants' appraisal of risk for self and their peers across various situations as well as reports of self and peers' past participation in various risky behaviors. Factor analyses have identified four domains of risk including crime, financial, minor violations, and sports (Horvath & Zuckerman, 1993). Participants responded to four questions for 30 risky activities, using 5-point Likert-type scales: (1) personal risk appraisal (*Own Risk*), the chance of the negative outcome if the participants themselves engaged in the activity; (2) *Own Behavior*, the number of times participants engaged in the risky behavior; (3) peer risk appraisal (*Peer Risk*), participants' estimates of the chance that a peer of their own sex and approximate age would experience the negative outcome if he/she engaged in the activity; and (4) *Peer Behavior*, an estimate of the percentage of participants' peers who engage in the activity.

Table 5 shows the Cronbach's internal consistency α for the four risk factors (Crime, Financial, Minor Violations, and Sports) for the GRAS (Horvath & Zuckerman, 1993). The GRAS collected data included participants' responses to both self (risk appraisal and risky behavior) and peer (risk appraisal and risky behavior) items; however, the specific hypotheses for this study only pertained to items related to self (risk appraisal and risky behavior). Responses to each item were weighted (1-5), and factor scores were calculated by summing the designated items for each factor. A Total score was calculated by summing the item weights.

Table 5

Cronbach's Internal Consistency α Reported in the Scoring Manual of the General Risk Appraisal Scale (GRAS) (Horvath & Zuckerman, 1993)

	Factor 1 Crime Risk	Factor 2 Financial Risk	Factor 3 Minor Violations Risk	Factor 4 Sports
Own Risk	.83	.71	.70	.66
Own Behavior	.69	.72	.55	.43
Peer Risk	.78	.70	.73	.71
Peer Behavior	.79	.75	.74	.62

Note. $N = 447$.

Horvath and Zuckerman (1993) conducted exploratory multiple regressions using one's own risky behavior as the dependent variable and four other factors (peer behavior, sensation seeking, impulsivity [measured by the Narrow Impulsivity scale of Eysenck and Eysenck (1978)], and risk appraisal) as the predictor variables. The results of these analyses are provided below in Table 6. The following variables showed significant prediction in all four areas of risk and are listed in order by relative strength of prediction: (1) peer behavior; (2) sensation seeking; and (3) risk appraisal. Impulsivity was the poorest predictor of risky behavior. For this reason, a measure of impulsivity was not included in this study.

Table 6

Predictors of Own Risky Behavior: Multiple Regression Beta Weights Reported by Horvath and Zuckerman (1993)

	Crime	Violations	Financial	Sports
Peer Behavior	.43	.54	.49	.39
Sensation seeking	.27	.23	.15	.15
Impulsivity	.13	.11	—[a]	—[a]
Risk appraisal	-.15	-.14	-.18	-.14
Multiple *r*	.71	.72	.59	.47
R^2	.50	.51	.34	.21

Note. [a]Did not enter multiple regression equation. $N = 447$.

Functions for Substance Use Scale

Initially, when the study survey was first posted on the Internet for data collection, the Functions for Substance Use Scale was used (Boys, Marsden, & Strang, 2001). This questionnaire consists of a 17-item scale designed to measure perceived functions for substance use spanning five domains including the following: 1) using to change mood; 2) using for specific physical effects; 3) using for social purposes; 4) using to facilitate activity; and 5) using to help manage the effects from other substances (Boys, et al., 2001). This scale consists of items first developed by Boys Marsden, Fountain, Griffiths, Stillwell, and Strang (1999) in addition to items generated from the research literature, informal discussions with young drug users, and qualitative interviews (Boys et al., 1999).

In the Boys et al. study (2001), Ecstasy was used to fulfill all of the functions that were measured. Cronbach's α for the Ecstasy scale items was .76. Seven of the 17 function items were endorsed by over half of the participants. The average total number of different functions endorsed for Ecstasy was eight. The above data suggest that Ecstasy users differ in their motivations for use and have different functional profiles. In their recent study (Boys & Marden, 2003), functions for substance use strongly predicted intensity of use of Ecstasy (explained an additional 11% of the variance) when controlling for peer use, age of first use, and demographics.

Development of the Reasons for Use of Ecstasy Scale: AMPS. As noted previously, after the necessary changes were made to the screening section, the survey was re-posted to the Internet for data collection. For the following three days, data continued to be examined. It was noted that many participants had provided feedback

indicating that there were many reasons why they had used Ecstasy which were not listed in the questionnaire. Again, the survey was revised and feedback was utilized to incorporate 11 additional items for possible reasons why participants may have used Ecstasy, totaling 30 items. Participants were asked to report how frequently they had used Ecstasy for each of the listed reasons, using a five-point Likert-type scale (*never* to *always*; coded 0-4, respectively). Participants were then asked to list any additional reasons why they had used Ecstasy as well as their primary reason for using Ecstasy. A copy of this questionnaire can be found in Appendix G.

Following completion of data collection, the frequency distributions of the 30 items (reasons for the use of Ecstasy) were examined (see Appendix H) and rational scale construction was used to identify four main categories of reasons for use of Ecstasy. These four categories were used to create the Reasons for Ecstasy Use Scale: AMPS (Alter Perception, enhance Mood, facilitate Personal Growth, and enhance Social/Interpersonal Relationships). The first category of use was to alter perception and was composed of two items: (1) "Just get really stoned or intoxicated" and (2) "Enhance sensations (touch, taste, sight and smell)." The second category of use was to enhance mood and was composed of five items: (1) "Make yourself feel better when down or depressed;" (2) "Help you to feel elated or euphoric;" (3) "Help you to relax;" (4) "Help you to stop worrying about a problem;" and (5) "Help make something you were doing less boring." The third category of use was to facilitate personal growth which also consisted of five items: (1) "Develop insight into yourself;" (2) "Have a new experience that would help you to see the world differently;" (3) "As part of religious/spiritual practices;" (4) "Facilitate a psychotherapeutic process;" and (5) "Facilitate creative

processes such as drawing, writing, playing music, singing or other artistic activities." The last category of use was to enhance social/interpersonal relationships which consisted of ten items: (1) "Help you to 'keep going' on a night out with friends;" (2) "Help you to enjoy the company of your friends;" (3) "Help you to feel more confident or better able to talk to people in a social situation;" (4) "Help you to lose your inhibitions;" (5) "Enhance feelings when having sex;" (6) "Enhance empathy;" (7) "Enhance intimacy;" (8) "Develop insight into others;" (9) "Increase your ability to express yourself openly and honestly;" and (10) "Fit in with peers (others were using)." Further analyses revealed adequate reliability for each of subscales of the Reasons for Ecstasy Scale: AMPS, especially given the number of items for each subscale: (1) Alter Perception (2 items): $\alpha = .338$; (2) Mood (5 items): $\alpha = .627$; (3) Personal Growth (5 items): $\alpha = .793$; and (4) Social/Interpersonal (10 items): $\alpha = .790$. Finally, simple Pearson product-moment correlations among the four subscales were examined in order to evaluate the degree of overlap (see Table 7); each subscale was judged to uniquely contribute to the scale. In addition, a factor analysis was conducted to explore alternative groupings of the 30 reasons for use of Ecstasy and 4 factors were found.

Table 7

Means (M), Standard Deviations (SD), and Intercorrelations of the Reasons for Ecstasy Use Scale: AMPS with Cronbach's Internal Consistency Reliability α on the Diagonal

	Mood	Alter Perception	Personal Growth	Social/Interpersonal
Mood	(.627)	.412	.294	.630
Alter Perception	.466	(.338)	.154	.407
Personal Growth	.303	.187	(.793)	.600
Social/Interpersonal	.658	.444	.636	(.790)
M	11.74	6.41	10.84	24.09
SD	3.74	2.13	4.54	8.34

Note. N = 219. Correlations below the diagonal are the simple Pearson product moment correlations, while correlations above the diagonal are the Pearson product moment correlations from which Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment, and Referral Type have been partialled.

Development of the Reasons for First Use of Ecstasy Scale. In addition to thinking about their general use of Ecstasy, participants were asked to think about the reasons why they had used Ecstasy their first time and to do the following: (1) select all of the applicable reasons from the same list of the thirty items discussed above with the addition of one item ("Curious what it would be like to use Ecstasy;") (2) list any additional reasons; and (3) list their primary reason for their first use of Ecstasy. The same four subscales discussed above (Alter Perception, Mood, Personal Growth and

Social/Interpersonal Relationships) were used for the Reasons for First Use of Ecstasy Scale so that a comparison could be made between reasons for first use of Ecstasy and reasons for general use of Ecstasy. A copy of this questionnaire can be found in Appendix I. In addition, a factor analysis was conducted to explore alternative groupings of the 31 reasons for first use of Ecstasy and 4 factors were found.

Measure of Knowledge and Beliefs about Ecstasy

In thinking of their knowledge and beliefs about Ecstasy, all participants were asked to respond "Yes" or "No" to questions in the following 9 areas: (1) having read about Ecstasy on the Internet; (2) having read books about Ecstasy; (3) having read scientific research articles about Ecstasy; (4) consider Ecstasy to be a safe drug; (5) believe that Ecstasy is an addictive drug; (6) feel they have needed or would need to take more Ecstasy each time they used in order to get the same desired effects; (7) feel that the benefits of using Ecstasy outweigh the risks; (8) feel they would stop using Ecstasy if they learned that it caused permanent brain damage; and (9) believe that they are more likely to engage in certain risky behaviors (unsafe sexual activity, driving, etc.) while using Ecstasy than when not under the influence of Ecstasy. A copy of this questionnaire can be found in Appendix J.

Infrequency Scale

Five items from the Infrequency Scale of the Jackson Personality Inventory were included in the survey as a validity scale. These items were interspersed among the Knowledge and Beliefs about Ecstasy items reviewed above. Participants were asked to respond true or false to each of the following items: (1) "I believe there are some jobs that I would not enjoy doing;" (2) "I do some things better than others;" (3) "Some things

don't turn out exactly as I plan them;" (4) "I have sometimes hesitated before making a decision" and (5) "Of the people I know, I like some better than others." As explained above, data from participants who had endorsed the infrequent response (False) for two or more of the five items were excluded.

Procedure

Selection of Participants

Recruitment postings for this study directed prospective participants to the study website address (http://cgi.umd.edu/survey/display?UMD/SURVEY). Prospective participants were first connected to the participant screening web page. After completing the screening items, individuals who met the study criteria (living in the United States and between the ages of 18 and 25) were asked to click on the "NEXT" button at the bottom of the page which connected them to the informed consent web page (see *Informed Consent*, below). As explained previously, those who did not meet the criteria for the study were connected to a web page stating that they did not meet the criteria for the study and providing educational information about Ecstasy as well as addresses of educational websites pertaining to Ecstasy. A copy of this educational information regarding Ecstasy can be found in Appendix K.

Informed Consent

Individuals who met the study criteria were asked to review the informed consent web page which explained their rights and responsibilities as a research participant in this study. Participants were informed that they had the right to withdraw their consent and to discontinue participation at any time. In addition, participants were invited to take part in the lottery for 5 awards of $50 each as a form of compensation for their participation.

Participants were informed that in order to participate in the lottery, they needed to provide an email address that would not be connected in any way to their survey data. In addition, the payment process through PayPal was explained in detail. Participants were provided the option to print a copy of the informed consent by simultaneously pressing two keys (Control and P). A copy of the informed consent can be found in Appendix L. After reviewing the informed consent page, participants provided their consent electronically by clicking the "NEXT" button to continue with the survey.

Completion of Questionnaires

Directions were provided for participants at the top of each questionnaire. Participants clicked "NEXT" at the bottom of each web page in order to move from page to page. Participants completed the questionnaires in the following order: (1) Demographics Questionnaire; (2) Drug History Questionnaire; (3) Reasons for Ecstasy Use Scale: AMPS (completed only by Controls); (4) Reasons for Not Using Ecstasy Scale: AMPS (completed only by Controls); (5) Sensation Seeking Scale Form V; (6) Perceived Peer Substance Use of Ecstasy; (7) Knowledge and Beliefs about Ecstasy Measure and Infrequency Scale; (8) Social Conformity Scale; and (9) General Risk Appraisal Scale. Questionnaires were ordered such that, in general, less intensive measures (e.g., measures that were briefer) were completed first and shorter measures were completed in between long measures to break up the monotony of questions.

Debriefing

Following completion of the survey, participants clicked the "DONE" button at the bottom of the page. They were then were forwarded to the debriefing page, thanking them for their participation and providing educational information about Ecstasy as well

as addresses of educational websites pertaining to Ecstasy. Participants had the option to print the debriefing page by simultaneously pressing two keys ("Control" and "P.") A copy of the debriefing page can be found in Appendix M.

Entrance into the Lottery

After reviewing the debriefing page, participants were given the opportunity to be connected to a web page reviewing the details of the lottery. They were also provided an optional link to the PayPal website for further information. Participants who chose to enter the lottery were asked to provide an email address through which notification would be made if they were selected as a winner in the lottery. Participants were also provided the option to click on a link to create a free email account.

Analysis of Data

Scoring of Measures

For each of the outcome measures, sum scores were calculated for each Ecstasy Use Group (Users, Experimenters, Quitters, Infrequent Users, and Controls). First, the mean for each measure for each participant was calculated by taking the mean of the items in the measure (using all available data) and then multiplying by the number of items for that subscale. Thus, scores were calculated for each participant who responded to at least one item on a given measure. Finally, for the case in which multiple outcome measures were included in a multivariate analysis, linear composite scores, representing a weighted combination of scores on the outcome measures, were calculated for each significant effect, using the unstandardized canonical variate coefficients (Harris, 2001).

Missing data was examined (see Table 8) for the subscales of the dependent measures (Sensation Seeking Scale, Social Conformity Scale, and Reasons for Ecstasy

Use Scale: AMPS). First, for each of the 4 subscales of the Sensation Seeking Scale (Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility), the number of participants who failed who answer at least one item was 12, 11, 8, and 9, respectively. Second, for each of the 3 subscales of the Social Conformity Scale (Law Abidance, Liberalism, and Conformity), the number of participants who failed to answer at least one item was 1, 5, and 5, respectively. Third, for the 4 subscales of the General Risk Appraisal Scale (Own Risk Appraisal) (Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk), the number of participants who failed to answer at least one item was 18, 14, 20, and 19, respectively. Fourth, for the 4 subscales of the General Risk Appraisal Scale (Own Risky Behavior) (Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk), the number of participants who failed to answer at least one item was 18, 14, 14, and 19, respectively. Finally, for the 4 subscales of the Reasons for Ecstasy Use Scale: AMPS, the number of participants who failed to answer at least one item was 2, 5, 1, and 13, respectively. In examining the percent of available data for each of the subscales, the percentages suggest that missing data was not problematic.

Table 8

Percents of Available Data for the Sensation Seeking Scale, Social Conformity Scale, and Reasons for Ecstasy Use Scale: AMPS

Scale	Missing 1 Item (*n*)	Missing 2 Items *(n)*	Missing 3-6 Items (*n*)	Available Data (%)
Sensation Seeking Scale				
Thrill and Adventure Seeking *n* (scale items) = 10	11	1	0	99.6
Experience Seeking *n* (scale items) = 10	11	0	0	99.7
Disinhibition *n* (scale items) = 10	8	0	0	99.8
Boredom Susceptibility *n* (scale items) = 10	9	0	0	99.7
Social Conformity Scale				
Law Abidance *n* (scale items) = 4	1	0	0	99.2
Liberalism *n* (scale items) = 4	3	2	0	99.5
Religiosity *n* (scale items) = 4	3	2	0	99.5

Note. N = 322.

Table 8 (continued)

Percent of Available Data for the Sensation Seeking Scale, Social Conformity Scale, General Risk Appraisal Scale, and Reasons for Ecstasy Use Scale: AMPS

Scale	Missing 1 Item (*n*)	Missing 2 Items (*n*)	Missing 3-6 Items (*n*)	Available Data (%)
General Risk Appraisal Scale (Own Risk Appraisal)				
Crime Risk *n* (scale items) = 6	11	0	7	97.8
Financial Risk *n* (scale items) = 5	8	3	3	98.4
Minor Violations Risk *n* (scale items) = 5	4	0	16	95.0
Sports Risk *n* (scale items) = 4	6	0	13	95.5
General Risk Appraisal Scale (Own Risky Behavior)				
Crime Risk *n* (scale items) = 6	10	1	7	97.8
Financial Risk *n* (scale items) = 5	8	3	3	98.9
Minor Violations Risk *n* (scale items) = 5	8	3	3	95.3
Sports Risk *n* (scale items) = 4	6	0	13	94.1

Note. N = 322.

Table 8 (continued)

Percent of Available Data for the Sensation Seeking Scale, Social Conformity Scale, General Risk Appraisal Scale, and Reasons for Ecstasy Use Scale: AMPS

Scale	Missing 1 Item (*n*)	Missing 2 Items (*n*)	Missing 3-6 Items (*n*)	Available Data (%)
Reasons for Ecstasy Use: AMPS				
Alter Perception *n* (scale items) = 2	2	0	0	99.7
Enhance Mood *n* (scale items) = 5	4	1	0	99.6
Personal Growth *n* (scale items) = 5	1	0	0	99.9
Social/Interpersonal *n* (scale items) = 10	12	1	0	99.6

Note. N = 322.

Statistical Model

Outcome measures. Dependent variables were determined to be either primary or secondary prior to data collection. Primary variables were outcomes of interest that specifically relate to the hypotheses. Secondary variables were outcomes of interest that do not specifically relate to the hypotheses, but were thought to have the potential to make a significant contribution to the existing literature relating to Ecstasy use among young adults. All 7 primary dependent variables were continuous random variables while secondary variables were either continuous or dichotomous variables (see Table 9 for a list of the primary and secondary dependent variables).

Explanatory variables. The predictor variables can be categorized as either an *Effect of Interest* or a *Concomitant Variable*. (From a statistical viewpoint, this categorization is arbitrary and is utilized here simply for ease of presentation.)

Effect of Interest. The predictor variable of primary interest was Ecstasy Use Group (User *v*. Experimenter *v*. Quitter *v*. Infrequent User *v*. Control). The definition of the 5 groups used to define the levels of this factor can be found in Table 2. It should be noted that the Control group was omitted from the analysis of several secondary outcome variables which pertained only to participants with a history of Ecstasy use.

Concomitant Variables. There were 7 concomitant variables: (1) Age; (2) Gender (Male *v*. Female); (3) Ethnicity (Caucasian *v*. Non-Caucasian); (4) Education (High School *v*. College *v*. Post College); (5) Sexual Orientation (Heterosexual *v*. Homosexual *v*. Bisexual); (6) Treatment (Psychological Counseling/Support Group *v*. No Psychological Counseling/Support Group); and (7) Type of Referral Source (Drug *v*. Non-Drug *v*. Rave/Music *v*. Unknown).

Table 9

Explanatory, Concomitant, and Criterion Variables

Variable	Measure	Response Group(s)
Explanatory		
Group (Experimenter, User, Quitter, Infrequent User, and Control)		
Concomitant		
Age	Demographics Questionnaire	
Gender	Demographics Questionnaire	
Ethnicity	Demographics Questionnaire	
Education	Demographics Questionnaire	
Sexual Orientation	Demographics Questionnaire	
Treatment	Demographics Questionnaire	
Referral Type	Demographics Questionnaire	
Criterion (Primary)		
Polydrug use	Drug History Questionnaire	U, E, Q, I, and C
Reasons for Ecstasy use	Reasons for Ecstasy Use Scale: AMPS	U, E, Q, and I
Normative influence	Normative Influence Scale	U, E, Q, I, and C
Social conformity	Social Conformity Scale	U, E, Q, I, and C
Sensation seeking	Sensation Seeking Scale Form-V	U, E, Q, I, and C
Risk appraisal	General Risk Appraisal Scale	U, E, Q, I, and C
Risk taking behaviors	General Risk Appraisal Scale	U, E, Q, I, and C

Table 9 (continued)

Explanatory, Control, and Criterion Variables

Variable	Measure	Response Group(s)
Criterion (Secondary)		
Age of First Use of Ecstasy	Drug History Questionnaire	U, E, Q, and I
Past 90-Day Use	Drug History Questionnaire	U, E, Q, I, and C
Psychological Addiction to Ecstasy	Drug History Questionnaire	U, E, Q, and I
Testing of Ecstasy Pills	Drug History Questionnaire	U, E, Q, and I
Substances Taken to Prevent Side-Effects of Ecstasy	Drug History Questionnaire	U, E, Q, and I
Reasons for Having Never Used Ecstasy	Drug History Questionnaire	C
Knowledge and Beliefs about Ecstasy	Measure of Knowledge and Beliefs about Ecstasy	U, E, Q, I, and C
Intensity of Ecstasy Use	Drug History Questionnaire	U

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Planned contrast. Although there were five distinct groups that formed the Ecstasy Use Group effect, one of the groups, the Infrequent Users, was determined following inspection of the frequencies for Ecstasy use in the sample, while another of the groups, the Control group, was included simply as a reference group. No hypotheses involved either of these two groups. Therefore, a 2-*df* planned comparison involving the mean differences among the Users, Quitters, and Experimenters was constructed to test for the mean differences among these three specific groups.

Analytic approach. Analyses were conducted by sets of variables, where each set contained one or more outcome variables thought to measure the outcome of interest. Because multiple tests of significance were undertaken, some adjustment to α was necessary to limit the cumulative error rate. Therefore, it was determined that the α for each set of primary outcome variables would be .05, with .04 assigned to the Planned Contrast (User *v*. Experimenter *v*. Quitter), and .01 divided up equally among the Concomitant Variables (that is, .01/7). Finally, because there were 5 groups in the Ecstasy Use Group effect, in order to examine for possible differences between these 5 groups, not all of which were included in the Planned Contrast, the Ecstasy Use Group effect was tested against a post hoc critical value with α = .04. In the case of a single outcome variable, this meant against a Scheffé critical value for the Ecstasy Use Group effect, while for case of multiple outcome variables, Gabriel's simultaneous test procedure, the multivariate 'extension' of Scheffé's adjustment procedure, was utilized (Harris, 2001). In contrast, α for secondary outcome variable was set to .01 for the Ecstasy Group main effect, and .01/7 for the concomitant variables, in order to partially control the error rate associated with 'data snooping' of the secondary outcome measures.

Although this approach to setting α limits the error to, at most, α for each set of primary outcome measures, it should be understood that the cumulative error rate for the study exceeds .05. Moreover, it is also the case that the power associated with the tests of the Concomitant Variables is probably generally quite low, and so some unknown number of relationships between the Concomitant Variables and the outcome variables that were found to be nonsignificant may in fact exist in the population. (This low power for the tests of the Concomitant Variables had no bearing on the power of the tests for the Planned Contrast or the Ecstasy Use Group effect.) This fact should be kept in mind in any interpretation of failure to find relationships between the Concomitant Variables and the outcome measures.

Statistical methods. A General Linear Model (GLM) approach was utilized to conduct all analyses of continuous outcome variables, while logistic regression analysis was employed in the analysis of the binary outcome variables. The General Linear Model (GLM) models the relationship between a continuous, normally-distributed response variable and one or more explanatory variables. The explanatory variables may be either categorical, continuous, or any combination thereof. GLM underlies many of the statistical analyses that are used in behavioral science research. It is the foundation for the *t*-test, Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), simple and multiple regression analysis, and many multivariate methods including discriminant function analysis, canonical correlation, and multivariate analysis of variance and covariance (MANOVA and MANCOVA). A more formal statement of the GLM can be in the equation: $\boldsymbol{y} = b_0 + b_1X_1 + ... + b_kX_k + e$, where y = criterion variable (the variable or set of variables to be modeled or explained); $X_1, ... X_k$ = predictor variables which are

assumed fixed (measured without error); e = random error which is determined by the principle of ordinary least squares to maximize the prediction of y; and b_i = the contribution of the independent variable x_i. For those analyses in which there was a single outcome variable, the resulting analysis can be seen as a oneway ANCOVA with seven control variables, one of which is continuous, age, with the remaining six being categorical. Age can be considered to be a covariate, and the remaining six variables can be seen as blocking factors. Similarly, when there was more than one outcome variable included in a given analysis, the analysis can be viewed as a MANCOVA. Roy's greatest characteristic root test was used to test all multivariate effects. A virtue of this test statistic is that it indicates the amount of variance explained in the linear composite of the dependent variables by the effect of interest. In the case of a single outcome measure, the F test was utilized. However, to simplify the presentation of results, R^2 rather than F is reported, to allow direct comparison of the explanatory power of the effect of interest for both the univariate and multivariate cases.

Finally, a profile analysis, sometimes termed repeated-measures MANOVA, (Harris, 2001), was conducted for each of the two measures of motivations for the use of ecstasy (Reasons for Use of Ecstasy Scale: AMPS and Reasons for First Use of Ecstasy Scale: AMPS), in order to examine for the possibility that the Ecstasy Use Groups might differ in the relative importance they would place on the reasons for use of Ecstasy and/or the reasons for first use of Ecstasy. In this case, the same effects were included in the model as in the other analyses, plus an effect for Measure, which allows for the examination of the interaction of each of the between-subjects effects with the within-subjects effect of Scale. Such an interaction would indicate that the Scale profile differed

among the levels of the between-subject effect. (The means rather than the sums of the scores on the subscales of the Reasons for Use of Ecstasy Scale as well as the Reasons for First Use of Ecstasy Scale were used in the profile analysis, because the subscales had differing numbers of items, so use of the sum rather than the mean would introduce a scaling artifact into the profile analyses).

Logistic regression analysis (Hosmer & Lemeshow, 1989) models the relationship between a discrete response variable and one or more explanatory variables. The logistic regression model utilizes the explanatory variables to predict the probability that the response variable takes on a certain value. The explanatory variables may be either categorical, continuous, or any combination thereof. Although similar to linear regression, logistic regression is useful for predicting the presence or absence of a characteristic or outcome that is binary (e.g., psychologically addicted to Ecstasy *v*. not psychologically addicted to Ecstasy) or ordered polytomous (e.g., high school graduate *v*. college graduate *v*. post-college graduate). Logistic regression applies maximum likelihood estimation after transforming the dependent variable into a logit variable (the natural log of the odds of the dependent variable occurring or not). In this way, logistic regression estimates the probability of a certain event occurring.

In logistic regression, probabilities are constrained to lie between 0 and 1, with ½ as a neutral value for which both outcomes are equally likely. The constraints at 0 and 1 make it impossible to construct a linear equation for predicting probabilities. More formally, the linear logistic regression model can be stated as: $\log[p_i / (1 - p_i)] = \beta_0 + x_i\beta$, where $p_i = P(y_i = y_1 \mid x_i)$, the response probability to be modeled where P is taken to mean 'the probability of;' y_i is taken to mean the *i*th ordered level of the response variable; | is

taken to mean 'given;' β_0 is the intercept parameter; β is the vector of slope parameters; and x_i is the vector of explanatory variables. Thus, this expression of the logistic regression equation models the log transformation of the ratio of the *i*th individual's response probability to non-response probability as a linear function of the explanatory variables, x_i. Finally, standard errors and tests of significance were adjusted by the deviance in the model, in order to control for possible overdispersion.

Results

Demographics

Background Information

The final study sample consisted of 322 participants for whom basic background information was obtained through the on-line survey. Tables 10 through 16 provide basic demographic information for the total sample and each Ecstasy Use Group. A little more than one half (58.4%) of participants were males, and the majority (87%) endorsed being heterosexual. The average age of participants was 21.7 years (range = 18-25, inclusive, by sampling design) and most (78.6%) were Caucasian. More than half (62.1%) of the sample had completed some college study and about one-fifth (20.8%) had earned a college or postgraduate degree. About one-half (50.6%) were recruited from non-drug related websites such as community forums or though a search engine (e.g., Google). Approximately 17% of participants were recruited from drug related websites, and about sixteen percent from rave or music related websites. Finally, approximately 16% of the sample reported having attended substance-related psychological counseling or a support group.

Table 10

Demographics: Gender Distributions in the Total Sample and Each Ecstasy Use Group

			Group				
Gender	Total Sample		U	E	Q	I	C
Male	*n* (Group)	188	42	24	32	27	63
	Group %	58.4	75.0	43.6	50.0	58.7	62.4
Female	*n* (Group)	134	14	31	32	19	38
	Group %	41.6	25.0	56.4	50.0	41.3	37.6
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 11

Demographics: Sexual Orientation Distributions in the Total Sample and Each Ecstasy Use Group

Sexual Orientation		Total Sample	Group U	E	Q	I	C
Heterosexual	*n* (Group)	280	46	48	58	37	91
	Group %	87.0	82.1	87.3	90.6	80.4	90.1
Homosexual	*n* (Group)	11	3	2	1	3	2
	Group %	3.4	5.4	3.6	1.6	6.5	2.0
Bisexual	*n* (Group)	31	7	5	5	6	8
	Group %	9.6	12.5	9.1	7.8	13.0	7.9
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 12

Demographics: Age Distributions in the Total Sample and Each Ecstasy Use Group

			Group				
Age		Total Sample	U	E	Q	I	C
18	*n* (Group)	45	12	5	3	1	24
	Group %	14.0	21.4	9.1	4.7	2.2	23.8
19	*n* (Group)	29	7	2	1	3	16
	Group %	9.0	12.5	3.6	1.6	6.5	15.8
20	*n* (Group)	39	7	5	3	7	17
	Group %	12.1	12.5	9.1	4.7	15.2	16.8
21	*n* (Group)	37	8	5	6	5	13
	Group %	11.5	14.3	9.1	9.4	10.9	12.9
22	*n* (Group)	38	3	13	5	6	11
	Group %	11.6	5.4	23.2	7.6	13.0	10.8
23	*n* (Group)	37	5	8	11	7	6
	Group %	11.5	8.9	14.5	17.2	15.2	5.9
24	*n* (Group)	34	6	7	12	3	6
	Group %	10.6	10.7	12.7	18.8	6.5	5.9
25	*n* (Group)	63	8	10	23	14	8
	Group %	19.6	14.3	18.2	35.9	30.4	7.9

Table 12 (continued)

Demographics: Age Distributions in the Total Sample and Each Ecstasy Use Group

			Group				
Age		Total Sample	U	E	Q	I	C
Total	*n* (Group)	322	56	55	64	46	101
	M	21.73	21.11	22.20	23.20	22.50	20.52
	SD	2.43	2.51	2.14	1.99	2.16	2.22

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 13

Demographics: Ethnicity Distributions in the Total Sample and Each Ecstasy Use Group

Ethnicity		Total Sample	Group U	E	Q	I	C
Caucasian	*n* (Group)	253	46	44	49	31	83
	Group %	78.6	82.1	80.0	76.6	67.4	82.2
Non-Caucasian	*n* (Group)	69	10	11	15	15	18
	Group %	21.4	17.9	20.0	23.4	32.6	17.8
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 14

Demographics: Level of Education Distributions in the Total Sample and Each Ecstasy Use Group

Level of Education		Total Sample	Group U	E	Q	I	C
Some H.S. or H.S. Diploma/ G.E.D.	*n* (Group)	55	19	8	5	5	18
	Group %	17.1	33.9	14.5	7.8	10.9	17.8
Some College	*n* (Group)	200	30	33	35	32	70
	Group %	62.1	53.6	60.0	54.7	69.6	69.3
B.A. or Graduate Work	*n* (Group)	67	7	14	24	9	13
	Group %	20.8	12.5	25.5	37.5	19.6	12.9
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 15

Demographics: Type of Recruitment Website Distributions in the Total Sample and Each Ecstasy Use Group

Type of Recruitment Web Site		Total Sample	Group U	E	Q	I	C
Drug Related	*n* (Group)	55	10	7	4	8	26
	Group %	17.1	17.9	12.7	6.3	17.4	25.7
Non-Drug Related	*n* (Group)	163	15	37	36	15	60
	Group %	50.6	26.8	67.3	56.3	32.6	59.4
Rave or Music	*n* (Group)	51	22	1	12	15	1
	Group %	15.8	39.3	1.8	18.8	32.6	1.0
Unknown	*n* (Group)	53	9	10	12	8	14
	Group %	16.2	15.8	17.9	18.2	17.4	13.7
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 16

Demographics: Participants Who Attended Substance Related Psychological Counseling or a Support Group Distributions in the Total Sample and Each Ecstasy Use Group

Counseling or Support Group Attendance		Group					
		Total Sample	U	E	Q	I	C
Yes	*n* (Group)	52	10	10	16	8	8
	Group %	16.1	17.9	18.2	25.0	17.4	7.9
No	*n* (Group)	270	46	45	48	38	93
	Group %	83.9	82.1	81.8	75.0	82.6	92.1
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Participants were also asked to indicate whether they were financially independent or dependent and to list annual household income [their own income if independent or their caregiver(s) income if dependent]. In reviewing the incomes of participants who reported being independent and comparing those incomes to those reported by participants who were dependent, it was decided that this measure of income was not likely to provide an adequate measure of socio-economic status, as young adults who were independent were less likely to earn as much as a caregiver. Therefore, socio-economic status was not used as a control variable.

Substance Use History for the Entire Sample

Age of First Use. Participants were asked to report the age that they first used each of the eight substances (Ecstasy, marijuana, psilocybin mushrooms, cocaine powder, LSD, amphetamines, prescription medications in a non-prescribed manner, and alcohol). Table 17 provides the means and standard deviations for first use for the entire sample. Of the 221 study participants who had used Ecstasy (68.6%), the average age of first use was 18 (SD = 2.15). The 2-*df* Ecstasy Use Group planned contrast revealed a significant difference (see Table 18) among the three groups (Users, M = 18.90, SE = .41; Experimenters, M = 19.35, SE = .42; and Quitters, M = 17.58, SE = .41) for age of first use of Ecstasy (R^2 = .170, $p < .001$) as well as a main effect for the four groups (R^2 = .115, $p < .001$). Pairwise comparisons revealed that Experimenters were significantly more likely to be older than both Quitters and Infrequent Users (M = 17.64, SE = .43) when they first used Ecstasy (see Table 19). No significant effects were found for Gender, Ethnicity, Education, Sexual Orientation, Treatment, or Referral Type (all ps > .008).

Table 17

Age of First Use of Ecstasy, Marijuana, Amphetamines, LSD, Powder Cocaine, Psilocybin Mushrooms, Prescription Drugs in a Non-Prescribed Manner and Alcohol in the Total Sample and Each Ecstasy Use Group

			Group				
		Total Sample	U	E	Q	I	C
Drug	*n* (group)	322	56	55	64	46	101
Ecstasy	*M*	18	18.0	18.9	17.6	17.7	—
	SD	2.15	2.28	2.06	2.25	1.66	—
Marijuana	*M*	15.6	15.3	16.7	18.2	17.2	16.0
	SD	2.38	2.41	2.50	2.34	2.23	2.35
Amphetamnes	*M*	17.3	17.3	15.8	15.0	15.7	16.0
	SD	4.98	4.72	5.65	2.37	5.46	6.35
LSD	*M*	17.4	17.6	17.8	17.2	17.4	17.2
	SD	2.41	2.33	2.06	2.34	3.08	1.81
Powder Cocaine	*M*	18.5	18.0	18.9	18.2	18.7	18.8
	SD	2.43	2.09	2.63	2.35	2.91	2.14
Psilocybin Mushrooms	*M*	18.0	17.7	18.2	17.8	18.1	18.1
	SD	2.19	1.77	2.53	2.30	2.28	2.04
Prescription Drugs	*M*	17.2	17.0	17.4	17.3	16.9	17.4
	SD	2.76	2.49	3.29	3.06	2.96	2.35

Table 17 (continued)

Age of First Use of Ecstasy, Marijuana, Amphetamines, LSD, Powder Cocaine, Psilocybin Mushrooms, Prescription Drugs in a Non-Prescribed Manner and Alcohol in the Total Sample and Each Ecstasy Use Group

			Group				
		Total Sample	U	E	Q	I	C
Drug	*n* (group)	322	56	55	64	46	101
Alcohol	*M*	7.8	6.0	6.0	8.8	8.7	8.9
	SD	7.74	6.97	5.77	8.88	7.47	8.20

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Table 18

Group Means (M) and Standard Errors (SE) for Age of First Use of Ecstasy

Group	*M*	*SE*
User	18.90	.41
Experimenter	19.35	.42
Quitter	17.58	.41
Infrequent User	17.64	.43

Note. Standard Errors were derived from the statistical model used to conduct the analyses.

Table 19

Source Table for Age of First Use of Ecstasy

Predictor Variable	R^2	*df*	*p*
Explanatory			
U *v*. E *v*. Q planned contrast	.170	2, 170	< .001*
Group main effect (U, E, Q, and I)	.115	3, 185	< .001*
Control			
Gender	.006	1, 184	.226
Ethnicity	.013	1, 184	.070
Education	.005	2, 184	.547
Sexual Orientation	.005	2, 184	.560
Treatment	.003	1, 184	.370
Referral Type	.010	3, 184	.468

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against Scheffé's critical value for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Notably, 97.8% of the entire sample had used marijuana with a mean age of first use of 15.6 (*SD* = 2.38). For amphetamines, LSD, cocaine, and psilocybin mushrooms, mean ages of first use were 17.32 (*SD* = 4.98), 17.44 (*SD* = 2.41) 17.44, (*SD* = 2.41) and 18.48 (*SD* = 2.43), respectively. Approximately three-quarters (76.4%) of the sample had used a prescription medication in a non-prescribed manner with a mean age of first use of 17.24 (*SD* = 2.76). As expected, the majority of the sample (98.1%) had used alcohol; however, the mean age of first use was 7.83 (*SD* = 7.74), which was much lower than expected. Results from the *2003 National Survey on Drug Use and Health: National findings* of adults (ages 21 and older) indicated that only 4% of the sample had used alcohol prior to age 12 (Office of Applied Studies, Substance Abuse and Mental Health Services Administration, 2004).

Past 90-Day use. Participants were asked to provide a history of their use of eight substances (Ecstasy, marijuana, psilocybin mushrooms, cocaine powder, LSD, amphetamines, prescription medications in a non-prescribed manner, and alcohol) during the past 30 days, 90 days, year, and lifetime. Given the variability in frequency of Ecstasy use, 90-day data (see Table 20) was judged to most accurately reflect overall patterns of usage. For example, a participant in the User Group may have not used Ecstasy in the past month, but may have used Ecstasy 5 times in the past 3 months. Examining past 90-data allows for this finding. In examining the data from the entire sample for the past 90 days (see Table 20), almost one-quarter (23.3%) reported having used Ecstasy, and about 60% reported having used three or more substances. Approximately three–quarters (72%) had used marijuana, one quarter had used powder cocaine (23.3%), one-fifth had used amphetamines (22%), and one-fifth (19.3%) had used psilocybin mushrooms. Notably,

almost half of the sample (44.7%) reported having used a prescription drug in a non-prescribed manner. Finally, the majority (91.9%) of participants had used alcohol. Because Ecstasy is an amphetamine, participants may have included Ecstasy in their report of their history of use of amphetamines. In addition, because the drug history questions were in free–response format, numerous participants reported that they did not know their history of use for the past year or lifetime because the frequency of their use was extremely high. For example, for history of marijuana use in the past year, 57 participants provided responses such as "a lot," "countless," "I have no idea" "hundreds," "100+ … 1000+," or entered a seemingly random number (e.g., 9999999). For lifetime history of marijuana use, 73 participants were unable to provide an estimate. Therefore, past year and lifetime use were not analyzed, given the resulting concerns regarding the reliability of such data. This concern will be reviewed further in the discussion section.

Table 20

Past 90-Day Drug Use Distributions in the Total Sample and Each Ecstasy Use Group

Drug		Total Sample	Group U	E	Q	I	C
Ecstasy	*n* (Group)	75	50	0	0	24	0
	Group %	23.3	89.3	0	0	52.2	0
Marijuana	*n* (Group)	232	46	35	31	35	85
	Group %	72.0	82.1	63.6	48.4	76.1	84.2
Amphetamines	*n* (Group)	71	25	6	4	16	20
	Group %	22.0	44.6	10.9	6.3	34.8	19.8
LSD	*n* (Group)	40	20	3	2	7	8
	Group %	12.4	35.7	5.5	3.1	15.2	7.9
Powder Cocaine	*n* (Group)	75	22	11	12	14	16
	Group %	23.3	39.3	20.0	18.8	30.4	15.8
Psilocybin Mushrooms	*n* (Group)	62	20	0	6	10	26
	Group %	19.3	35.7	0	9.4	21.7	25.7
Prescription Drugs	*n* (Group)	144	31	17	18	19	59
	Group %	44.7	55.4	30.9	28.1	41.3	58.4

Table 20 (continued)

Past 90-Day Drug Use Distributions in the Total Sample and Each Ecstasy Use Group

			Group				
Drug	Total Sample		U	E	Q	I	C
Alcohol	*n* (Group)	296	52	52	57	45	90
	Group %	91.9	92.9	94.5	89.1	97.8	89.1
Total	*n* (Group)	322	56	55	64	46	101

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control.

Substance Use History for Each Ecstasy Use Group

Past 90-Day Use. Data for past 90-day drug use were collected for each of the Ecstasy Use Groups (see Table 20). First, the percentages of the 56 participants in the User Group who had used each of the eight substances during the past 90 days were examined: Ecstasy (89.3%); marijuana (82.1%); amphetamines (44.6%); LSD (35.7); powder cocaine (39.3%); psilocybin mushrooms (35.7%); prescription drugs (55.4%); and alcohol (92.9%). Second, of the 55 participants in the Experimenter Group, the percentages of those who had used each of the eight substances during the past 90 days were found to be: Ecstasy (0%); marijuana (63.6%); amphetamines (10.9%); LSD (5.5); powder cocaine (20.0%); psilocybin mushrooms (0%); prescription drugs (30.9%); and alcohol (94.5%). Third, the percentages of the 64 participants in the Quitter Group who had used each of the eight substances during the past 90 days were reviewed: Ecstasy (0%); marijuana (48.4%); amphetamines (6.3%); LSD (3.1); powder cocaine (18.8%); psilocybin mushrooms (9.4%); prescription drugs (28.1%); and alcohol (89.1%). Fourth, the percentages of the 46 participants in the Infrequent User Group who had used each of the eight substances during the past 90 days were examined: Ecstasy (52.2%); marijuana (76.1%); amphetamines (34.8%); LSD (15.2); powder cocaine (30.4%); psilocybin mushrooms (21.7%); prescription drugs (41.3%); and alcohol (97.8%). Finally, of the 101 participants in the Control Group, the percentages of those who had used each of the eight substances during the past 90 days were found to be: Ecstasy (0%); marijuana (84.2%); amphetamines (19.8%); LSD (7.9); powder cocaine (15.8%); psilocybin mushrooms (25.7%); prescription drugs (58.4%); and alcohol (89.1%).

Patterns of Ecstasy consumption. The four groups of participants who had used Ecstasy were asked to report the average number of Ecstasy pills taken on one occasion. The 2-*df* Ecstasy Use Group planned contrast revealed significant differences among the three groups (Users, Experimenters, and Quitters) (R^2 = .101, p < .001) as well as a main effect for the four groups (R^2 = .086, p < .001). Pairwise comparisons indicated that the average number of Ecstasy pills taken on one occasion by Quitters was significantly greater than that of Experimenters (R^2 = .092, p < .001). No significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment, or Referral Type (all ps > .018).

Participants with a history of Ecstasy use were also asked to report the largest number of Ecstasy pills taken on one occasion. The 2-*df* Ecstasy Use Group planned contrast revealed significant differences among the three groups (User, Experimenter, and Quitter) (R^2 = .092, p = .001) as well as a main effect for the four groups (R^2 = .093, p = .002; Users, M = 6.12, SE = .1.02; Experimenters, M = 2.83, SE = .1.03; Quitters, M = 6.13, SE = .1.01; and Infrequent Users, M = 5.53, SE = .1.07). Pairwise comparisons indicated that the largest number of Ecstasy pills taken on one occasion by Quitters was significantly greater than that of Experimenters (R^2 = .075, p < .001). No significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment, or Referral Type (all ps > .008).

Table 21 shows the means and standard deviations of the typical and largest number of Ecstasy pills taken on one occasion for each Ecstasy Use Group. The average number of Ecstasy pills taken on one occasion for Users, Experimenters, Quitters, and Infrequent Users were 2.30 (SD = 1.15), 1.40 (SD = .56), 2.65 (SD = 2.54) and 1.93

(*SD* = .97), respectively. The average of the largest number of Ecstasy pills taken in one occasion for Users, Experimenters, Quitters, and Infrequent Users were 5.74 (*SD* = 4.04), 1.65 (*SD* = 1.07), 5.58 (*SD* = 6.76) and 5.07 (*SD* = 3.85), respectively.

Table 21

Group Means (M) and Standard Deviations (SD) for Typical and Largest Number of Ecstasy Pills Taken on One Occasion

Group	*M*	*SD*
Typical Number of Pills		
User	2.30	1.15
Experimenter	1.40	.56
Quitter	2.65	2.54
Infrequent User	1.93	.97
Largest Number of Pills		
User	5.74	4.04
Experimenter	1.65	1.07
Quitter	5.58	6.76
Infrequent User	5.07	3.85

Reliability of Scales

Social Conformity Scale. Cronbach's internal consistency α was calculated for each of the three subscales. For the subscale, Cronbach's internal consistency αs for the Law Abidance and Liberalism subscales were .438 and .453, which are low and will be examined further in the Discussion section. However, Cronbach's internal consistency α for the Liberalism subscale was .861, which is more than adequate (see Table 22).

Sensation Seeking Scale. Marginally-adequate to adequate reliabilities were obtained for each of the subscales of the Sensation Seeking Scale (see Table 23). Cronbach's internal consistency αs for the Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility subscales were .758, .520, .641, and .571, respectively.

General Risk Appraisal Scale (Own Risk Appraisal). Cronbach's internal consistency α for the four subscales (Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk) of the General Risk Appraisal Scale (*Own Risk Appraisal*) was examined for Own Risk and Own Behavior and results were indicative of adequate reliability. Cronbach's internal consistency αs for the Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk subscales were .783, .611, .620, and .728, respectively (see Table 24).

Table 22

Means (M), Standard Deviations (SD), and Intercorrelations of the Social Conformity Scale for the Sample of Ecstasy Use Groups with Cronbach's Internal Consistency Reliability (α) on the Diagonal

Pearson Correlation Coefficients for the Social Conformity Scale

	Law Abidance	Liberalism	Religiosity
Law Abidance	(.438)[a]		
Liberalism	-.243	(.453)[b]	
Religiosity	.191	-.128	(.861)[c]
N	321	317	318
M	37.16	37.34	31.87
SD	9.585	8.85	13.89

Note. For the calculation of Cronbach's Internal Consistency Reliability, participants who were missing an item for any subscale were excluded from the analysis ([a]n = 321; [b]n = 317; and [c]n = 318).

Table 23

Means (M), Standard Deviations (SD), and Intercorrelations of the Sensation Seeking Scale for the Sample of Ecstasy Use Groups with Cronbach's Internal Consistency Reliability (α) on the Diagonal

Pearson Correlation Coefficients for the Sensation Seeking Scale

	TAS	ES	DIS	BS
TAS	(.758)[a]			
ES	.277	(.520)[b]		
DIS	.154	.134	(.641)[c]	
BS	.145	.168	.339	(.571)[d]
M	6.91	7.15	6.27	3.89
SD	2.58	1.81	2.22	2.10

Note. (N = 322). For the calculation of Cronbach's Internal Consistency Reliability, participants who were missing an item for any subscale were excluded from the analysis ([a]*n* = 310; [b]*n* = 311; [c]*n* = 314; and [d]*n* = 313).

Table 24

Means (M), Standard Deviations (SD), and Intercorrelations of the General Risk Appraisal Scale (Own Risk Appraisal) for the Sample of Ecstasy Use Groups with Cronbach's Internal Consistency Reliability (α) on the Diagonal

Pearson Correlation Coefficients for the General Risk Appraisal Scale (Own Appraisal)

		Crime Risk Appraisal	Financial Risk Appraisal	Minor Violations Risk Appraisal	Sports Risk Appraisal
Crime Risk Appraisal		(.783)[a]			
Financial Risk Appraisal		.457	(.611)[b]		
Minor Violations Risk Appraisal		.599	.360	(.620)[c]	
Sports Risk Appraisal		.328	.192	.404	(.728)[d]
	N	321	321	308	309
	M	17.73	19.15	14.10	8.84
	SD	4.70	3.20	3.08	2.17

Note. Correlations below the diagonal are the simple Pearson product moment correlations. For the calculation of Cronbach's Internal Consistency Reliability, the number of participants varies per subscale as any participant who was missing an item for a subscale was excluded from that analysis ([a]n = 304; [b]n = 308; [c]n = 302; and [d]n = 303).

varies per subscale as any participant who was missing an item for a subscale was excluded from that analysis ([a]N = 304; [b]N = 308; [c]N = 303; and [d]N = 302).

General Risk Appraisal Scale (Own Risky Behavior). Cronbach's internal consistency α for the four subscales of the General Risk Appraisal Scale (Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk) were examined for Own Risk and Own Behavior and results were indicative of marginally adequate reliability. Cronbach's internal consistency αs for the Crime Risk, Financial Risk, Minor Violations Risk, and Sports Risk subscales were .554, .534, .635, and .512, respectively (see Table 25).

Table 25

Means (M), Standard Deviations (SD), and Intercorrelations of the General Risk Appraisal Scale (Own Risky Behavior) for the Sample of Ecstasy Use Groups with Cronbach's Internal Consistency Reliability (α) on the Diagonal

Pearson Correlation Coefficients for the General Risk Appraisal Scale (Own Behavior)

		Crime Risky Behavior	Financial Risky Behavior	Minor Violations Risky Behavior	Sports Risky Behavior
Crime Risky Behavior		(.554)[a]			
Financial Risky Behavior		.186	(.534)[b]		
Minor Violations Risky Behavior		.401	.270	(.635)[c]	
Sports Risky Behavior		.021	.072	.245	(.512)[d]
	N	321	321	308	309
	M	11.64	9.20	12.30	6.05
	SD	4.10	3.29	3.98	2.54

Note. Correlations below the diagonal are the simple Pearson product moment correlations. For the calculation of Cronbach's Internal Consistency Reliability, the number of participants varies per subscale as any participant who was missing an item for a subscale was excluded from that analysis ([a]n = 304; [b]n = 308; [c]n = 303; and [d]n = 302).

Reasons for Ecstasy Use Scale: AMPS. Analyses of the subscales of the Reasons for Ecstasy Use Scale: AMPS revealed adequate reliability coefficients, especially given the number of items for each scale: (1) Alter Perception (2 items): $\alpha = .3383$; (2) Mood (5 items): $\alpha = .6273$; (3) Personal Growth (5 items): $\alpha = .7934$; and (4) Social/Interpersonal (10 items): $\alpha = .7902$. In addition, simple Pearson product-moment correlations among the four subscales were examined in order to evaluate the degree of overlap; each subscale was judged to uniquely contribute to the scale (see Table 26).

Furthermore, a factor analysis was conducted to explore alternative groupings of the 30 reasons for use of Ecstasy and 4 factors were found (see Table 27). Similar reliabilities were found in comparison to the experimenter's derived scale: Alter Perception: $\alpha = .3383$; (2) Mood: $\alpha = .6274$; (3) Personal Growth: $\alpha = .7934$; and (4) Social/Interpersonal: $\alpha = .7902$. However, the analytically derived scale was not as powerful in detecting a significant difference among the three groups (Users, Experimenters, and Quitters) (see Table 28). Therefore, the experimenter's Reasons for Use Scale: AMPS was selected for data analysis.

Table 26

Means (M), Standard Deviations (SD), and Intercorrelations of the Reasons for Ecstasy Use Scale: AMPS with Cronbach's Internal Consistency Reliability α on the Diagonal

	Mood	Alter Perception	Personal Growth	Social/Interpersonal
Mood	(.627)			
Alter Perception	.466	(.338)		
Personal Growth	.303	.187	(.793)	
Social/Interpersonal	.658	.444	.636	(.790)
M	11.74	6.41	10.84	24.09
SD	3.74	2.13	4.54	8.34

Note. N = 219. Correlations below the diagonal are the simple Pearson product moment correlations.

Table 27

Reliability Coefficients for the 4 Subscales of the Reasons for Ecstasy Use Scale: AMPS and the 4 Subscales Derived from Iterated Principal Factor Analysis

Subscale	α	Number of Items
Reasons for Ecstasy Use Scale: AMPS		
Alter Perception	.338	2
Mood	.627	5
Personal Growth	.793	5
Social/Interpersonal	.790	10
Factor Analytically Derived Subscales		
Subscale 1	.754	9
Subscale 2	.877	11
Subscale 3	.489	3
Subscale 4	—	1

Table 28

Source Table for the 4 Subscales of the Reasons for Ecstasy Use Scale: AMPS and the 4 Subscales Derived from Iterated Principal Factor Analysis

U v. E v. Q planned contrast	Roy's θ	*df*	*p*
Reasons for Ecstasy Use: AMPS Subscales	.248	4, 204	< .001*
Factor-Analytically Derived Subscales	.236	4, 203	< .001*

Note. U = User; E = Experimenter; and Q = Quitter. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned comparison. See text for details regarding this analytic approach. An asterisk denotes the detection of a significant difference among the three groups.

Reasons for First Use of Ecstasy Scale: AMPS. Analyses of the Reasons for Use of Ecstasy Scale: AMPS revealed adequate reliability coefficients (see Table 29), particularly given the number of items for each scale: (1) Alter Perception (2 items): α = .344; (2) Mood (5 items): α = .595; (3) Personal Growth (5 items): α = .631; and (4) Social/Interpersonal (10 items): α = .746. Finally, Pearson Correlation Coefficients were examined, and values were similar to those found for the Reasons for Use of Ecstasy Scale: AMPS. There was some degree of overlap among the subscales (see Table 29), but each subscale was judged to uniquely contribute to the scale.

A factor analysis was conducted to explore alternative groupings of the 31 reasons for first use of Ecstasy and 4 factors were found (see Table 30). Consistent with findings for the Reasons for Ecstasy Use Scale: AMPS, the experimenter's scale, was found to be superior to the factor analytically derived scale (see Table 31).

Table 29

Means (M), Standard Deviations (SD), and Intercorrelations of the Reasons for First Use of Ecstasy Scale: AMPS with Cronbach's internal consistency reliability (α) on the diagonal

Pearson Correlation Coefficients for the Reasons for First Use of Ecstasy Scale: AMPS

	Mood	Alter Perception	Personal Growth	Social/Interpersonal
Mood	(.595)	.436	.322	.552
Alter Perception	.466	(.344)	.328	.390
Personal Growth	.303	.187	(.631)	.554
Social/Interpersonal	.658	.444	.636	(.746)
M	1.05	.95	.91	2.06
SD	1.11	.78	1.12	2.19

Note. N = 219. Correlations below the diagonal are the simple Pearson product moment correlations, while correlations above the diagonal are the Pearson product moment correlations from which Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment, and Referral Type have been partialled.

Table 30

Reliability Coefficients for the 4 Subscales of the Reasons for First Use of Ecstasy Scale: AMPS and the 4 Subscales Derived from Iterated Principal Factor Analysis

Subscale	α	Number of Items
Reasons for First Use of Ecstasy Use Scale: AMPS		
Alter Perception	.343	2
Mood	.595	5
Personal Growth	.631	5
Social/Interpersonal	.746	10
Factor Analytically Derived Subscales		
Subscale 1	.853	14
Subscale 2	.657	5
Subscale 3	.432	4
Subscale 4	.518	3

Table 31

Source Table for the 4 Subscales of the Reasons for First Use of Ecstasy Scale: AMPS and the 4 Subscales Derived from Iterated Principal Factor Analysis

Group main effect (U, E, Q, and I)	Roy's θ	*df*	*p*
Reasons for First Use: AMPS Subscales	.031	4, 203	.185
Factor-Analytically Derived Subscales	.021	4, 203	.376

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. The main effect for Group was tested against a critical value for Roy's greatest characteristic root test. See text for details regarding this analytic approach.

Correlations of Variables

The primary dependent measures that were examined in this study included the following: Sensation Seeking subscales (Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility); Normative Influence Scale; Social Conformity subscales (Law Abidance, Liberalism, and Religiosity); General Risk Appraisal Scale subscales for own risk appraisal and own risky behavior (Crime Risk, Financial Risk, Minor Risk Violations, and Sports Risk); the Mood subscale of the Reasons for Ecstasy Use: AMPS; and the total number of drugs used during the past 90 days.

Correlations of Subscales for Primary Dependent Measures

The simple Pearson product-moment intercorrelations among each of the subscales within the Sensation Seeking Scale, Social Conformity Scale, and General Risk Appraisal Scale (Own Risk Appraisal and Own Risky Behavior) were examined (see Tables 22, 23, 24, and 25, respectively). First, for the Sensation Seeking Scale, negligible to weak positive correlations were found among all of the subscales (Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility), except for a moderate positive association between the Disinhibition and Boredom Susceptibility subscales. These correlations were weaker than expected, given the sample population. Notably, Galizio et al. (1993) found a moderate association between the Experience Seeking and Disinhibition subscales in their study of polydrug users, but this association was not found in the current study. Second, the intercorrelations for the Social Conformity Scale subscales were examined, and were also weaker than expected. However, the directions of the associations were consistent with what was expected (a

positive association between law abidance and religiosity and a negative association between law abidance and liberalism) within the sample population. Third, the intercorrelations for the 4 subscales of the General Risk Appraisal Scale (Own Risk) were examined and strong positive correlations were found between Crime Risk and Financial Risk as well as between Crime Risk and Minor Violations Risk. Moderate positive associations were found between Crime Risk and Sports Risk as well as between Financial Risk and Minor Violations Risk. Finally, the association between Financial Risk and Sports Risk was negligible. All of these correlations are consistent with what was expected, given this sample population. Finally, the intercorrelations of the 4 subscales of the General Risk Appraisal Scale (Own Risky Behavior) were examined and the following associations were found: (1) strong positive correlation between Crime Risky Behavior and Minor Violations Behavior; (2) weak positive correlations between Minor Violations Behavior and both Financial Risky Behavior and Sports Risky Behavior; (4) negligible correlations between Financial Risky Behavior and both Crime Risky Behavior and Sports Risky Behavior; and (5) negligible correlation between Crime Risk Behavior and Sports Risky Behavior. Again, all of these latter correlations are consistent with what was expected, given the study sample.

Correlations Between Primary Dependent Measures

The correlations between the primary dependent variables were generally weaker than expected (see Appendix N). However, the following moderate correlations were found and are consistent with what would be expected, given the study sample: (1) negative correlations between Law Abidance and both Disinhibition (r = -.32) and Boredom Susceptibility (r = -.31); (2) negative correlation between Law Abidance and

Crime Behavior (r = .36); (3) positive correlation between Thrill and Sensation Seeking and Sports Risky Behavior (.33). In addition, although weak, negative correlations were found between Crime Risk and Crime Behavior (r = -.26) as well as between Minor Violations Risk and Minor Violations Behavior (r = -.26), suggesting that the lower that participants evaluated their risk for engaging in some type of crime or minor violation, the more likely they were to engage in those types of behaviors. Finally, surprisingly, only week associations were found between the total number of drugs used in the past 90 days and (a) Boredom Susceptibility, r = .25 ; (b) Normative Influence, r = .27; and (c) Law Abidance, r = -.26.

Tests of Hypotheses

Hypothesis 1: Polydrug Use (Number of Substances Used in Past 90 Days Excluding Ecstasy)

Hypothesis 1 predicted that there would be significant group differences among Users, Experimenters, and Quitters for the number of substances used during the past 90 days. Specifically, Hypothesis 1 (a and b) predicted that Users would, on average, have used a greater number of substances in the past 90 days than both Experimenters and Quitters. The source table representing the results of the analysis for polydrug use in the past 90 days can be found in Table 32. The 2-*df* Ecstasy Use Group planned contrasts revealed that these hypotheses were both supported (R^2 = .111, p < .001; R^2 = .092, p < .001, respectively). Users (M = 3.72, SE = .23) were significantly more likely to report having used a greater number of substances during the past 90 days than both Experimenters (M = 2.51, SE = .24) and Quitters (M = 2.36, SE = .23) (see Tables 33 and 34). In addition, post hoc testing of the significant Ecstasy Use Group effect revealed two

additional significant pairwise comparisons. Users were significantly more likely than Controls (M = 2.95, SE = .23) and Infrequent Users (M = 3.43, SE = .23) were significantly more likely than Quitters and Experimenters to report having used a greater number of substances during the past 90 days. Finally, a significant effect for Age was found for past 90-day drug use (b = -.208, SE = .038, p < 001), indicating that younger participants were more likely than older participants to have used a greater number of substances during the past 90 days.

Table 32

Source Table for Polydrug Use Excluding Ecstasy (Past 90 Days)

Predictor Variable	R^2	*df*	*p*
Explanatory			
U *v*. E *v*. Q planned contrast	.111	2, 306	< .001*
Group main effect (U, E, Q, I, & C)	.092	4, 306	< .001*
Control			
Age	.069	1, 306	< .001*
Gender	.010	1, 306	.041
Ethnicity	.007	1, 306	.083
Education	.008	2, 306	.178
Sexual Orientation	< .001	2, 306	.983
Treatment	.012	1, 306	.022
Referral Type	.006	3, 306	.468

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups was tested with a 2-*df* planned contrast. The main effect for Group was tested against Scheffé's critical value for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Table 33

Group Means (M) and Standard Errors (SE) for Polydrug Use (Past 90 Days)

Group	*M*	*SE*
User	3.72	.23
Experimenter	2.51	.24
Quitter	2.36	.23
Infrequent	3.43	.23
Control	2.95	.23

Note. Standard Errors were derived from the statistical model used to conduct the analyses.

Table 34

Pairwise Comparisons of Group Means for Polydrug Use (Past 90 Days)

Group	*v.*	Group	Mean Difference	*SE*	*p*
User		Experimenter	1.206	.258	<.001*
		Quitter	1.356	.247	<.001*
		Infrequent	.289	.257	.261
		Control	.766	.766	.001*
Experimenter		User	-1.206	.258	<.001*
		Quitter	.150	.236	.526
		Infrequent	-.917	.263	.001*
		Control	-.441	.135	.929
Quitter		User	-1.356	.247	<.001*
		Experimenter	-.150	.236	.526
		Infrequent	-1.067	.249	<.001*
		Control	- .590	.224	.009
Infrequent		User	-.289	.257	.261
		Experimenter	.917	.263	.001*
		Quitter	1.067	.249	<.001*
		Control	.476	.245	.053

Table 34 (continued)

Pairwise Comparisons of Group Means for Polydrug Use (Past 90 Days)

Group	*v.*	Group	Mean Difference	*SE*	*p*
Control		User	-.766	.230	.001*
		Experimenter	.441	.218	.044
		Quitter	.590	.224	.009
		Infrequent	-.476	.053	.053

Note. Mean differences determined to be significant by post hoc testing using Roy's greatest characteristic root test are marked with an asterisk.

Hypothesis 2: Normative Influence

Hypothesis 2 predicted that there would be significant group differences in level of normative influence, which was supported for the 2-*df* Ecstasy Use Group planned contrast among Users, Experimenters, and Quitters ($R^2 = .271$, $p < .001$). The main effect for the five groups (Users, $M = 3.15$, $SE = .14$; Experimenters, $M = 1.88$, $SE = .15$; Quitters, $M = 1.90$, $SE = .14$; Infrequent Users, $M = 2.67$, $SE = .14$; and Controls, $M = 1.89$, $SE = .14$) was also significant ($R^2 = .195$, $p < .001$). The source table representing the results of the analysis of the Normative Influence Scale can be found in Table 35. Specifically, Hypothesis 2 (a and b) predicted that Users would, on average, have higher scores on normative influence than both Experimenters and Quitters. Pairwise post hoc comparisons revealed that these hypotheses were both supported. Users were significantly more likely to report having a greater number of friends who were currently using Ecstasy, than both Experimenters and Quitters (see Tables 36 and 37). In addition, post hoc testing of the significant Ecstasy Use Group effect revealed two additional significant pairwise comparisons. Infrequent Users were significantly more likely than both Quitters and Controls to report having a greater number of friends who were currently using Ecstasy (see Table 40). No significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment or Referral Type (all *p*s > .001).

Table 35

Source Table for Normative Influence Scale

Predictor Variable	R^2	*df*	*p*
Explanatory			
U *v*. E *v*. Q planned contrast	.271	2, 306	< .001*
Group main effect (U, E, Q, I, & C)	.228	4, 306	< .001*
Control			
Age	< .001	1, 306	.702
Gender	.003	1, 306	.206
Ethnicity	.003	1, 306	.229
Education	< .001	2, 306	.927
Sexual Orientation	.006	2, 306	.230
Treatment	< .001	1, 306	.649
Referral Type	.004	3, 306	.556

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups was tested with a 2-*df* planned contrast. The main effect for Group was tested against Scheffé's critical value for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Table 36

Group Means (M) and Standard Errors (SE) for Normative Influence Scale

Group	*M*	*SE*
User	3.15	.14
Experimenter	1.88	.15
Quitter	1.90	.14
Infrequent	2.67	.15
Control	1.90	.14

Note. Standard Errors were derived from the statistical model used to conduct the analyses.

Table 37

Pairwise Comparisons of Group Means for Normative Influence Scale

Group	*v.*	Group	Mean Difference	*SE*	*p*
User		Experimenter	1.270	.160	<.001*
		Quitter	1.250	.153	<.001*
		Infrequent	.480	.160	.003
		Control	1.257	.143	<.001*
Experimenter		User	-1.270	.160	<.001*
		Quitter	-.019	.146	.897
		Infrequent	-.789	.163	<.001*
		Control	-.026	.135	.929
Quitter		User	-1.250	.153	<.001*
		Experimenter	.019	.146	.897
		Infrequent	-.770	.154	<.001*
		Control	.007	.139	.960
Infrequent		User	-.480	.160	.003
		Experimenter	.789	.163	<.001*
		Quitter	.770	.154	<.001*
		Control	.777	.152	<.001*

Table 37 (continued)

Pairwise Comparisons of Group Means for Normative Influence Scale

Group	*v.*	Group	Mean Difference	*SE*	*p*
Control		User	-1.257	.143	<.001*
		Experimenter	.012	.135	.929
		Quitter	-.007	.139	.960
		Infrequent	-.777	.152	<.001*

Note. Mean differences determined to be significant by post hoc testing using Roy's greatest characteristic root test are marked with an asterisk.

Hypothesis 3: Social Conformity

The source table representing the results of the analysis of three Social Conformity subscales can be found in Table 38. Hypothesis 3 predicted that there would be significant group differences in level of social conformity. Specifically, Hypothesis 3 (a) predicted that Users would, on average, have lower scores on social conformity than Experimenters. This hypothesis was not supported, as the 2-*df* Ecstasy User Group planned contrast among the three groups (Users, Experimenters, and Quitters) was not significant (Roy's $\theta = .010$, $p = .401$). Furthermore, no main effect was found for the Ecstasy Use Group (Users, Experimenters, Quitters, Infrequent Users, and Controls) effect (Roy's $\theta = .026$, $p = .101$). In contrast, Hypothesis 2 (b), which suggested that Users would, on average, have similar scores on social conformity to Quitters, was therefore weakly supported.

Age was also significantly related to social conformity (Roy's $\theta = .069$, $p < .001$). Post hoc testing of each of the three subscales of the Social Conformity Scale revealed that age was positively related to law abidance ($b = 1.191$, $SE = .285$ $p < .001$), indicating that older participants were more likely than younger participants to adhere to laws. In addition, there was a significant effect for Gender (females scored higher than males) for the linear composite score ($M = 5.00$ for males and $M = 5.54$ for females; $SD_{error} = 1$; $p = .001$. Notably, the means were more than half a standard deviation apart and suggest that females were more likely to conform than males. However, no significant differences were found for any of the subscales (Law Abidance, Liberalism and Religiosity), all *p*s > .001).

Table 38

Source Table for Social Conformity Scale

Predictor Variable	Roy's θ	*df*	*p*
Explanatory			
U v. E v. Q planned contrast	.010	3, 305	.401
Group main effect (U, E, Q, I, & C)	.026	4, 306	.101
Control			
Age	.069	3, 304	< .001*
Gender	.059	3, 304	< .001*
Ethnicity	.008	3, 304	.500
Education	.047	3, 305	.003
Sexual Orientation	.008	3, 305	.468
Treatment	.030	3, 304	.228
Referral Type	.014	3, 306	.227

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against a critical value for Roy's greatest characteristic root test for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Hypothesis 4: Sensation Seeking

Hypothesis 4 predicted that there would be significant group differences in level of sensation seeking (see Table 39 for the Ecstasy Group means and Table 40 for the Source Table). The 2-*df* Ecstasy Use Group planned contrast revealed significant differences among Users, Experimenters, and Quitters (Roy's $\theta = .043$, $p = .012$) on the linear composite of the four Sensation Seeking Scale subscales (Thrill and Adventure Seeking, Experience Seeking, Disinhibition and Boredom Susceptibility). However, post hoc testing in each case revealed no significant pairwise mean differences. In addition, the Ecstasy Use Group (Users, Experimenters, Quitters, Infrequent Users, and Controls) effect was nonsignificant. Consequently, Hypothesis 4 (a), which predicted that Users would, on average, have higher scores on sensation seeking than Experimenters, was not supported. In contrast, Hypothesis 4 (b), which suggested that Users would, on average, have similar scores on sensation seeking to Quitters, was weakly supported, given a non-significant difference between Users and Quitters for the linear composite score of the four Sensation Seeking Scale subscales.

However, a significant effect for Gender (males scored higher than females) was found (Roy's $\theta = .197$, $p < .001$). Post hoc testing of each subscale revealed a significant effect for Gender for the Thrill and Adventure Seeking subscale ($M = 7.19$, $SE = .38$ for males, $M = 5.63$, $SE = .37$ for females; $p < .001$) and the Boredom Susceptibility subscale ($M = 4.80$, SE = .31 for males, $M = 3.33$, $SE = .30$ for females; $p < .001$). These findings indicate that females are less likely than males to (1) engage in sports or activities involving some degree of physical danger and (2) evidence an aversion for a repetitive

experience of any kind, routine work or dull/predictable people as well as to feel restless when things are unchanging.

Table 39

Group Means (M) and Standard Errors (SE) for Sensation Seeking Scale

Group	*M*	*SE*
User	3.28	.187
Experimenter	3.50	.196
Quitter	2.83	.186
Infrequent	3.12	.190
Control	3.28	.186

Note. Standard Errors were derived from the statistical model used to conduct the analyses. The error standard deviation in this model is determined to be 1.

Table 40

Source Table for Sensation Seeking Scale

Predictor Variable	Roy's θ	*df*	*p*
Explanatory			
U v. E v. Q planned contrast	.043	4, 304	.012*
Group main effect (U, E, Q, I, & C)	.045	4, 306	.009*
Control			
Age	.057	4, 303	.002
Gender	.197	4, 303	<.001*
Ethnicity	.023	4, 303	.147
Education	.054	4, 304	.003
Sexual Orientation	.045	4, 304	.009
Treatment	.025	4, 303	.109
Referral Type	.045	4, 305	.009

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against a critical value for Roy's greatest characteristic root test for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Hypothesis 5: Risk Appraisal

The source table representing the results of the analysis of the GRAS for Risk Appraisal (*Own Risk*) can be found in Table 41. Hypothesis 5 predicted that there would be significant group differences in level of risk appraisal for self. Specifically, Hypothesis 5 (a) predicted that Users would, on average, have lower scores on risk appraisal than Experimenters. This hypothesis was not supported as the 2-*df* Ecstasy Use Group planned contrast among the three groups (Users, Experimenters, and Quitters) was not significant (Roy's $\theta = .018$, $p = .275$). Furthermore, the Ecstasy Use Group (Users, Experimenters, Quitters, Infrequent Users and Controls) effect was not significant (Roy's $\theta = .043$, $p = .015$). However, Hypothesis 5 (b), which predicted that Users would, on average, have similar scores on risk appraisal for self to Quitters, was weakly supported.

Finally, a significant effect for Gender was found (males scored lower than females) on the linear composite score for Risk Appraisal ($M = 2.14$ for males and $M = 2.82$ for females; $SD = 1.0$; $p < .001$). However, no significant effects were found for any of the four subscales (Crime Risk, Financial Risk, Minor Violations Risk and Sports Risk). Given that the means for males and females were more than half a standard deviation apart, results suggest that females were more likely than males to appraise a higher personal risk of a negative outcome if they were to commit a crime or minor violation, take a financial risk, or engage in a risky sporting activity.

Table 41

Source Table for General Risk Appraisal Scale: Risk Appraisal

Predictor Variable	Roy's θ	*df*	*p*
Explanatory			
U v. E v. Q planned contrast	.018	4, 304	.275
Group main effect (U, E, Q, I & C)	.043	4, 292	.015
Control			
Age	.017	4, 289	.288
Gender	.093	4, 289	<.001*
Ethnicity	.049	4, 289	.008
Education	.047	4, 290	.010
Sexual Orientation	.036	4, 290	.036
Treatment	.013	4, 289	.436
Referral Type	.030	4, 291	.073

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against a critical value for Roy's greatest characteristic root test for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Hypothesis 6: Risky Behavior (Own Behavior)

The source table representing the results of the analysis of GRAS for Risky Behavior can be found in Table 42. Hypothesis 6 predicted that there would be significant group differences in level of risk-taking behaviors. Specifically, Hypothesis 6 (a) predicted that Users would, on average, have higher scores on risk taking behaviors than Experimenters. This hypothesis was not supported, as the 2-*df* Ecstasy Use Group planned contrast among the three groups (Users, Experimenters, and Quitters) was not significant (Roy's $\theta = .010$, $p = .556$). Furthermore, the Ecstasy Use Group (Users, Experimenters, Quitters, Infrequent Users, and Controls) was not significant (Roy's $\theta = .038$, $p = .026$). In contrast, Hypothesis 6 (b), which predicted that Users would, on average, have similar scores on risk taking behaviors to Quitters, was weakly supported.

Moreover, a significant effect for Gender was found (males scored higher than females) for risk-taking behavior. Post hoc testing of each of the four subscales revealed a significant effect for Gender (males scored higher) for the Crime subscale ($M = 13.42$, $SE = .62$ for males, $M = 10.87$, $SE = .60$ for females; $p < .001$) and the Minor Violations subscale ($M = 13.18$, $SE = .60$ for males, $M = 10.64$, $SE = .58$ for females; $p < .001$). These findings indicate that males are more likely than females to have engaged in crime and minor violations.

Table 42

Source Table for General Risk Appraisal Scale: Risk-Taking Behaviors

Predictor Variable	Roy's θ	*df*	*p*
Explanatory			
U v. E v. Q planned contrast	.010	4, 304	.556
Group main effect (U, E, Q, I, & C)	.038	4, 292	.026
Control			
Age	.122	4, 289	.288
Gender	.188	4, 289	<.001*
Ethnicity	.027	4, 289	.008
Education	.031	4, 290	.010
Sexual Orientation	.023	4, 290	.036
Treatment	.109	4, 289	.436
Referral Type	.047	4, 291	.073

Note. U = User; E = Experimenter; Q = Quitter; I = Infrequent User; and C = Control. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against a critical value for Roy's greatest characteristic root test for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Hypothesis 7: Use of Ecstasy to Alter Mood

Hypothesis 7 predicted that there would be significant group differences in the use of Ecstasy to alter mood, which was supported by the 2-*df* Ecstasy Use Group planned contrast among Users, Experimenters, and Quitters ($R^2 = .149$, $p < .001$). The main effect for the four Ecstasy Use groups (Users, Experimenters, Quitters, and Infrequent Users) was also significant ($R^2 = .125$, $p < .001$). The source table representing the results of the analysis of the Mood Subscale of the Reasons for Use Scale: AMPS can be found in Table 43. Hypothesis 7 (a) predicted that Users would, on average, have higher scores on the mood subscale than Experimenters, was supported (see Tables 44 and 45). In thinking of the times in which they used Ecstasy, Users were significantly more likely than Experimenters to endorse having used Ecstasy to alter their mood. In addition, post hoc testing revealed another significant pairwise comparison. Quitters were also significantly more likely than Experimenters to endorse having used Ecstasy to alter their mood (see Tables 44 and 45). Hypothesis 7 (b), which predicted that Users would, on average, have similar scores on the mood subscale to those of Quitters, was weakly supported. No significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment, or Referral Type (all *p*s > .038).

Table 43

Source Table for Reasons for Use: Mood Subscale

Predictor Variable	R^2	*df*	*p*
Explanatory			
U *v*. E *v*. Q planned contrast	.149	2, 206	< .001*
Group main effect (U, E, Q, & I)	.125	3, 206	< .001*
Control			
Age	< .001	1, 206	.754
Gender	.018	1, 206	.035
Ethnicity	.003	1, 206	.380
Education	.008	2, 206	.386
Sexual Orientation	.009	2, 206	.309
Treatment	< .001	1, 206	.931
Referral Type	.014	3, 206	.313

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. The differences between the User, Experimenter, and Quitter groups were tested with a 2-*df* planned contrast. The main effect for Group was tested against Scheffé's critical value for a post hoc test of a main effect following a planned comparison. See text for details regarding this analytic approach.

Table 44

Group Means (M) and Standard Errors (SE) for Mood Subscale of AMPS

Group	*M*	*SE*
User	13.537	.70
Experimenter	10.345	.73
Quitter	13.793	.69
Infrequent	12.341	.69

Note. Standard Errors were derived from the statistical model used to conduct the analyses.

Table 45

Pairwise Comparisons of Group Means for Mood Subscale of AMPS

Group	*v.*	Group	Mean Difference	*SE*	*p*
User		Experimenter	3.192	.742	< .001*
		Quitter	-.256	.717	.721
		Infrequent	1.196	.736	.106
Experimenter		User	-3.192	.742	< .001*
		Quitter	-3.449	.669	< .001*
		Infrequent	1.452	.710	.042
Quitter		User	.256	.717	.721
		Experimenter	3.449	.669	< .001*
		Infrequent	1.452	.710	.042
Infrequent		User	-1.196	.736	.106
		Experimenter	1.997	.748	.008
		Quitter	-1.452	.710	.042

Note. *Mean differences determined to be significant by post hoc testing using Roy's greatest characteristic root test are marked with an asterisk.

Exploratory Analyses

Reasons for First Use of Ecstasy Scale: AMPS

Analyses were conducted to determine if there was an interaction between Ecstasy Use Group effect (Users, Experimenters, Quitters, and Infrequent Users) and the Scale effect for the Reasons for First Use Scale: AMPS. Results indicated that there were no significant group differences on the profiles of four subscales for the reasons participants reported for their first use of Ecstasy. However, Age was significantly related to the Mood and Alter Perception subscales (b = -.028, SE = .008, p = .001 and -.047, SE = .014, p = .001, respectively). Findings indicate that younger participants were more likely than older participants to report that the primary reason they first used Ecstasy was to alter their mood as well as to alter their perception.

Primary Reason for First Use of Ecstasy

Participants (Users, Experimenters, Quitters, and Infrequent Users) were asked in a free-response format what the primary reason was for why they first used Ecstasy (see Table 46). As noted in Methods, participants' responses were reviewed and similar responses were grouped together. Based upon the frequencies of responses pertaining to using ecstasy because others had recommended it ("heard it was 'good'") and "for fun," these reasons were also examined, creating a total of 33 reasons for first use of ecstasy. The four most commonly reported reasons for first using Ecstasy were (1) curiosity of what it would be like to use Ecstasy (52.5%), (2) use was recommended by others (heard it was "good") (11.7%), (3) to have a new experience that would help to see the world differently (7.5%), and (4) to fit in with peers (others were using) (7.9%).

Table 46

Primary Reason for First Use of Ecstasy in the Total Sample and Each Group

Primary Reason		Total Sample	Group U	Group E	Group Q	Group I
Have a New Experience That Would Help You to See the World Differently	*n* (Group)	18	4	6	4	4
	Group %[a]	7.5	6.5	10.2	5.6	8.5
Fit in With Peers (Others Were Using)	*n* (Group)	19	4	5	8	2
	Group %[a]	7.9	6.5	8.5	11.1	4.3
Curious What It Would Be Like to Use Ecstasy	*n* (Group)	126	29	31	41	25
	Group %[a]	52.5	46.8	52.5	56.9	53.2
Use Recommended by Others (Heard It Was Good)	*n* (Group)	28	5	5	11	7
	Group %[a]	11.7	8.1	8.5	15.3	14.9
Other	*n* (Group)	49	20	12	8	9
	Group %[a]	20.4	32.3	20.3	11.1	19.1
No Reason Reported	*n* (Group)	15	4	5	2	4
	Group %[b]	6.8	7.1	9.1	3.1	8.7
Total Sample	*n* (Group)	221	56	55	64	46
Total Responses	*n* (Group)	236	62	59	72	47

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. Participants responded to a free-response question and responses were grouped together by category. Twenty-six participants endorsed two or more reasons. [a]Percentages were calculated

based on total number of responses in each group. [b]Percentages were calculated based on total number of participants in each group.

Reasons for Ecstasy Use Scale: AMPS

In addition, Ecstasy use profiles (i.e., the pattern of means among the four subscales of the Reasons for Ecstasy Use Scale: AMPS) were also examined and compared among Users, Experimenters, and Quitters. Although a significant group difference was found ($R^2 = .054$, $p = .013$), post hoc testing revealed no significant pairwise mean differences. Notably, in examining the means (see Table 47) for each of the four subscales for the User, Experimenter, and Quitter Groups, the highest mean for each group was for the Alter Perception subscale, and the lowest mean for each group was for the Personal Growth subscale. No significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment or Referral Type (all ps > .03).

Table 47

Group Means (M) and Standard Errors (SE) for AMPS Ecstasy Use Profiles

		Reasons for Ecstasy Use Subscale			
Group		Mood	Alter Perception	Personal Growth	Social/ Interpersonal
User	*M*	2.5	3.29	2.40	2.71
	SE	.08	.10	.11	.09
Experimenter	*M*	1.97	2.79	1.72	1.82
	SE	.12	.171	.12	.11
Quitter	*M*	2.58	3.54	2.28	2.65
	SE	.094	.12	.10	.094
Infrequent User	*M*	2.28	3.14	2.26	2.41
	SE	.084	.16	.15	.12

Primary Reason for Use of Ecstasy

Participants were asked in a free-response format what the primary reason was for why they used Ecstasy. Participants' responses were reviewed and similar responses were grouped together. Based upon the frequency of responses pertaining to using ecstasy "for fun," this reason was also examined, creating a total of 31 reasons for use of ecstasy. The three most commonly reported reasons for using Ecstasy were (1) for fun (17.2%), (2) to help to feel elated or euphoric (14.4%), and (3) to enhance an activity (12.4%).

Psychological Addiction to Ecstasy

Participants in the four Ecstasy Use groups (Users, Experimenters, Quitters, and Infrequent Users) were asked, "Do you feel that you are or were at one time psychologically addicted to Ecstasy?" The frequency distributions of participants who answered "Yes" for the total sample and each group can be found in Table 48. Approximately 26% of the participants in the four groups responded affirmatively. Post hoc analyses (see Table 49) indicated that there was a significant difference among the four groups ($\chi^2 = 24.719$, $p < .001$). Pairwise comparisons revealed that Users were significantly more likely than both Experimenters and Infrequent users to report psychological addiction to Ecstasy. However, Quitters were significantly more likely than Users to report a history of psychological addition to Ecstasy. Moreover, a significant effect for Treatment was found; Ecstasy users with a history of attending substance related psychological counseling or a support group were 4.1 times more likely to endorse psychological addiction to Ecstasy than those without a history of treatment ($p < .001$).

Table 48

Frequency Distributions in the Total Sample and Each Ecstasy Use Group:

Do you feel that you are or were at one time psychologically addicted to ecstasy?

		Group				
Response		Total Sample	U	E	Q	I
Yes	*n* (Group)	57	20	2	28	7
	Group %	25.9	35.7	3.7	43.8	15.2
Total	*n* (Group)	220	56	54	64	46

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. One participant in the User Group failed to answer the question.

Table 49

Source Table for Psychological Addiction to Ecstasy:

"Do you feel that you are or were at one time psychologically addicted to ecstasy?"

Predictor Variable	Wald χ^2	*df*	*p*	Odds Ratio	Confidence Interval
Explanatory					
Group main effect (U, E, Q & I)	24.719	3	< .001*		
I *v*. U contrast				.285	.098, .824
Q *v*. U contrast				1.507	.626, 3.627
E *v*. U contrast				.055	.011, .268
Control					
Age	.084	1	.772		
Gender	.017	1	.898		
Ethnicity	12.025	6	.061		
Sexual Orientation	1.578	2	.454		
Treatment	9.893	1	.002		
Referral Type	3.394	3	.335		

Note. U = User; E = Experimenter; Q = Quitter and I = Infrequent User. Controls were not included in this analysis as they did not respond to this question. The main effect for Group was tested at $\alpha = .01$, while the remaining effects were tested at $\alpha = .0014$. Only those contrasts that were significant following detection of a significant main effect are included in the table. Confidence Intervals for the Group effect contrasts are 99%

intervals, consistent with the choice of α. See text for details regarding the analytic approach.

Testing of Ecstasy Pills

Participants in the four groups (Users, Experimenters, Quitters, and Infrequent Users) were asked, "Do you or did you usually test your Ecstasy pills for their contents?" The frequency distributions of participants who answered "Yes" for the total sample and each group can be found in Table 50. Approximately 18% of the participants in the four groups responded affirmatively. Post hoc analyses failed to find a significant difference among the four groups ($\chi^2 = 9.979$, $p = .019$). Furthermore, no significant effects were found for Age, Gender, Ethnicity, Education, Sexual Orientation, Treatment or Referral Type (all ps > .019).

Table 50

Ecstasy Use Question: "Do or did you usually test your ecstasy pills for their contents?"

		Group				
Response		Total Sample	U	E	Q	I
Yes	*n* (Group)	40	18	2	9	11
	Group %	18.4	32.1	3.8	14.3	24.4
Total	*n* (Group)	217	56	53	63	45

Note. U = User; E = Experimenter; Q = Quitter and I = Infrequent User. Two participants in the Quitter Group and 1 participant in the User group failed to answer the question.

Taken to Prevent Side Effects Following the Use of Ecstasy

Participants in the four groups (Users, Experimenters, Quitters and Infrequent Users) were asked, “Did or do you take any drugs or substances to try to prevent unwanted Ecstasy side-effects?” In examining the responses, 5-HTP and vitamins were the two responses that were most frequently reported. The frequency distributions of participants who reported taking 5-HTP and vitamins for the total sample and each group can be found in Table 51. Of the total sample, nineteen percent reported taking 5-HTP and nine percent reported taking vitamins.

Table 51

Frequencies for Reported Use of 5-HTP and Vitamins to Prevent Side Effects Following Use of Ecstasy in the Total Sample and Each Ecstasy Use Group.

		Group				
Taken to Prevent Side Effects from Ecstasy Use		Total Sample	U	E	Q	I
5-HTP	*n* (Group)	42	16	2	10	14
	Group %	19.0	28.6	3.6	15.6	30.4
Vitamins	*n* (Group)	20	9	1	4	6
	Group %	9.0	16.1	1.8	6.3	13.0
Total	*n* (Group)	62	25	3	14	20
	Group %	28.1	44.6	5.5	21.9	43.5
Total Sample	*n* (Group)	221	56	55	64	46

Note. U = User; E = Experimenter; Q = Quitter and I = Infrequent User. Participants who had used ecstasy were asked in a free response format to list any substances they had taken in an attempt to prevent side effects from ecstasy use. Vitamins and 5-HTP were the two substances that were endorsed with the greatest frequency.

Reasons for Having Never Used Ecstasy

Participants in the Control group were asked to respond "Yes" or "No" to a list of possible reasons (see Table 52) why they had never used Ecstasy? The five most commonly endorsed reasons were are provided in Table 53: (1) "I am concerned about the possible side effects" (61%); (2) "I have never been in an environment where others were using Ecstasy (e.g., bar, club, friend's house)" (47.5%); (3) "I have not been able to obtain it" (42.6%); (4) I know of someone who had a bad experience related to Ecstasy use" (30.7%) and (5) "Other drugs/substances that I take give me similar experiences to what I believe using Ecstasy would give me" (26.0%). Due to the sample size, logistic regressions could not be conducted, even with the control variables, because the statistical model was too complex for the data in such a small sample.

Table 52

Frequencies of "Yes" Responses by Controls for Reasons

for Having Never Used Ecstasy: "I have NEVER used ecstasy because …"

Reason	*n* (Group)	Group %
Of the cost.	11	10.9
I know of someone who had a bad experience related to ecstasy use.	31	30.7
I am concerned about the possible side effects.	61	61.0
I have not been able to obtain it (lack of availability).	43	42.6
It is illegal.	7	6.9
I am concerned about the legal consequences if I am caught.	18	17.8
I am concerned about becoming addicted.	21	20.8
I am concerned about the reaction of my parent(s).	16	15.8
Ecstasy use goes against my religious/spiritual/beliefs/values.	8	7.9
I am concerned about testing positive on a drug test (e.g., work, athletic team, testing by parent).	12	11.9
My friends do not support the use of ecstasy.	22	22.0
I have never been in an environment where others were using ecstasy (e.g., bar, club, friend's house).	48	47.5
Ecstasy does not produce the effects that I desire.	18	18.0
Other drugs/substances that I take give me similar experiences to what I believe using ecstasy would give me.	26	26.0

Note. n (Controls) = 101.

Table 53

Primary Reason Reported by Controls for Having Never Used Ecstasy

	Control Group (*n* = 101)	
Primary Reason	*n*	Group %
Lack of availability/opportunity	26	23.85[a]
Concern about the possible side effects/ Health concerns/ Consider ecstasy to be dangerous	25	22.94[a]
Lack of interest in using ecstasy	9	8.26[a]
Concern about the purity of ecstasy pills	8	7.34[a]
Other Reason	25	22.94[a]
No Reason Reported	9	8.91[b]

Note. U = User; E = Experimenter; Q = Quitter; and I = Infrequent User. Total responses (*n* = 109). Participants responded to a free-response question and responses were grouped together by category. Eight participants endorsed two reasons. [a]Percentages were calculated based on total number of responses in each group. [b]Percentages were calculated based on total number of participants in each group.

Knowledge and Beliefs about Ecstasy

Participants in all of the groups (Users, Experimenters, Quitters, Infrequent Users, and Controls) were asked questions pertaining to their knowledge and beliefs about Ecstasy. Table 54 provides the frequency distributions of participants who answered affirmatively in the total sample and each Ecstasy use group. In examining the frequencies of responses for each question among the entire sample, the following results were found: (1) Almost all of the sample reported having read about Ecstasy on the Internet (92.8%); (2) A little more than one-third (35.5%) endorsed having read books about Ecstasy; (3) Three-quarters of the sample (75.5%) reported that they had read scientific research articles about Ecstasy; (4) Approximately one-third (34.2%) endorsed that they considered Ecstasy to be a safe drug; (5) A little less than half (43.8%) reported believing that Ecstasy is an addictive drug; (6) Approximately one-quarter (25.9%) endorsed that they felt they needed or would need to take more Ecstasy each time they used in order to get the same desired effects; (7) Almost half (48.1%) of the sample endorsed feeling that the benefits of using Ecstasy outweigh the risks; (8) Approximately 62% responded that they would stop using Ecstasy if they learned that it caused permanent brain damage and (9) Almost 40% of the sample endorsed believing that they are more likely to engage in certain risky behaviors (unsafe sexual activity, driving, etc.) while using Ecstasy than when not under the influence of Ecstasy. Again, due to the sample size, logistic regressions could not be conducted because the statistical model was too complex for the data in such a small sample.

Table 54

Frequency Distributions of Affirmative Responses to Questions Pertaining to Knowledge and Beliefs About Ecstasy in the Total Sample and Each Ecstasy Use Group

Statement		Total Sample	Group U	Group E	Group Q	Group I	Group C
I have read about ecstasy on the Internet. *n* (Missing) = 2 for Q	*n* (Group)	297	55	45	61	45	91
	Group %	92.8	98.2	81.8	95.3	100	91.0
I have read books about ecstasy. *n* (Missing) = 1 for U	*n* (Group)	114	28	12	28	26	20
	Group %	35.5	50.0	22.2	43.8	56.5	19.8
I have read scientific research articles about ecstasy.	*n* (Group)	243	50	34	55	40	64
	Group %	75.5	89.3	61.8	85.9	87.0	63.4
Ecstasy is a safe drug.	*n* (Group)	110	33	10	14	24	29
	Group %	34.2	58.9	18.2	21.9	52.2	28.7
Ecstasy is an addictive drug.	*n* (Group)	141	21	32	28	14	46
	Group %	43.8	37.5	58.2	43.8	30.4	45.5
I feel that I must (or would need to) take more ecstasy each time using in order to get the same desired effects. *n* (Missing) = 2 for U; 1 for Q; and 2 for C	*n* (Group)	82	6	19	31	4	22
	Group %	25.9	10.9	34.5	49.2	8.7	22.7
I feel the benefits of using ecstasy outweigh the risks of using ecstasy. *n* (Missing) = 2 for U	*n* (Group)	154	51	9	20	36	38
	Group %	48.1	91.1	16.4	31.3	78.3	38.4

Table 54 (continued)

Frequency Distributions of Affirmative Responses to Questions Pertaining to Knowledge and Beliefs About Ecstasy in the Total Sample and Each Ecstasy Use Group

Statement		Total Sample	Group U	E	Q	I	C
If I learned that using ecstasy caused permanent brain damage, I would stop using ecstasy. *n* (Missing) = 2 for U	*n* (Group)	198	22	41	35	21	79
	Group %	61.9	39.3	74.5	55.6	45.7	79.0
I am more likely to engage in certain risky behaviors (unsafe sexual activity, driving *n* (Missing) = 2 for U; 1 for Q; 1 for Q; and 1 for C	*n* (Group)	125	14	20	35	9	47
	Group %	39.3	25.0	36.4	54.7	19.6	48.5

Intensity of Ecstasy Use for Users

The intensity of Ecstasy use for the User group for the past 90 days was calculated by taking mean of the number of times Ecstasy was used in the past 90 days multiplied by the average number of Ecstasy pills taken per occasion. The average consumption intensity for Ecstasy Users during the past 90 days was 8.53 (*SD* = 6.78). Notably, a weak but negative correlation was found between age of first use of Ecstasy and current intensity of Ecstasy use (*r* = -.288), indicating that the younger Users were when they first experimented with Ecstasy, the greater their current consumption intensity of Ecstasy.

Discussion

The current study examined substance use among young adults in the United States, with a focus on Ecstasy. The primary goal of this study was to increase our understanding of what factors differentiate between different 'types' of Ecstasy users. Specifically, what factors distinguish individuals who simply experiment with Ecstasy and cease use from individuals who initially experiment with Ecstasy and become regular users? Secondly, what factors distinguish individuals who become regular users of Ecstasy and eventually quit from individuals who continue to use? The following sections highlight the interesting and potentially important findings of this study, and are organized according to topic areas in a manner similar to the Results. In addition, limitations of the current study as well as directions for future research are discussed.

Substance Use History

Age of First Use

Of the 221 study participants who had used Ecstasy (68.6%), the average age of first use was 18, which is a year and a half younger than the mean age of first use reported in the 2004 National Survey on Drug Use and Health. This finding suggests that, in comparison to 2004, young adults are now experimenting with Ecstasy at a younger age. Furthermore, age of first use of Ecstasy was examined among Users, Experimenters, and Quitters; pairwise comparisons revealed that Experimenters were significantly more likely to be older than both Quitters and Infrequent Users when they first experimented with Ecstasy. Given that by definition, Quitters and Infrequent Users have an established history of Ecstasy use (≥ 12 occasions), this finding is consistent with prior research

findings that individuals who experiment with illicit drugs at an early age are at greater risk for later drug abuse (Hawkins et al., 1992).

In addition, the correlation between age of first use of Ecstasy and current intensity of Ecstasy use was examined for Users, and a negative correlation was found. Consistent with Boys and Madsen (2003), results suggest that individuals who begin using Ecstasy at a young age are at greater risk for more intense use in the future.

Polydrug Use

Notably, all of the participants in this study were polydrug users. An examination of past 90-day drug use revealed that almost one-quarter of the sample reported they had used Ecstasy and approximately 60% had used three or more substances (Ecstasy, marijuana, psilocybin mushrooms, cocaine powder, LSD, amphetamines, and/or prescription drugs in a non-prescribed manner). Moreover, the most commonly abused illicit substance was marijuana (72%). Consistent with the trend of increased use of prescription pain relievers among young adults ages 18 to 25 (2004 National Survey on Drug Use and Health), 44.7% of participants reported having used a prescription drug in a non-prescribed manner during the past 90 days.

In comparing polydrug use among the five groups of participants (Users, Experimenters, Quitters, Infrequent Users, and Controls), significant group differences were found. Specifically, Users were significantly more likely to report having used a greater number of substances during the past 90 days than Experimenters, Quitters, and Controls. This finding is also consistent with the literature; current users of Ecstasy tend to be polydrug users (Boys et al., 2001; Boys & Marsden, 2003; Levy et al., 2005). In addition, results revealed that younger participants were more likely than older

participants to have used a greater number of substances during the past 90 days. Finally, as expected, the percentages of the 56 participants in the User Group who had used each of the eight substances during the past 90 days were quite large: Ecstasy (89.3%); marijuana (82.1%); amphetamines (44.6%); LSD (35.7); powder cocaine (39.3%); psilocybin mushrooms (35.7%); prescription drugs (55.4%); and alcohol (92.9%). Not surprisingly, the majority of Ecstasy users had a history of recent marijuana use which was expected, based upon the studies reviewed above.

Patterns of Ecstasy Consumption

Results indicated that on average, during their period of use, Quitters tended to take significantly more Ecstasy pills per occasion than Experimenters. In addition, the largest number of Ecstasy pills taken on one occasion by Quitters was significantly larger than that of Experimenters. Given that Quitters had a more extensive use of Ecstasy than Experimenters, these results are consistent with prior findings that consumption patterns of Ecstasy tend to increase with use of Ecstasy (Boys et al., 2001).

Potential Risk Factors for Ecstasy Use

Substance Use by Peers

Prior research has consistently found that involvement in a substance-using peer group tends to be associated with various forms of both licit and illicit substance use (Chassin, Presson, Sherman, Montello, & McGrew, 1986; Hawkins, Catalano, & Miller, 1992). Accordingly, current findings revealed that Users were significantly more likely to report having a greater number of friends who were currently using Ecstasy, than Experimenters, Quitters, and Controls. In addition, Infrequent Users were significantly more likely than Experimenters, Quitters, and Controls to report having a greater number

of friends who were currently using Ecstasy. Although young adults may deny acquiescing to peer pressure (Ter Bogt & Engels, 2005), peer pressure clearly plays an important role in young adult substance use. Notably, of the 221 participants with a history of Ecstasy use, 6.4% reported that the primary reason they used Ecstasy for the first time was "to fit in with peers (others were using)." These findings highlight the importance of examining the social network of young adults when developing prevention or intervention programs pertaining to Ecstasy use.

Social Conformity

Consistent with the above findings, prior research has found a negative correlation between social conformity (degree of law abidance, conservatism, and religiosity) and proscribed activities such as drug use (Newcomb & Bentler, 1989). In the current study, participants completed a measure of social conformity and group differences were examined. Contrary to expectations, no significant Ecstasy Use Group differences were found. However, consistent with Stein et al. (1987), both age and gender were found to be significantly related to social conformity. Specifically, older participants were more likely than younger participants to adhere to laws. Furthermore, although no significant differences were found for the 3 subscales of the Social Conformity Scale, results indicated that females were more likely to conform than males. The lack of significant group differences may be accounted for by the general tendency of polydrug users to score in the low range on measures of social conformity (Huba & Bentler, 1982).

Sensation Seeking

Prior research has found profiles of Ecstasy users to be characterized by high levels of sensation seeking (e.g., Bobes et al., 2002). In addition, prior studies suggest an

association between degree of sensation seeking and intensity of use of Ecstasy (Bobes et al, 2002; Daumann, 2001). In the current study, levels of sensation seeking were examined, and although significant differences were found among Users, Experimenters, and Quitters on the linear composite of the four Sensation Seeking Scale subscales (Thrill and Adventure Seeking, Experience Seeking, Disinhibition and Boredom Susceptibility) post hoc testing in each case revealed no significant pairwise mean differences. These findings are consistent with prior studies in that polydrug users (including Ecstasy users) tend to be high sensation-seekers (Gerra et al., 2004). Notably though, upon further examination, in comparing the mean of the Total Scale Scores for all Ecstasy Use Groups (Users, Experimenters, Quitters, Infrequent Users, and Controls) with that obtained by Gerra et al. (2004), the mean for the current sample (M = 24.22, SE = .308) was higher than the mean (M = 21.80, SE = .89) reported by Gerra et al. (2005) and the standard error is smaller, suggesting that participants in the current study tended to exhibit even higher levels of, and less variability in, sensation seeking than another sample of polydrug users; this result may have contributed to the inability to detect significant group differences in the current sample, and may be the cause of the lower correlations among the SSS subscales.

In addition, also consistent with previous findings (Zuckerman, 1999), significant gender differences were found for the Thrill and Adventure Seeking and the Boredom Susceptibility subscales, suggesting that females are less likely than males to (1) engage in sports or activities involving some degree of physical danger and (2) evidence an aversion for a repetitive experience of any kind, routine work or dull/predictable people as well as to feel restless when things are unchanging.

Risk Appraisal (Own Risk)

In the current study, Horvath and Zuckerman's (1993) concept of risk appraisal, "a cognitive trait specific to particular areas of risky behavior (p. 27)," was examined for group differences in how participants perceived the likelihood of negative consequences for various behaviors that they may or may not choose to engage in (crime risk, minor violations risk, financial risk, and sports risk). No significant differences were found. As suggested by Zuckerman and Kuhlman (2000), as a whole, polydrug drug users may evaluate the possibility of their drug use leading to negative outcomes such as addiction, overdose, and financial or legal problems as lower than low sensation-seekers (non-drug users), thus increasing the likelihood that they will engage in behaviors that low sensation-seekers would view as too risky, i.e., polydrug use).

Similar to the sensation seeking trait, significant gender differences were found for risk appraisal. Specifically, the means for males and females on the linear composite score of the General Risk Appraisal Scale (Own Risk) were more than half a standard deviation apart, suggesting that females were more likely than males to appraise a higher personal risk of a negative outcome if they were to commit a crime or minor violation, take a financial risk, or engage in a risky sporting activity.

Risky Behavior (Own Behavior)

Horvath and Zuckerman (1993) also examined the correlations between risk appraisal and risky behaviors (crime, minor violations, financial, and sports) and found that individuals who had evaluated risk for themselves as low in the above areas were more likely to self-report having engaged in those risky behaviors. Participants were asked to self-report their history of engaging in the above activities, and again, no

significant group differences were found. However, although weak, negative correlations were found between Crime Risk and Crime Behavior as well as between Minor Violations Risk and Minor Violations Behavior, suggesting that the lower that participants evaluated their risk for engaging in some type of crime or minor violation, the more likely they were to engage in those types of behaviors. Furthermore, findings indicated that males were more likely than females to have committed a crime or minor violation.

Overall, the above findings suggest that polydrug users in the current study tended to evaluate their risk for engaging in polydrug use as low; however, only 58.9% of participants in the User Group responded affirmatively to the following statement: "Ecstasy is a safe drug." Therefore, 41.1% of Users self-reported use of Ecstasy, even though they did not consider it to be a 'safe' drug. These findings are consistent with those reported in a recent study conducted by Gamma, Jerome, Liechti, and Sumnall (2005), which examined the perceived harmfulness of Ecstasy use among 900 drug users, 883 of whom self-reported at least a single lifetime use of Ecstasy. Results indicated that 73.2% of respondents viewed Ecstasy to be associated with at least some risk (49.3% 'some risk,' 18.0% dangerous,' and 5.9% 'very dangerous'). Only 26.1% reported believing that Ecstasy was either 'safe' or 'very safe.' However, respondents were also asked to estimate relative drug risks, and results indicated that respondents tended to view Ecstasy to be less dangerous than many other misused substances. Specifically, alcohol, amphetamines, cigarettes, cocaine, DXM, GHB, and heroin were ranked as possessing greater risk than Ecstasy.

The above findings highlight the discrepancy between drug users' perception of risk related to their drug use and their choice to use drugs, particularly Ecstasy. In thinking back to the findings of Horvath and Zuckerman (1993) regarding sensation seeking, they suggest that possibly it is the greater willingness of sensation-seekers to accept risks that puts them at greater risk through their behavior. In the current study, given that Ecstasy users tended to be high sensation-seekers, although some Ecstasy users may not perceive the risk of Ecstasy use to be low, they may simply be more willing to accept the risks associated with engaging in this type of behavior, particularly when they perceive the risks of Ecstasy use to be less dangerous in comparison to other substances.

Motivations for First Use of Ecstasy

Participants (Users, Experimenters, Quitters, and Infrequent Users) were asked in a free-response format what the primary reason was for why they first used Ecstasy. Participants' responses were reviewed and similar responses were grouped together. The four most commonly reported reasons for first using Ecstasy were: (1) curiosity of what it would be like to use Ecstasy (53.4%); (2) use was recommended by others (heard it was "good") (11.9%); (3) to have a new experience that would help to see the world differently (7.6%); and (4) to fit in with peers (others were using) (6.4%). The current finding that curiosity was the primary reason self-reported for first use of Ecstasy is consistent with results reported by Van de Wijngaart et al. (1997) that Ecstasy was typically taken for the first time because of curiosity and a desire to "try out" the drug. It appears that the primary motivation self-reported for first use of Ecstasy has not changed over time. Furthermore, these findings suggest that first use of Ecstasy tends to result

from simple curiosity and that continued use of Ecstasy is motivated by additional factors, such as a positive experience with the drug itself (Levy et al., 2005).

Motivations for Continued Use of Ecstasy

Prior research (Ter Bogt & Engels, 2005) has found that the reasons young adults use Ecstasy can be categorized in a similar manner to the motivations for the use of alcohol (Cox & Clinger, 1988): (1) drinking to get into a positive mood (enhancement); (2) drinking to obtain social rewards (need for sociability); (3) drinking to deal with negative emotions (coping); and (4) drinking to avoid social rejection (conformism). In the current study, the Reasons for Ecstasy Use Scale: AMPS (Alter Perception; Enhance Mood; Enhance Personal Growth; and Enhance Social/Interpersonal Relationships) was developed based upon a measure of functions for Ecstasy use developed by Boys et al. (2001) as well as data obtained during the pilot period of the study. Significant group differences were found among Users, Experimenters, Quitters and Infrequent Users for how often they had used Ecstasy for each of four subscales (AMPS); pairwise comparisons revealed the following significant differences: (1) Both Users and Quitters were significantly more likely than Experimenters to endorse having used Ecstasy to enhance their mood; (2) Quitters were significantly more likely than Experimenters to self-report using Ecstasy in order to alter their perception of the world; (3) Users and Quitters were significantly more likely than Experimenters to self-report the use of Ecstasy for personal growth; and (4) Users, Quitters, and Infrequent Users were all significantly more likely than Experimenters to endorse having used Ecstasy for social/interpersonal reasons.

In addition, 'Ecstasy use profiles' (i.e., the pattern of means among the four subscales of the Reasons for Ecstasy Use Scale: AMPS) were examined and compared among Users, Experimenters, and Quitters. Although a significant group difference was found, post hoc testing revealed no significant pairwise mean differences. Notably, in examining the means for each of the four subscales for the User, Experimenter, and Quitter Groups, the highest mean for each group was for the Alter Perception subscale, and the lowest mean for each group was for the Personal Growth subscale. These findings suggest that individuals who use Ecstasy are most likely to self-report using Ecstasy to alter their perception of the world ("Just get really stoned or intoxicated;" "Enhance sensations.")

Furthermore, all participants with a history of Ecstasy use were also asked in a free-response format what the primary reason was for why they used Ecstasy. As for exploration of reasons self-reported for first use of Ecstasy, participants' responses were reviewed and similar responses were grouped together. The three most commonly reported reasons for using Ecstasy were: (1) for fun (18.2%); (2) to help to feel elated or euphoric (14.2%); and (3) to enhance an activity (12.5%). The finding that the most frequently self-reported reason for using Ecstasy was "for fun" is consistent with the above finding that, on average, Ecstasy users self-reported that they most frequently used Ecstasy to alter their perception of the world, a subscale which encompasses using Ecstasy to "Just get really stoned or intoxicated" which young adults tend to associate with having fun.

Psychological Addiction to Ecstasy

Participants in the four Ecstasy Use groups (Users, Experimenters, Quitters, and Infrequent Users) were asked, "Do you feel that you are or were at one time psychologically addicted to Ecstasy?" Approximately 26% of the participants in the four groups responded affirmatively. These findings are consistent with prior studies in which Ecstasy users self-reported a history of psychological addiction to Ecstasy (e.g., Levy et al., 2005; Parrot et al., 2002). Post hoc analyses indicated that there was a significant difference among the four groups; pairwise comparisons revealed that Users were significantly more likely than both Experimenters and Infrequent users to report psychological addiction to Ecstasy. However, Quitters were significantly more likely than Users to report a history of psychological addition to Ecstasy. Given that by definition, Experimenters have used Ecstasy no more than 3 times and Infrequent Users have not used Ecstasy more than 4 times in the past year, it is not surprising that current active Users of Ecstasy were more likely to report currently being or having been psychologically addicted to Ecstasy. Furthermore, it is possible that one of the reasons Quitters were self-reportedly no longer using Ecstasy relates to a history of psychological addition. Unfortunately, this relationship was not examined in the current study. Notably, no significant effect was found for history of attending substance related psychological counseling or a support group.

Testing of Ecstasy Pills

Participants in the four Ecstasy Use Groups (Users, Experimenters, Quitters, and Infrequent Users) were asked, "Do you or did you usually test your Ecstasy pills for their contents?" Approximately 18% of the participants in the four groups responded

affirmatively. Post hoc analyses failed to find a significant difference among the four groups, possibly due to the low rate of endorsement of testing Ecstasy pills in the overall sample.

Use of 5-HTP and Vitamins

Participants in the four groups (Users, Experimenters, Quitters and Infrequent Users) were asked, "Did or do you take any drugs or substances to try to prevent unwanted Ecstasy side-effects?" In examining the responses, 5-HTP and vitamins were the two responses that were most frequently reported. Of the total sample, 19% self-reported taking 5-HTP and 9% self-reported taking vitamins. These findings are consistent with prior reports of Ecstasy users taking steps to "minimize" negative side-effects related to their Ecstasy use (Maxwell, 2005).

Reasons for Having Never Used Ecstasy

Participants who denied a history of Ecstasy use (Controls) were asked to respond "Yes" or "No" to a list of possible reasons why they had never used Ecstasy? The five most commonly endorsed reasons were: (1) "I am concerned about the possible side effects" (61%); (2) "I have never been in an environment where others were using Ecstasy (e.g., bar, club, friend's house)" (47.5%); (3) "I have not been able to obtain it" (42.6%); (4) I know of someone who had a bad experience related to Ecstasy use" (30.7%) and (5) "Other drugs/substances that I take give me similar experiences to what I believe using Ecstasy would give me" (26.0%). These findings indicate that the primary self-reported reason why non-Ecstasy users had never used Ecstasy was related to health concerns, suggesting that current prevention strategies which emphasize the education of young adults about the risks of Ecstasy use have had some degree of success. However,

results also highlight a significant concern that a large proportion of Controls had never used Ecstasy simply due to lack of opportunity/availability, suggesting that, similar to other substances, ease of access to Ecstasy is a high risk factor for use (Levy et al., 2005).

Knowledge and Beliefs about Ecstasy

Participants in all of the Ecstasy Use Groups (Users, Experimenters, Quitters, Infrequent Users, and Controls) were asked questions pertaining to their knowledge and beliefs about Ecstasy. In examining the frequencies of responses for each question among the entire sample, the following results were found: (1) Almost all of the sample reported having read about Ecstasy on the Internet (92.8%); (2) A little more than one-third (35.5%) endorsed having read books about Ecstasy; (3) Three-quarters of the sample (75.5%) reported that they had read scientific research articles about Ecstasy; (4) Approximately one-third (34.2%) endorsed that they considered Ecstasy to be a safe drug; (5) A little less than half (43.8%) reported believing that Ecstasy is an addictive drug; (6) Approximately one-quarter (25.9%) endorsed that they felt they needed or would need to take more Ecstasy each time they used in order to get the same desired effects; (7) Almost half (48.1%) of the sample endorsed feeling that the benefits of using Ecstasy outweigh the risks; (8) Approximately 62% responded that they would stop using Ecstasy if they learned that it caused permanent brain damage; and (9) Almost 40% of the sample endorsed believing that they are more likely to engage in certain risky behaviors (unsafe sexual activity, driving, etc.) while using Ecstasy than when not under the influence of Ecstasy.

Many pertinent conclusions can be drawn from the above findings. It is clear that young adults use the Internet as a source of information, particularly about drugs. Similar

to current study findings, Falck, Carlson, Wang and Siegal (2004) found that a large proportion (50%) of their sample of 304 young adult Ecstasy users (aged 18-30) had self-reported use of the Internet to obtain information about Ecstasy. Furthermore, the majority of the current sample self-reported having read scientific research articles about Ecstasy. Given the current availability of scientific literature on the Internet, results suggest that young adults are taking advantage of these Internet resources and that the Internet may provide a means for the implementation of mass scale substance-related prevention/intervention efforts.

Summary of 3 Key Variables Associated with Significant Differences among Users, Experimenters, and Quitters

In summary, three variables were found to be of importance in exploring potential factors that distinguish between young adults who experiment with the use of Ecstasy and then quit (Experimenters), become active users of Ecstasy and continue use (Users) and become active users of Ecstasy and then quit (Quitters). First, age of initial use of Ecstasy was found to be a significant factor. Findings suggest that the younger individuals are when they when first experiment with Ecstasy, the more at risk they are for future risk. The second significant factor was found to be the peer group. Specifically, results suggest that young adults who have peers who use Ecstasy are at great risk for either the initiation or continuation of current Ecstasy use. Likewise, given the finding that Quitters tended to have fewer friends who currently used Ecstasy than Users, results also suggest that the peer group plays an important role in a young adult's decision and/or ability to either quit or maintain sobriety from Ecstasy use following prior Ecstasy use; notably peer pressure may facilitate the use of Ecstasy as well as inhibit the use of Ecstasy (Ter Bogt & Engels,

2005). Consequently, it is vital that intervention plans evaluate Ecstasy users in the context of their peer group. Finally, significant group differences were found for the reasons endorsed for the continued use of ecstasy. Notably, results suggest that individuals who use ecstasy beyond the period of experimentation are significantly more likely to use ecstasy to enhance social/interpersonal relationships.

Study Limitations and Directions for Future Research

Experimental Design

Although prior research (Petraitis et al., 1998) has examined risk factors for the initiation of illicit substance use [e.g., friendship patterns and peer behaviors, absence of supportive parents, psychological temperament; history of abuse; socioeconomic status; affective states], a theoretical model does not exist which would provide for examining different 'types' of ecstasy users. Therefore, this study was designed to examine risk factors thought to differentiate 'types' of ecstasy users. The design of the current study was retrospective; therefore, it did not provide for the evaluation of dynamic or causal relationships between potential risk factors and Ecstasy use. Results of the current study are clearly consistent with prior research findings of the significant role of the peer group in Ecstasy use. As reviewed earlier, researchers have found that friends can influence drug use and that drug use itself can influence the selection of friends (Dishion & Owen, 2002). A prospective study would allow for the evaluation of the directionality of the influence of peer group and Ecstasy use among young adults.

Categorical v. Dimensional Approach

A categorical approach was used to assign participants to each of the Ecstasy Use Groups. Given that criteria for such groups (Users, Experimenters, and Quitters) were not

available in the literature, the inclusion criteria for each group in this study were somewhat arbitrary and narrow. As a result of this categorical approach, many ecstasy users and non-ecstasy polydrug users were excluded. A future study could contribute to the literature by using a dimensional approach to examine the full continuum of individuals with a history of ecstasy use.

Sample Size

Sample size appeared to be adequate for examining group differences for the primary dependent variables: Sensation Seeking subscales (Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility); Normative Influence Scale; Social Conformity subscales (Law Abidance, Liberalism, and Religiosity); General Risk Appraisal Scale subscales for own risk appraisal and own risky behavior (Crime Risk, Financial Risk, Minor Risk Violations, and Sports Risk); the Mood subscale of the Reasons for Ecstasy Use: AMPS; and the total number of drugs used during the past 90 days. Analyses revealed that for each dependent variable, either significant differences were clearly evident among the groups (ps < .001) or they were not at all present. However, power may have been low for post hoc tests. In addition, sample size, or the base rate of responding to the items, was found to be inadequate for examining some of the binary outcome variables, particularly those related to participant's knowledge and beliefs regarding Ecstasy. Due to the sample size, logistic regressions could not be conducted because the statistical model was too complex for the data in such a relatively small sample.

Validity of Drug History Data

Because the drug history questions were in free–response format, numerous participants reported that they did not know their history of use for the past year or lifetime because the frequency of their use was extremely high whereas other participants provided what were clearly random responses (e.g. 999,999). Consequently, given concerns regarding the validity of data, past year and lifetime use were not analyzed. This restriction in the analysis of data limited examination of Ecstasy use spanning an extended period of time; frequency of Ecstasy use may have been relatively infrequent during the past 90-days but rather high during the past year which could not be ascertained from the data. However, this response, or lack of response tendency, suggests that participants responded in such a manner when they could not accurately estimate their history of use, which lends credibility to the data estimates that were provided for past 90-day use. Overall, participants' apparent difficulty in providing free-response estimates of their past year and lifetime history of drug use suggests that a fixed response format such as a Likert scale may have provided for increased validity of data. However, such an approach would require a clear understanding of how to scale each response point on the scale.

Another limitation related to the collection of drug history data was that large variances for lifetime history of Ecstasy use may have been present within the Ecstasy Use Groups (Users, Experimenters, Quitters and Infrequent Users), but could not be detected. For example, one participant in the User group may have used Ecstasy 8 times in the past year and have a lifetime history of Ecstasy use equal to 8 times; however, another participant in the User group may have used Ecstasy 8 times in the past year, but

have a lifetime history of Ecstasy use equal to 800 times. Limitations in the collection of data prevented these types of differences from being analyzed.

Sampling and Response Biases

Because this study used convenience sampling, the design of this study was quasi-experimental; participants self-selected themselves for the study and could not be randomly assigned to an Ecstasy Use Group. In addition, the length of the survey may have resulted in some prospective participants choosing not to participate in the survey. Some individuals may have begun completing the survey and then stopped, thus creating another form of response bias. It is likely that those individuals who chose not to participate at all, or who failed to complete the survey, were in some way different from those who chose to participate and to complete the survey. Due to limitations in the collection of drug history data, it is possible that a cohort of 'heavy' ecstasy users was not represented in this study and limits the generalizabilty of results. Furthermore, differences in motivation for completing the survey (i.e., for the lottery, to contribute to the field of psychology) may have affected the amount of time, thought, and effort put into responding to questions.

Accuracy of Responding

The order of the questionnaires within the survey was not varied among the participants, and thus, order effects may have been present. There may have been a differential shift in the means as well as lower reliability than what may have been obtained had the order of the measures been varied. The length of time taken to complete the survey varied among participants, and some measures were much longer than others. Possibly, the obtained reliabilities for the Social Conformity Scale and the Sensation

Seeking Scale would have been higher had these measures come earlier in the survey. It is possible that in some cases, failure to find significant group differences may have been due to low power resulting from low reliability. However, it is important to note that the General Risk Appraisal Scale, a 120-item measure, was the last measure to be completed by participants and for which adequate reliabilities were obtained. Therefore, the lack of significant differences (i.e., sensation seeking, social conformity, risky appraisal and risky behavior, etc.) may truly be due to similar characteristics among polydrug users rather than a result of insufficient power.

Generalizability

It is important to note that the current study was limited to the use of Ecstasy among young adults in the US. Given the extent of the use of Ecstasy outside of the US, a cross cultural study would make a significant contribution to the literature. Moreover, it would be beneficial to examine different 'types' of ecstasy users and patterns of use among older adults (beyond 25 years of age) in comparison to younger adults (ages 18-25).

In addition, study participants were only recruited via the Internet. Therefore, individuals who did not have access to the Internet did not have the opportunity to participate. As noted by Gamma et al. (2005), the Internet provides for rapid access to and sampling of a large population, and anonymity of response may facilitate greater honesty in responses to questions regarding illegal behaviors. However, a study using the Internet does not provide for verification of factors such as age, sex, education, and current intoxication, which could be controlled for in the laboratory. Although the generalizabilty of findings from the current study is limited because a non-random

sample was used, the demographic characteristics of participants are similar to those found in recent studies of young adults in the United States with a history of Ecstasy use.

Notably, the demographic characteristics of Ecstasy users from the 2003 NSDUH study and the current study (see Table 55) are similar to the demographic data reported by Yacoubian, Deutsch, and Schumacher (2004) in their study of adult club rave attendees along the Baltimore-Washington corridor in 2002. The majority of this sample (2004) was male (64%) and Caucasian (69%), with 72% self-reporting a history of Ecstasy use. The mean age of the sample was 21 years and 96% had completed at least the 12th grade. As noted by Yacoubian et al. (2004) and consistent with prior research (Urbach, Reynolds, & Yacoubian, 2003; Yacoubian, 2002, 2003; Yacoubian, Arria, Fost, & Wish, 2002; Arria, Yacoubian, Fost & Wish, 2002), the findings suggest that the use of Ecstasy is most common among educated, Caucasian, young adults.

Furthermore, prior research has found that young adults use the Internet to obtain information about drugs and that such information can influence drug-taking behavior (Borzekowski and Rickert, 2002; Wax, 2002). In 2003, Falck, Carlson, Wang, and Siegal (2004) conducted a study which specifically examined the use of the Internet by young adult ecstasy users. Falck et al. (2004) used a respondent driven sampling plan to recruit a community sample of recent ecstasy users (n = 304), aged 18-30, from a Metropolitan area in central Ohio. The sample was largely male (66.1%) and predominately white (81.6%), with a mean age of 21.2 years (S.D. = 2.8) and some college or a college degree reported by 50.3% of participants. The mean age of first use of ecstasy was 18.7 years (S.D. = 2.9). The demographic characteristics of the sample of Ecstasy users in the Falck et al. study (2004) are similar to those found for the current study which only recruited

through the Internet. Notably, Falck et al. (2004) found that about half of their sample had used the Internet to obtain information about Ecstasy, with younger and more educated participants significantly more likely to do so. This finding is consistent with the findings of the current study in that Ecstasy users frequently use the Internet to obtain information about Ecstasy. Therefore, future studies which examine various modes of prevention and intervention relating to the use of Ecstasy among young adults, specifically, the Internet as an interface, would make a significant contribution to the literature.

Table 55

Comparison of Demographic Data from a Subset of Participants (Ages 18-25 with a History of Ecstasy Use) from the 2003 National Survey on Drug Use and Health (NSDUH) with Demographic Data of Participants with a History of Ecstasy Use from the Current Study (Users, Experimenters, Quitters, and Infrequent Users)

Variable	NSDUH 2003	Current Study
Age of first use of Ecstasy (years)	*M* = 18.5 *SD* = 2.14	*M* = 18.0 *SD* = 2.15
Gender (male)	52.7 %	56.6%
Education (at least some college)	88.8 %	82.9%
Ethnicity (non-Hispanic white)	74.9 %	78.6%

Appendix A

Recruitment Posting

PARTICIPANTS NEEDED (AGES 18-25) FOR AN ANONYMOUS INTERNET STUDY CONDUCTED BY RESEARCHERS FROM THE DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF MARYLAND, COLLEGE PARK. FOR FURTHER INFORMATION ABOUT THE STUDY INVESTIGATORS, VISIT THE PSYCHOLOGY DEPARTMENT'S CLINICAL PSYCHOLOGY PROGRAM WEBPAGE.

PURPOSE: I am a graduate student at the University of Maryland, College Park and I am conducting this study for my dissertation. My goal is to increase researchers' understanding of young adults' use of various substances (Ecstasy, Amphetamines, LSD, Cocaine Powder, Psilocybin Mushrooms, Heroin, or Prescription Drugs in a non-prescribed manner) in the United States, with a particular focus on Ecstasy.

COMPENSATION: After completing the survey, you will have the option to enter a lottery for one of five $50 prizes. In order to participate in the lottery, you will need to provide an email address that will not be connected in any way to the information you provide in the survey. You can create a free email account by clicking here. If you are a winner in the lottery, your email address will be submitted to PayPal, an internet payment service. Winners will receive an email from PayPal which will provide instructions for how to open a *free* PayPal account to which the $50 will be credited. You will then have the option to transfer the $50 to a checking account, request a check, or send the $50 to someone else. For more information on how PayPal can be used to make this anonymous payment, click here.

CRITERIA: You live in the United States and have used ECSTASY OR at least 2 of the following: Marijuana, Amphetamines, LSD, Cocaine powder, Psilocybin mushrooms, heroin, or a prescription drug in a non-prescribed manner

If you have any questions, send an email to: klevy@psyc.umd.edu

Click NEXT below to take a brief screening to determine if you meet the selection criteria for this study. The survey will take approximately 15 to 30 minutes.

NOTE: SCROLL DOWN ON EACH PAGE TO ANSWER QUESTIONS, THEN CLICK NEXT.
SOME PAGES HAVE ONLY ONE QUESTION.

NEXT **PAGE 1 OF 22**

Appendix B

Lottery Page

ENTERING THE LOTTERY

You have the opportunity to enter a lottery for $50. In order to participate in the lottery, you will need to provide an email address that will be emailed to klevy@psyc.umd.edu. There is no way in which we would be able to connect this email address to the information you provided in the survey you just completed. However, if your name typically appears in parentheses when you send an email, and you use this email account, we will know that you participated in the study. If you do not currently have an email account or would like to create a new one that is anonymous, you can create a *free* email account by clicking here. If you are a winner in the lottery, an email will be sent from an internet payment service, PayPal, to the email address you provide. This email will provide instructions for how to open a *free* PayPal account which will enable you to either transfer the $50 you won to a checking account, request a check, or send the $50 to someone else. For more information on PayPal, click here.

If you would like to participate in the lottery, please enter your email address in the box below. Your computer will use your default email server to send your email.

Submit Query

If you have any problems submitting your email address above, please send an email with the SUBJECT: LOTTERY to klevy@psyc.umd.edu and include the email address where you would like to be contacted if you are a winner in the lottery.

Once again, thank you for participating in our research study.

Appendix C

Screening Questionnaire

Please read the following 2 statements:

(A) My age falls into the category of 18-25.
(B) I live in the United States.

Are BOTH of the 2 statements above (A and B) TRUE about you?

If NO, please CLICK HERE

If YES, please CONTINUE with Question #1 below.

1. Please read the following 4 statements:

(A) I have used ECSTASY.
(B) I have NOT used ECSTASY MORE THAN 3 times.
(C) I have NOT used ECSTASY in the past 6 months.
(D) I do NOT intend to use ecstasy in the future.

Are ALL 4 of the statements above (A, B, C, and D) TRUE about you?

☐ **YES** ☐ **NO**

2. Please read the following 2 statements:

(A) I have used ECSTASY 12 or more times in the past year (past 12 months).
(B) I intend to continue using ECSTASY in the future.

Are BOTH of the 2 statements above (A and B) TRUE about you?

☐ **YES** ☐ **NO**

3. Please read the following 3 statements:

(A) I have used ECSTASY 12 or more times.
(B) I have NOT used ECSTASY in the past 6 months.
(C) I do NOT intend to use ECSTASY in the future.

Are ALL 3 of the statements above (A, B, and C) TRUE about you?

☐ **YES** ☐ **NO**

4. Please answer TRUE or FALSE:

I have NEVER used ECSTASY.

- ☐ **TRUE**
- ☐ **FALSE**

5. Please answer TRUE or FALSE:

I am currently using AT LEAST 2 of the following substances and intend to use these substances AND/OR others on the list below in the future:

Marijuana
Amphetamines
LSD
Cocaine powder
Psilocybin Mushrooms
Heroin
Prescription drug in a non-prescribed manner

- ☐ **TRUE**
- ☐ **FALSE**

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Appendix D

Demographics Questionnaire

Please answer the following questions:

6. **How old are you (years)?**
   - a. ☐ **18**
   - b. ☐ **19**
   - c. ☐ **20**
   - d. ☐ **21**
   - e. ☐ **22**
   - f. ☐ **23**
   - g. ☐ **24**
   - h. ☐ **25**
7. **What state are you currently living in the United States?**
   Please type your state in the box. ☐
8. **What is your sex?**
   - a. ☐ **Male**
   - b. ☐ **Female**
9. **What is your sexual orientation?**
   - a. ☐ **Heterosexual**
   - b. ☐ **Homosexual**
   - c. ☐ **Bisexual**

10. Please select <u>ALL</u> items that describe you:

- **a.** ☐ **I am currently a high school student.**
- **b.** ☐ **I am currently a college student.**
- **c.** ☐ **I am currently employed.**
- **d.** ☐ **I am currently unemployed.**

11. What is the highest level of education you completed?

- **a.** ○ **Some High School**
- **b.** ○ **High School Diploma or GED**
- **c.** ○ **Some College**
- **d.** ○ **Associates Degree**
- **e.** ○ **B.A. or B.S.**
- **f.** ○ **M.A. or M.S.**
- **g.** ○ **Ph.D.**
- **h.** ○ **M.D.**

12. What is or was your approximate high school GPA (grade point average) letter grade equivalent?

- **a.** ○ **Don't Know**
- **b.** ○ **A**
- **c.** ○ **B**
- **d.** ○ **C**
- **e.** ○ **D**
- **f.** ○ **E**
- **g.** ○ **F**

13. **What is or was your COLLEGE GPA (if applicable) letter grade equivalent?**

    a. ☐ **Not Applicable**

    b. ☐ **Don't Know**

    c. ☐ **A**

    d. ☐ **B**

    e. ☐ **C**

    f. ☐ **D**

    g. ☐ **E**

    h. ☐ **F**

14. **What is your current marital status?**

    a. ☐ **Single**

    b. ☐ **Married**

    c. ☐ **Divorced**

    d. ☐ **Separated**

    e. ☐ **Widowed**

15. **If you are financially DEPENDENT on your caregiver(s), please estimate the combined income of your caregivers' annual household income.** _____

16. **If you are financially INDEPENDENT, please estimate your annual household income.** _____

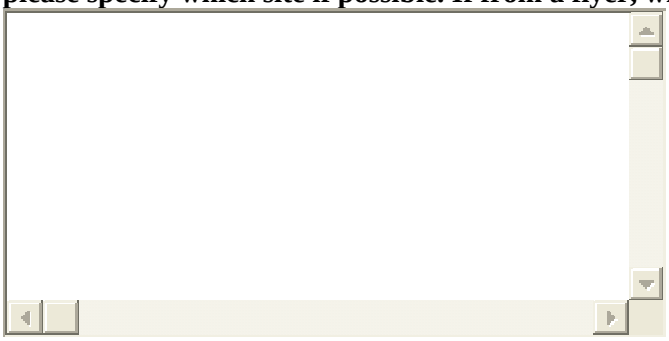
17. What is your Ethnicity? Please select ALL that apply.

- **a.** ☐ **Caucasian**
- **b.** ☐ **African-American**
- **c.** ☐ **Hispanic**
- **d.** ☐ **Asian/Pacific Islander**
- **e.** ☐ **Native American**
- **f.** ☐ **Other**

18. Have you ever received counseling or attended a support group for your substance use?

☐ **YES** ☐ **NO**

19. How did you hear about this study? Please be as specific as possible (e.g., website; flyer; friend who saw it on a particular website; AOL chat room; AOL Bulletin Board; YAHOO chat room, search engine such as Google, etc.). If from a website, please specify which site if possible. If from a flyer, where was it posted?



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Appendix E

Drug History Questionnaire

PLEASE TYPE A NUMBER IN THE BOX IN RESPONSE TO THE FOLLOWING QUESTIONS REGARDING YOUR USE OF ECSTASY. PLEASE PROVIDE YOUR BEST ESTIMATE RATHER THAN LEAVING A BOX BLANK. IF YOU NEED TO, USE A PLUS. FOR EXAMPLE, 100+ = MORE THAN 100 TIMES.

IF YOU HAVE NEVER USED ECSTASY, PLEASE SKIP TO THE BOTTOM OF THIS PAGE AND CLICK NEXT.

20. Age you first used ECSTASY ☐

21. Number of times you used ECSTASY in the past 30 days ☐

22. Number of times you used ECSTASY in the past 90 days ☐

23. Number of times you used ECSTASY in the past year (past 12 months) ☐

24. Number of times you used ECSTASY in your lifetime ☐

25. In thinking of your most recent period of ecstasy use, how many pills would you typically take in one occasion? ☐

26. What is the largest number of ecstasy pills you have ever taken in one occasion? ☐

27. Do you feel that you are or were at one time physically addicted to ecstasy?

☐ **YES** ☐ **NO**

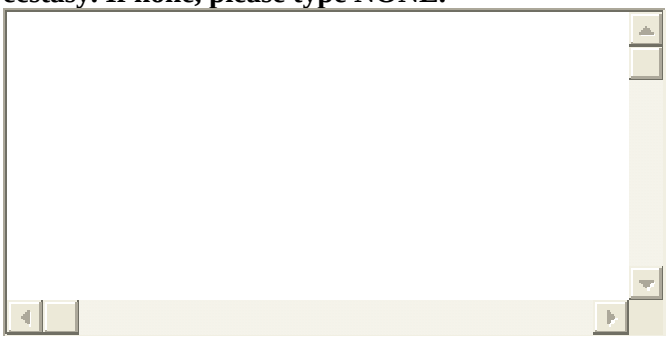
28. Do you feel that you are or were at one time psychologically addicted to ecstasy?

☐ **YES** ☐ **NO**

29. Do or did you usually test your ecstasy pills for their contents?

☐ **YES** ☐ **NO**

30. Please list any other drugs (including alcohol) that you did or do usually take with ecstasy. If none, please type NONE.



31. Did or do you take any drugs or substances to try to prevent unwanted ecstasy side-effects? If yes, please list any substances in the box. If no, please type NO.

32. Have you quit using ECSTASY?

☐ **YES** ☐ **NO**

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Please type a number in the box in response to the following questions. Please provide your best ESTIMATE rather than leaving a box blank. If you need to, estimate using +. For example, 100+ = more than 100 times. If you have NEVER used MARIJUANA, click NEXT, below.

84. Age you first used MARIJUANA ☐

85. Number of times you used MARIJUANA in the past 30 days ☐

86. Number of times you used MARIJUANA in the past 90 days ☐

87. Number of times you used MARIJUANA in the past year (past 12 months) ☐

88. Number of times you used MARIJUANA in your lifetime ☐

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Please type a number in the box in response to the following questions. If you have never used AMPHETAMINES, click NEXT, below.

89. Age you first used AMPHETAMINES ☐

90. Number of times you used AMPHETAMINES in the past 30 days ☐

91. Number of times you used AMPHETAMINES in the past 90 days ☐

92. Number of times you used AMPHETAMINES in the past year ☐

93. Number of times you used AMPHETAMINES in you lifetime ☐

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Please type a number in the box in response to the following questions. If you have never used LSD, click NEXT, below.

94. Age you first used LSD ☐

95. Number of times you used LSD in the past 30 days ☐

96. Number of times you used LSD in the past 90 days ☐

97. Number of times you used LSD in the past year ☐

98. Number of times you used LSD in your lifetime [ ]

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Please type a number in the box in response to the following questions. If you have never used COCAINE POWDER, click NEXT, below.

99. Age you first used COCAINE POWDER [ ]

100. Number of times you used COCAINE POWDER in the past 30 days [ ]

101. Number of times you used COCAINE POWDER in the past 90 days [ ]

102. Number of times you used COCAINE POWDER in the past year [ ]

103. Number of times you used COCAINE POWDER in your lifetime [ ]

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Please type a number in the box in response to the following questions. If you have never used PSILOCYBIN MUSHROOMS, click NEXT, below.

104. Age you first used PSILOCYBIN MUSHROOMS [ ]

105. Number of times you used PSILOCYBIN MUSHROOMS in the past 30 days
[ ]

106. Number of times you used PSILOCYBIN MUSHROOMS in the past 90 days
[ ]

107. Number of times you used PSILOCYBIN MUSHROOMS in the past year
[ ]

108. Number of times you used PSILOCYBIN MUSHROOMS in your lifetime
[ ]

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Please type a number in the box in response to the following questions. If you have never used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER, click NEXT, below.

109. Age you first used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER

110. Number of times you used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER in the past 30 days

111. Number of times you used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER in the past 90 days

112. Number of times you used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER in the past year

113. Number of times you used a PRESCRIPTION DRUG IN A NON-PRESCRIBED MANNER in your lifetime

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Please type a number in the box in response to the following questions. If you have never used POLYTHENZINE, click NEXT, below.

114. Age you first used POLYTHENZINE

115. Number of times you used POLYTHENZINE in the past 30 days

116. Number of times you used POLYTHENZINE in the past 90 days

117. Number of times you used POLYTHENZINE in the past year

118. Number of times you used POLYTHENZINE in your lifetime

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Please type a number in the box in response to the following questions. Please provide your best ESTIMATE. If you need to, use a plus. For example, 100+ = more than 100 times. If you have never used ALCOHOL, click NEXT, below.

119. Age you first used ALCOHOL

120. Number of times you used ALCOHOL in the past 30 days

121. Number of times you used ALCOHOL in the past 90

122. Number of times you used ALCOHOL in the past year

123. Number of times you used ALCOHOL in your <u>lifetime</u>

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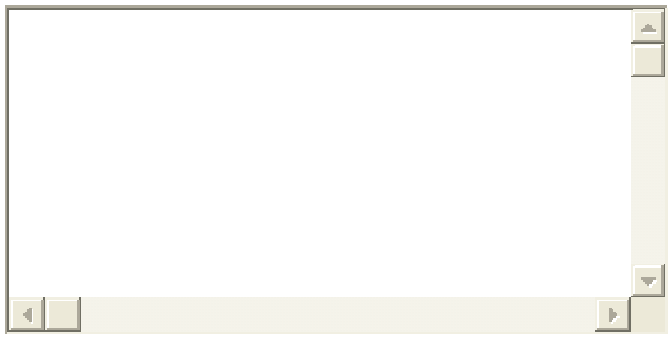
124. Please list the names of any additional drugs (not asked about above) which you have used in the PAST 30 DAYS.



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If you have EVER used ECSTASY, please click NEXT below.

If you have NEVER used ECSTASY , please respond with TRUE or FALSE to the following questions regarding reasons why you have NEVER used ECSTASY.

I HAVE NEVER USED ECSTASY BECAUSE .....

68. Of the cost.

- **TRUE**
- **FALSE**

69. I know of someone who had a bad experience related to ecstasy use.

- **TRUE**
- **FALSE**

70. I am concerned about the possible side effects.

- **TRUE**
- **FALSE**

71. I have not been able to obtain it (lack of availability).

- **TRUE**
- **FALSE**

72. It is illegal.

- **TRUE**
- **FALSE**

73. I am concerned about the legal consequences if I am caught.

- **TRUE**
- **FALSE**

74. I am concerned about becoming addicted.

- **TRUE**
- **FALSE**

75. I am concerned about the reaction of my parent(s).

- **TRUE**
- **FALSE**

76. Ecstasy use goes against my religious/spiritual beliefs/values.

TRUE

FALSE

77. I am concerned about testing positive on a drug test (e.g., work, athletic team, testing by parent).

TRUE

FALSE

78. My friends do not support the use of ecstasy.

TRUE

FALSE

79. I have never been in an environment where others were using ecstasy (e.g., bar, club, friend's house).

TRUE

FALSE

80. Ecstasy does not produce the effects that I desire.

TRUE

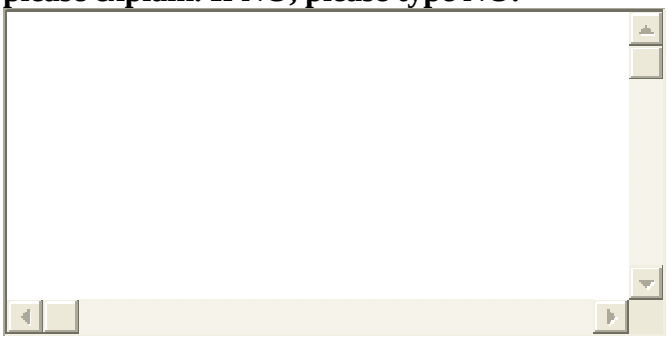
FALSE

81. Other drugs/substances that I take give me similar experiences to what I believe using ecstasy would give me.

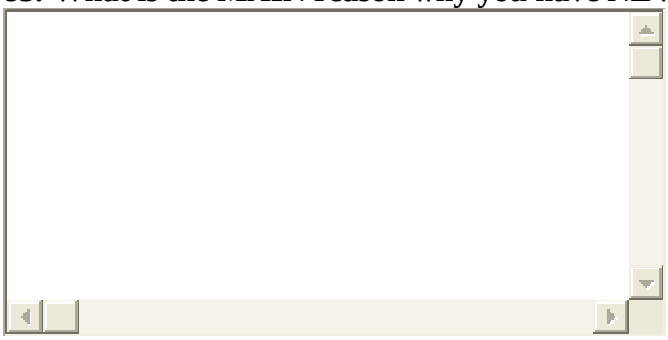
TRUE

FALSE

82. Are there any other reasons why you have NEVER used ECSTASY. If YES, please explain. If NO, please type NO.



83. What is the MAIN reason why you have NEVER used ECSTASY?



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Normative Influence

165. Please estimate how many of your friends currently use ecstasy. Please think of friends as people with whom you regularly spend time with (at least once a month).

a. ☐ **None**

b. ☐ **A few**

c. ☐ **Some**

d. ☐ **Most**

e. ☐ **All**

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Appendix G

Reasons for the Use of Ecstasy Scale: AMPS

PLEASE ANSWER THE FOLLOWING QUESTIONS REGARDING THE REASONS YOU HAVE USED ECSTASY.

HOW OFTEN HAVE YOU USED ECSTASY TO ……..

33. Make yourself feel better when down or depressed?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

34. Help you to 'keep going' on a night out with friends?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

35. Help you to feel elated or euphoric?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

36. Just get really stoned or intoxicated?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

37. Help you to lose weight?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

38. Help you to enjoy the company of your friends?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

39. Help you to relax?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

40. Help you to feel more confident or better able to talk to people in a social situation?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

41. Improve the effects of other substances?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

42. Help ease the after effects of other substances?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

43. Help you to stay awake?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

44. Help you to lose your inhibitions?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

45. Enhance feelings when having sex?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

46. Help you to stop worrying about a problem?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

47. Help make something you were doing less boring?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

48. Help you to concentrate, to work, or to study?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

49. Enhance an activity such as listening to music, playing a game or playing a sport?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

50. Enhance empathy?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

51. Enhance sensations (touch, taste, sight and smell)?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

52. Enhance intimacy?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

53. Develop insight into yourself?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

54. Develop insight into others?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

55. Increase your ability to express yourself openly and honestly?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

56. Have a new experience that would help you to see the world differently?

a. ☐ Never

b. ☐ Rarely

c. ☐ Sometimes

d. ☐ Often

e. ☐ Always

57. As part of religious/spiritual practices?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

58. Facilitate a psychotherapeutic process?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

59. Facilitate creative processes such as drawing, writing, playing music, singing or other artistic activities?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

60. Relieve pain?

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

61. Fit in with peers (because others were using)

    a. ☐ Never

    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

62. Because it was there (available where you were spending time)

    a. ☐ Never

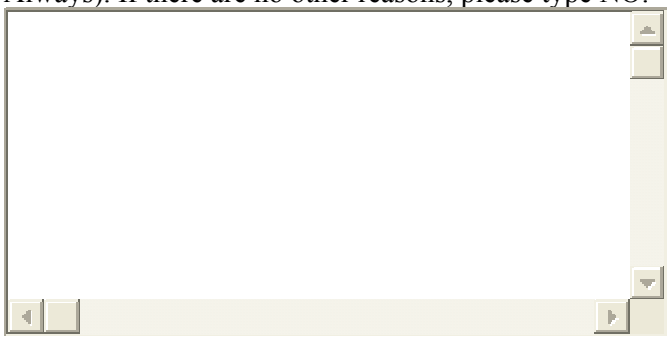
    b. ☐ Rarely

    c. ☐ Sometimes

    d. ☐ Often

    e. ☐ Always

63. Are there any other reasons why you have used ecstasy? If yes, please list each reason and specify how often you used ecstasy for each reason. (Rarely, Sometimes, Often, or Always). If there are no other reasons, please type NO.



64. People use ecstasy for many different reasons. Is there a main reason why you use or used ecstasy? If yes, please explain your reason. If no, please type NO.

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Appendix H

Frequency Distribution of Responses to the 30 Items of the Reasons for Use of Ecstasy Scale: AMPS

Frequency of Participants Who Endorsed Having Ever Used Ecstasy for Each of the 30 Items (Reasons for Ecstasy Use)

Reason for Use of Ecstasy	Frequency
Make yourself feel better when down or depressed	81
Help you to 'keep going' on a night out with friends	126
Help you to feel elated or euphoric	207
Just get really stoned or intoxicated	168
Help you to lose weight	24
Help you to enjoy the company of your friends	157
Help you to relax	128
Help you to feel more confident or better able to talk to people in a social situation	127
Improve the effects of other substances	97
Help ease the after effects of other substances	36
Help you to stay awake	87
Help you to lose your inhibitions	128
Enhance feelings when having sex	115
Help you to stop worrying about a problem	78

Help make something you were doing less boring	122
Help you to concentrate, to work, or to study	22
Enhance an activity such as listening to music, playing a game or playing a sport	159
Enhance empathy	127
Enhance sensations (touch, taste, sight and smell)	191
Enhance intimacy	158
Develop insight into yourself	162
Develop insight into others	155
Increase your ability to express yourself openly and honestly	154
Have a new experience that would help you to see the world differently	178
As part of religious/spiritual practices	47
Facilitate a psychotherapeutic process	64
Facilitate creative processes such as drawing, writing, playing music, singing or other artistic activities	98
Relieve pain	37
Fit in with peers (others were using)	87
Because it was there	169

Note. N = 221.

Appendix I

Reasons for First Use of Ecstasy Scale: AMPS

65. Please select ALL of the reasons below for WHY YOU USED ECSTASY THE FIRST TIME (select as many as apply).

a. ☐ Make yourself feel better when down or depressed

b. ☐ Help you to 'keep going' on a night out with friends

c. ☐ Help you to feel elated or euphoric

d. ☐ Just get really stoned or intoxicated

e. ☐ Help you to lose weight

f. ☐ Help you to enjoy the company of your friends

g. ☐ Help you to relax

h. ☐ Help you to feel more confident or better able to talk to people in a social situation

i. ☐ Improve the effects of other substances

j. ☐ Help ease the after effects of other substances

k. ☐ Help you to stay awake

l. ☐ Help you to lose your inhibitions

m. ☐ Enhance feelings when having sex

n. ☐ Help you to stop worrying about a problem

o. ☐ Help make something you were doing less boring

p. ☐ Help you to concentrate, to work, or to study

q. ☐ Enhance an activity such as listening to music, playing a game or playing a sport

r. ☐ Enhance empathy

s. ☐ Enhance sensations (touch, taste, sight and smell)

t. ☐ Enhance intimacy

u. ☐ Develop insight into yourself

v. ☐ Develop insight into others

w. ☐ Increase your ability to express yourself openly and honestly

x. ☐ Have a new experience that would help you to see the world differently

y. ☐ As part of religious/spiritual practices

z. ☐ Facilitate a psychotherapeutic process

aa. ☐ Facilitate creative processes such as drawing, writing, playing music, singing or other artistic activities

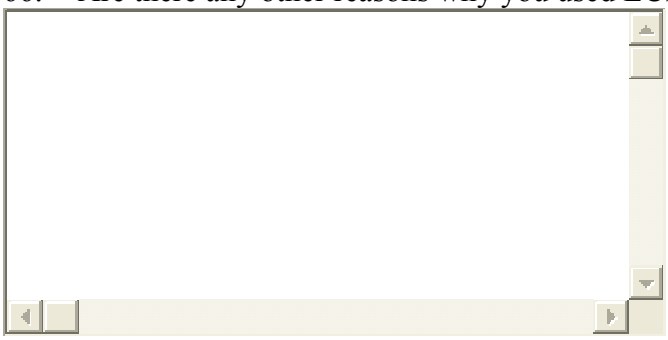
bb. ☐ Relieve pain

cc. ☐ Fit in with peers (others were using)

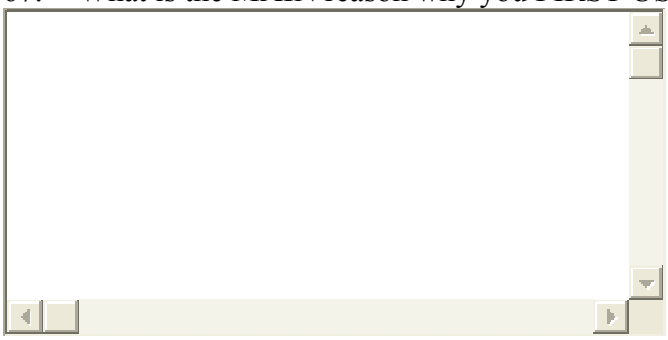
dd. ☐ Because it was there (available where you were spending time)

ee. ☐ Curious what it would be like to use Ecstasy

66. Are there any other reasons why you used ECSTASY the first time?



67. What is the MAIN reason why you FIRST USED ECSTASY?



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Appendix J

Measure of Knowledge and Beliefs about Ecstasy

Please answer the following questions with either TRUE or FALSE.

166. I have read about ecstasy on the Internet.

☐ **TRUE**

☐ **FALSE**

167. If I learned that using ecstasy caused permanent brain damage, I would stop using ecstasy.

☐ **TRUE**

☐ **FALSE**

168. I believe there are some jobs that I would not enjoy doing.

☐ **TRUE**

☐ **FALSE**

169. Ecstasy is an addictive drug.

☐ **TRUE**

☐ **FALSE**

170. I do some things better than others.

☐ **TRUE**

☐ **FALSE**

171. I feel the benefits of using ecstasy outweigh the risks of using ecstasy.

☐ **TRUE**

☐ **FALSE**

172. I have read books about ecstasy.

☐ **TRUE**

☐ **FALSE**

173. Ecstasy is a safe drug.

☐ **TRUE**

☐ **FALSE**

174. Some things don't turn out exactly as I plan them.

TRUE

FALSE

175. I have read scientific research articles about ecstasy.

TRUE

FALSE

176. I am more likely to engage in certain risky behaviors (unsafe sexual activity, driving, etc.) while using ecstasy than when I am not using ecstasy.

TRUE

FALSE

177. I have sometimes hesitated before making a decision.

TRUE

FALSE

178. I feel that I must (or would need to) take more ecstasy each time using in order to get the same desired effects.

TRUE

FALSE

179. Of the people I know, I like some better than others.

TRUE

FALSE

180. I am currently high.

TRUE

FALSE

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Appendix K

Non-participant Debriefing

Thank you for your interest in our Ecstasy study. Although you do not meet the selection criteria for this research project, please find below educational information about Ecstasy. If you have any questions, feel free to send an email to *klevy@psyc.umd.edu*.

What is MDMA?

MDMA (3-4 methylenedioxymethamphetamine) is more commonly known as Ecstasy and is a synthetic, psychoactive drug which is chemically similar to the stimulant, methamphetamine, and the hallucinogen, mescaline. MDMA is known for its empathogenic, euphoric, and stimulant effects. In its pure form, MDMA is a white crystalline powder that can be found in capsule form, in pressed pills, or as loose powder. One of the primary concerns for ecstasy users is purity. Ecstasy tablets may contain other substances in addition to MDMA which may have undesired effects. In addition, other drugs which are chemically similar to MDMA are sometimes sold as ecstasy. For example, PMA (paramethoxyamphetamine) is a synthetic hallucinogen that has stimulant effects that are similar to MDMA, but the effects take longer to occur. Deaths by overdose of PMA have been reported in the U.S. and Australia.

What are the biological effects of MDMA?

MDMA affects the serotonin system in the brain which plays an important role in regulating mood, aggression, sexual activity, sleep and sensitivity to pain. Animal research suggests that MDMA has long term effects on the serotonin system which appear to be toxic. However, further research is needed to fully understand the effects of MDMA on the human brain. A great controversy continues among researchers regarding the question of neurotoxicity.

What are the psychological effects of MDMA?

Reports of the psychological effects of MDMA vary. Users of MDMA have frequently reported experiencing feelings of peace and happiness, emotional closeness with others, and an enhancement of the senses. However, other reported effects that may occur during and sometimes days or weeks after the use of MDMA, include confusion, depression, anxiety, drug craving and paranoia.

A recent study was conducted by Roiser, J.P., Cook, L.J., Cooper, J.D., Rubinsztein, D.C., and Sahakian, B.J. (2005) which examined the association between ecstasy use and subsequent depression. Specifically, the focus of the research was to assess the contribution of a functional polymorphism in the gene encoding serotonin transporter to changes in emotional processing following chronic ecstasy use. Based upon the results of their study, the authors hypothesize that chronic ecstasy use may cause long-term changes to the serotonin system, and that ecstasy users carrying the s allele may be at particular risk for emotional dysfunction. Therefore, findings suggest that an individual's risk of developing chronic depression as a result of taking ecstasy depends significantly on one's genes.

Summary of reported effects of MDMA

Below is a summary of data published by Erowid (www.erowid.org) which was gathered from users, research, and other resources detailing reported effects of MDMA. It is important to consider individual differences in experiences. The effects of MDMA may vary significantly based on a variety of factors (body chemistry, age, gender, physical health, etc.). Please note that negative side effects tend to increase with higher doses and frequent use:

- **Extreme mood lift**
- **Increased willingness to communicate**
- **Increase in energy (stimulation)**
- **Ego softening**
- **Feelings of comfort, belonging, and closeness to others**
- **Feelings of love and empathy**
- **Forgiveness**
- **Increased awareness & appreciation of music**
- **Increased awareness of senses (eating, drinking, smell)**
- **Profound life-changing spiritual experiences**
- **Neurotically based fear dissolution**
- **Bright and intense sensations**
- **Urge to hug and kiss people**
- **Appetite loss**
- **Visual distortion**
- **Rapid, involuntary eye jiggling (nystagmus)**
- **Mild visual hallucinations (uncommon)**
- **Moderately increased heart rate and blood pressure (increases with dose)**
- **Restlessness, nervousness, shivering**
- **Change in body temperature regulation**
- **Upwellings of unexpected emotion, emotional lability**
- **Strong desire to do or want more when coming down**
- **Inappropriate and/or unintended emotional bonding**
- **Tendency to say things you might feel uncomfortable about later**
- **Mild to extreme jaw clenching (trisma), tongue and cheek chewing, and teeth grinding (bruxia)**
- **Difficulty concentrating & problems with activities requiring linear focus**
- **Short-term memory difficulty**
- **Confusion**
- **Muscle tension**
- **Erectile dysfunction and difficulty achieving orgasm**
- **Increase in body temperature, hyperthermia, dehydration**
- **Hyponatremia**
- **Nausea and vomiting**
- **Headaches, dizziness, loss of balance, and vertigo**
- **Sadness on coming down, sense of loss or immediate nostalgia**
- **Unpleasantly harsh comedown from the peak effect**

- **Hangover the next day, lasting days to weeks**
- **Mild depression and fatigue for up to a week**
- **Severe depression and/or fatigue**
- **Possible psychological addiction (strong urge to repeat the experience)**
- **Possible psychological distress requiring hospitalization (psychotic episodes, sever panic attacks) (rare)**
- **Possible Liver toxicity (rare)**
- **Possible neurotoxicity (controversial)**
- **Risk of death (approximately 2 per 100,000 users have extreme negative reactions resulting in death) (rare)**

Erowid. (2005, November 19). MDMA Effects. *Erowid.org*. http://www.erowid.org/chemicals/mdma/mdma_effects.shtml.

Is MDMA legal?

No. Ecstasy is classified as a "Schedule 1" controlled substance in the United States. It is illegal to buy, sell, or possess MDMA without a DEA license. It is also listed as Schedule I in the International Convention on Psychotropic Substances, an international drug control treaty.

References:

http://www.maps.org
http://www.whitehousedrugpolicy.gov
http://www.nida.nih.gov
http://www.dea.gov
http://www.erowid.org
http://ajp.psychiatryonline.org

***Association of a Functional Polymorphism in the Serotonin Transporter Gene With Abnormal Emotional Processing in Ecstasy Users*. Roiser, Jonathan P.; Cook, Lynnette J.; Cooper, Jason D.; American Journal of Psychiatry, Vol 162(3), Mar 2005. pp. 609-612.**

Appendix L

Informed Consent

INFORMED CONSENT FORM

Project Title: Substance Use Among Young Adults

Why is this research being done?
This is a research project being conducted by Kevin O'Grady, Ph.D. and Kira Levy, M.A. at the University of Maryland, College Park, Department of Psychology. We are inviting you to participate in this research project because you live in the United States, are between the ages of 18 and 25 and have a history of substance use. The purpose of this study is to increase researchers' understanding of young adults' use of various substances (Ecstasy, Amphetamines, LSD, Cocaine Powder, Psilocybin Mushrooms, Heroin, and a prescription drug in a non-prescribed manner) in the United States, with a particular focus on Ecstasy, a street drug often referred to as 'X.' The data obtained from this study will be used to gain a clearer understanding of the reasons young adults use Ecstasy.

What will I be asked to do?
The procedure involves completing an ANONYMOUS internet survey which will take approximately 15 to 30 minutes. The survey will ask you questions about the following main topics: 1) your history of drug use; 2) use of ecstasy by your peers; 3) your motivation for using ecstasy; 4) your interests and preferences; 5) your opinions and experiences with a variety of situations and 6) your religious beliefs.

Will I be compensated for participating in this research?
After completing the survey, you will be asked if you would like to participate in a lottery for $50. This is completely optional. In order to participate in the lottery, you will need to provide an email address that will not be connected in any way to the information you provide in the survey. You will be provided instructions for how to create a free email account which will be used for the lottery. If you are a winner in the lottery, an email will be sent from an internet service, PayPal, to the email address you provide. This email will instruct you how to open a free PayPal account which will enable you to either transfer the $50 you won to a checking account, request a check, or send the $50 to someone else.

What about confidentiality?
This is an anonymous survey. Each survey will be assigned a participant number. You will not be asked to provide any identifying information. Thus, information that you provide will NOT contain your name or IP address and CANNOT be connected to you in any way. The data collected from this study will be stored as a file and only the website administrators of the Office of Information Technology at the University of Maryland, College, Park as well as Dr. O'Grady, an Associate Professor, and Kira Levy, M.A., a doctoral student, in the Department of Psychology at the University of Maryland, College Park will have access to the data. If you choose to participate in the lottery, the file containing your email address will

be deleted as soon as the lottery has been completed. The data from the surveys will be kept for ten years on the personal computer of Kira Levy in password-protected form (only Dr. O'Grady and Kira Levy will know the password). The results of this study may be written up in the form of a report or an article.

What are the risks of this research?
There are no known risks to my participation in this research. However, in filling out the survey, you might become upset in thinking about your personal experiences relating to drug use. The study investigators, Kevin O'Grady, Ph.D. and Kira Levy, M.A., will be available by email or phone if you experience any distress related to this study. Either Dr. O'Grady or Ms. Levy will answer any questions you have and provide a referral for mental health resources, if necessary. You will also be provided educational information and a list of educational web sites pertaining to substance use.

What are the benefits of this research?
This research is not designed to help you personally, though you may benefit by deepening your understanding of the drug, Ecstasy, through your participation, and by obtaining educational information. In addition, after all study analyses have been completed, the practical implications of the general findings of this study will be made available to you upon your request, by sending an email to ogrady@psyc.umd.edu.

Do I have to be in this research? May I stop participating at any time?
Your participation in this research is completely voluntary. You may choose to not take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

What if I have questions?
This research is being conducted by Kevin O'Grady, Ph.D. and Kira Levy, M.A. at the University of Maryland, College Park, Department of Psychology. If you have any questions about the research study itself, please contact Kira Levy, M.A. at: The University of Maryland, 2123H Biology-Psychology Building; (e-mail) klevy@psyc.umd.edu OR Kevin O'Grady, Ph.D. at: The University of Maryland, 2123H Biology-Psychology Building; (e-mail) ogrady@umd.edu; (telephone) (301) 405-5902.

If you have any questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office, University of Maryland, College Park, Maryland, 20742; (e-mail) irb@deans.umd.edu; (telephone) 301-405-0678.
This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

By clicking on the NEXT button below, you are electronically signing this informed consent form and certifying that:

- **You are between the ages of 18 and 25.**
- **You have read and understand the contents of this informed consent form.**

- **Your questions have been answered.**
- **You freely and voluntarily choose to participate in this research project.**

YOU MAY PRINT A COPY OF THIS PAGE BY HOLDING DOWN THE 'Ctrl' KEY AND PRESSING THE 'P' KEY

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Appendix M

Participant Debriefing

Thank you for your participation in our research study. We greatly appreciate your willingness to share your experiences which will further our knowledge regarding the use of Ecstasy among young adults. Please find below educational information about Ecstasy. If you have any questions, or would like to be informed of the research findings once the study is complete, please send an email to *klevy@psyc.umd.edu*. If you are interested in entering the lottery, please click on the button at the bottom of this page.

What is MDMA?

MDMA (3-4 methylenedioxymethamphetamine) is more commonly known as Ecstasy and is a synthetic, psychoactive drug which is chemically similar to the stimulant, methamphetamine, and the hallucinogen, mescaline. MDMA is known for its empathogenic, euphoric, and stimulant effects. In its pure form, MDMA is a white crystalline powder that can be found in capsule form, in pressed pills, or as loose powder. One of the primary concerns for ecstasy users is purity. Ecstasy tablets may contain other substances in addition to MDMA which may have undesired effects. In addition, other drugs which are chemically similar to MDMA are sometimes sold as ecstasy. For example, PMA (paramethoxyamphetamine) is a synthetic hallucinogen that has stimulant effects that are similar to MDMA, but the effects take longer to occur. Deaths by overdose of PMA have been reported in the U.S. and Australia.

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Thanks again for your participation!

CLICK here IF YOU ARE INTERESTED IN ENTERING THE LOTTERY

Appendix N

Intercorrelations of Primary Dependent Variables

Intercorrelations of Primary Dependent Variables

The CORR Procedure

18	Variables:	TAS	ES	DIS	BS	NORMATIV	SCLAW	SCLIB
		SCRELIG	CRRISK	FRRISK	MVRRISK	SRRISK	CRBEH	FRBEH
		MVRBEH	SRBEH	MOOD	TOTAL90			

Simple Statistics

Variable	Label
TAS	SSS Thrill and Adventure Seeking
ES	SSS Experience Seeking
DIS	SSS Disinhibition
BS	SSS Boredom Susceptibility
NORMATIV	Normative Influence
SCLAW	SC Law Abidance
SCLIB	SC Liberalism
SCRELIG	SC Religiosity
CRRISK	GRAS Crime Risk Appraisal
FRRISK	GRAS Financial Risk Appraisal
MVRRISK	GRAS Minor Violations Risk Appraisal
SRRISK	GRAS Sports Risk Appraisal
CRBEH	GRAS Crime Behavior
FRBEH	GRAS Financial Risky Behavior
MVRBEH	GRAS Minor Violations Behavior
SRBEH	Sports Risky Behavior
MOOD	Reasons for Use
TOTAL90	Number of Drugs Used Past 90 Days

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	TAS	ES	DIS	BS	NORMATIV
TAS	1.00000	0.27694	0.15381	0.14477	0.04414
SSS thrill and adventure seeking		<.0001	0.0057	0.0093	0.4299
	322	322	322	322	322
ES	0.27694	1.00000	0.13409	0.16841	0.07652
SSS experience seeking	<.0001		0.0161	0.0024	0.1708
	322	322	322	322	322
DIS	0.15381	0.13409	1.00000	0.33888	0.05229
SSS disinhibition	0.0057	0.0161		<.0001	0.3496
	322	322	322	322	322
BS	0.14477	0.16841	0.33888	1.00000	0.08936
SSS boredom susceptability	0.0093	0.0024	<.0001		0.1095
	322	322	322	322	322
NORMATIV	0.04414	0.07652	0.05229	0.08936	1.00000
normativ	0.4299	0.1708	0.3496	0.1095	
	322	322	322	322	322

SCLAW	-0.09983	-0.03733	-0.31623	-0.30972	-0.09410
SC law abidance	0.0736	0.5045	<.0001	<.0001	0.0918
	322	322	322	322	322
SCLIB	-0.05591	0.24250	0.05512	0.09278	0.02279
SC liberalism	0.3173	<.0001	0.3241	0.0965	0.6838
	322	322	322	322	322

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SCLAW	SCLIB	SCRELIG	CRRISK	FRRISK
TAS	-0.09983	-0.05591	-0.10870	-0.18465	-0.08130
SSS thrill and adventure seeking	0.0736	0.3173	0.0513	0.0009	0.1462
	322	322	322	321	321
ES	-0.03733	0.24250	-0.17104	-0.12129	-0.00770
SSS experience seeking	0.5045	<.0001	0.0021	0.0298	0.8908
	322	322	322	321	321
DIS	-0.31623	0.05512	-0.15685	-0.13582	-0.04023
SSS disinhibition	<.0001	0.3241	0.0048	0.0149	0.4726
	322	322	322	321	321
BS	-0.30972	0.09278	-0.28460	-0.13548	-0.00320
SSS boredom susceptability	<.0001	0.0965	<.0001	0.0151	0.9545
	322	322	322	321	321
NORMATIV	-0.09410	0.02279	-0.06028	-0.10639	-0.09788
normativ	0.0918	0.6838	0.2808	0.0569	0.0799
	322	322	322	321	321
SCLAW	1.00000	-0.15670	0.19130	0.23250	0.07275
SC law abidance		0.0048	0.0006	<.0001	0.1936
	322	322	322	321	321
SCLIB	-0.15670	1.00000	-0.12831	0.00302	0.11507
SC liberalism	0.0048		0.0213	0.9570	0.0394
	322	322	322	321	321

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	MVRRISK	SRRISK	CRBEH	FRBEH	MVRBEH
TAS	-0.13665	-0.27804	0.14469	-0.00077	0.12036
SSS thrill and adventure seeking	0.0164	<.0001	0.0094	0.9890	0.0347
	308	309	321	321	308
ES	-0.08309	-0.06975	0.20431	0.09617	0.08229
SSS experience seeking	0.1457	0.2215	0.0002	0.0854	0.1497
	308	309	321	321	308
DIS	-0.12463	0.01403	0.28099	0.12207	0.21401
SSS disinhibition	0.0288	0.8060	<.0001	0.0288	0.0002
	308	309	321	321	308
BS	-0.14118	-0.05955	0.21631	0.06532	0.24004
SSS boredom susceptibility	0.0131	0.2967	<.0001	0.2432	<.0001
	308	309	321	321	308

NORMATIV	-0.01366	0.02586	0.08832	0.09952	0.06261
normative	0.8113	0.6506	0.1143	0.0750	0.2733
	308	309	321	321	308
SCLAW	0.12681	-0.00006	-0.35984	0.01390	-0.15279
SC law abidance	0.0261	0.9992	<.0001	0.8041	0.0072
	308	309	321	321	308
SCLIB	0.06912	0.02644	0.16305	-0.16057	-0.00305
SC liberalism	0.2264	0.6434	0.0034	0.0039	0.9574
	308	309	321	321	308

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SRBEH	MOOD	TOTAL90
TAS	0.32515	-0.13032	0.16778
SSS thrill and adventure seeking	<.0001	0.0530	0.0025
	309	221	322
ES	0.08940	-0.06257	0.09556
SSS experience seeking	0.1168	0.3545	0.0869
	309	221	322
DIS	0.02421	0.08931	0.19265
SSS disinhibition	0.6717	0.1859	0.0005
	309	221	322
BS	0.05640	0.06328	0.24736
SSS boredom susceptibility	0.3231	0.3491	<.0001
	309	221	322
NORMATIV	0.01691	0.00605	0.27336
normative	0.7672	0.9287	<.0001
	309	221	322
SCLAW	0.06505	-0.11197	-0.25881
SC law abidance	0.2542	0.0968	<.0001
	309	221	322
SCLIB	-0.15066	0.01922	0.13659
SC liberalism	0.0080	0.7763	0.0142
	309	221	322

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	TAS	ES	DIS	BS	NORMATIV
SCRELIG	-0.10870	-0.17104	-0.15685	-0.28460	-0.06028
SC religiosity	0.0513	0.0021	0.0048	<.0001	0.2808
	322	322	322	322	322
CRRISK	-0.18465	-0.12129	-0.13582	-0.13548	-0.10639
	0.0009	0.0298	0.0149	0.0151	0.0569
	321	321	321	321	321
FRRISK	-0.08130	-0.00770	-0.04023	-0.00320	-0.09788
	0.1462	0.8908	0.4726	0.9545	0.0799
	321	321	321	321	321

MVRRISK	-0.13665	-0.08309	-0.12463	-0.14118	-0.01366
	0.0164	0.1457	0.0288	0.0131	0.8113
	308	308	308	308	308
SRRISK	-0.27804	-0.06975	0.01403	-0.05955	0.02586
	<.0001	0.2215	0.8060	0.2967	0.6506
	309	309	309	309	309
CRBEH	0.14469	0.20431	0.28099	0.21631	0.08832
	0.0094	0.0002	<.0001	<.0001	0.1143
	321	321	321	321	321
FRBEH	-0.00077	0.09617	0.12207	0.06532	0.09952
	0.9890	0.0854	0.0288	0.2432	0.0750
	321	321	321	321	321

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SCLAW	SCLIB	SCRELIG	CRRISK	FRRISK
SCRELIG	0.19130	-0.12831	1.00000	0.10215	-0.02621
SC religiosity	0.0006	0.0213		0.0676	0.6399
	322	322	322	321	321
CRRISK	0.23250	0.00302	0.10215	1.00000	0.45680
	<.0001	0.9570	0.0676		<.0001
	321	321	321	321	321
FRRISK	0.07275	0.11507	-0.02621	0.45680	1.00000
	0.1936	0.0394	0.6399	<.0001	
	321	321	321	321	321
MVRRISK	0.12681	0.06912	0.08200	0.59940	0.36040
	0.0261	0.2264	0.1511	<.0001	<.0001
	308	308	308	308	308
SRRISK	-0.00006	0.02644	0.11109	0.32806	0.19198
	0.9992	0.6434	0.0511	<.0001	0.0007
	309	309	309	309	309
CRBEH	-0.35984	0.16305	-0.06342	-0.26071	-0.02651
	<.0001	0.0034	0.2572	<.0001	0.6361
	321	321	321	321	321
FRBEH	0.01390	-0.16057	0.08079	-0.05548	-0.02933
	0.8041	0.0039	0.1487	0.3217	0.6006
	321	321	321	321	321

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	MVRRISK	SRRISK	CRBEH	FRBEH	MVRBEH
SCRELIG	0.08200	0.11109	-0.06342	0.08079	-0.06715
SC religiosity	0.1511	0.0511	0.2572	0.1487	0.2400
	308	309	321	321	308
CRRISK	0.59940	0.32806	-0.26071	-0.05548	-0.19344
	<.0001	<.0001	<.0001	0.3217	0.0006
	308	309	321	321	308

FRRISK	0.36040	0.19198	-0.02651	-0.02933	0.09367
	<.0001	0.0007	0.6361	0.6006	0.1008
	308	309	321	321	308
MVRRISK	1.00000	0.40412	-0.11095	-0.04101	-0.23476
		<.0001	0.0518	0.4733	<.0001
	308	308	308	308	308
SRRISK	0.40412	1.00000	0.02181	0.06355	-0.00070
	<.0001		0.7026	0.2654	0.9902
	308	309	309	309	308
CRBEH	-0.11095	0.02181	1.00000	0.18634	0.40065
	0.0518	0.7026		0.0008	<.0001
	308	309	321	321	308
FRBEH	-0.04101	0.06355	0.18634	1.00000	0.26984
	0.4733	0.2654	0.0008		<.0001
	308	309	321	321	308

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SRBEH	MOOD	TOTAL90
SCRELIG	-0.05136	0.06409	-0.17202
SC religiosity	0.3682	0.3430	0.0019
	309	221	322
CRRISK	-0.07045	-0.05473	-0.12172
	0.2169	0.4192	0.0292
	309	220	321
FRRISK	0.02718	-0.08283	-0.01632
	0.6341	0.2211	0.7708
	309	220	321
MVRRISK	-0.02627	-0.05574	-0.08909
	0.6461	0.4206	0.1187
	308	211	308
SRRISK	-0.10064	-0.07599	-0.03079
	0.0773	0.2719	0.5897
	309	211	309
CRBEH	0.02141	0.02351	0.24694
	0.7078	0.7287	<.0001
	309	220	321
FRBEH	0.07200	-0.04825	-0.09062
	0.2069	0.4765	0.1051
	309	220	321

The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	TAS	ES	DIS	BS	NORMATIV
MVRBEH	0.12036	0.08229	0.21401	0.24004	0.06261
	0.0347	0.1497	0.0002	<.0001	0.2733

	308	308	308	308	308
SRBEH	0.32515	0.08940	0.02421	0.05640	0.01691
	<.0001	0.1168	0.6717	0.3231	0.7672
	309	309	309	309	309
MOOD	-0.13032	-0.06257	0.08931	0.06328	0.00605
mood	0.0530	0.3545	0.1859	0.3491	0.9287
	221	221	221	221	221
TOTAL90	0.16778	0.09556	0.19265	0.24736	0.27336
	0.0025	0.0869	0.0005	<.0001	<.0001
	322	322	322	322	322

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SCLAW	SCLIB	SCRELIG	CRRISK	FRRISK
MVRBEH	-0.15279	-0.00305	-0.06715	-0.19344	0.09367
	0.0072	0.9574	0.2400	0.0006	0.1008
	308	308	308	308	308
SRBEH	0.06505	-0.15066	-0.05136	-0.07045	0.02718
	0.2542	0.0080	0.3682	0.2169	0.6341
	309	309	309	309	309
MOOD	-0.11197	0.01922	0.06409	-0.05473	-0.08283
mood	0.0968	0.7763	0.3430	0.4192	0.2211
	221	221	221	220	220
TOTAL90	-0.25881	0.13659	-0.17202	-0.12172	-0.01632
	<.0001	0.0142	0.0019	0.0292	0.7708
	322	322	322	321	321

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	MVRRISK	SRRISK	CRBEH	FRBEH	MVRBEH
MVRBEH	-0.23476	-0.00070	0.40065	0.26984	1.00000
	<.0001	0.9902	<.0001	<.0001	
	308	308	308	308	308
SRBEH	-0.02627	-0.10064	0.02141	0.07200	0.24471
	0.6461	0.0773	0.7078	0.2069	<.0001
	308	309	309	309	308
MOOD	-0.05574	-0.07599	0.02351	-0.04825	0.03481
	0.4206	0.2719	0.7287	0.4765	0.6151
	211	211	220	220	211
TOTAL90	-0.08909	-0.03079	0.24694	-0.09062	0.24025
	0.1187	0.5897	<.0001	0.1051	<.0001
	308	309	321	321	308

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	SRBEH	MOOD	TOTAL90
MVRBEH	0.24471	0.03481	0.24025
	<.0001	0.6151	<.0001
	308	211	308
SRBEH	1.00000	0.00675	0.08360
		0.9223	0.1426
	309	211	309
MOOD	0.00675	1.00000	-0.03599
mood	0.9223		0.5946
	211	221	221
TOTAL90	0.08360	-0.03599	1.00000
	0.1426	0.5946	
	309	221	322

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