Published in final edited form as:
Subst Use Misuse. 2003 January ; 38(2): 221–248.

Psychostimulant Dependence in a Community Sample

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Abstract

Objective—To examine the prevalence of psychostimulant dependence and the characteristics associated with nonmedical users' development of dependence.

Methods—The study sample was drawn from the 1995 to 1998 National Household Surveys on Drug Abuse. Statistical analysis was conducted on a total of 1047 individuals aged 12 or older who reported nonmedical use of stimulants in the past year. Multiple multinomial logistic regression identified factors related to stimulant dependence and dependence problems.

Results—Among all past year stimulant users, 19% met criteria for stimulant dependence in the past year, and an additional 16% reported having one to two dependence problems. Adjusting for demographics and drug use characteristics, female stimulant users were an estimated 2.6 times more likely than male users to develop dependence. Not only did the Western region of the United States have more recent stimulant users than other regions, its users also were more likely to meet criteria for dependence or experience dependence problems. Stimulant users who had increased odds of progressing into dependence were characterized by an early onset of stimulant use, coexisting multiple illicit drug use, and an onset of daily cigarette smoking between the ages of 13 and 17 years.

Conclusions—Gender differences in initial stimulant use and progression to dependence require further investigation, including contextual, cultural, or perceptual factors related specifically to the choice of drugs by females.

Keywords

Drug use; Drug dependence; Epidemiology; Gateway substances; Gender difference; Stimulants

INTRODUCTION

Nonmedical use of psychostimulant drugs has received increased attention from both the research community and policymakers. In particular, nonmedical use of amphetamine and methamphetamine has increased worldwide in recent years (1). Available data, including reports from the Drug Abuse Warning Network (DAWN), the Treatment Episode Data Set (TEDS), and the Arrestee Drug Abuse Monitoring (ADAM) program, suggest a recent increase in the use of methamphetamine and in methamphetamine user-related treatment seeking and deaths (2,3).

Demographic characteristics have been shown to be related to stimulant use. Among ADAM arrestees, an increased proportion of methamphetamine use has been observed among females, whites, and young persons (3–5). Methamphetamine use also has shown a clear regional

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variation, with increased use confined to areas in the West and Southwest of the United States (3–5).

Prior use of gateway substances (e.g., tobacco, alcohol, and marijuana) also may be associated with stimulant use and dependence problems. Studies have suggested that the use of gateway substances often precedes the use of psychostimulants (6–9) and that early age at first use of gateway substances is associated with increased odds of substance abuse and dependence (10–12).

Characteristics associated with stimulant dependence among the general population have not been well documented. Studies typically have focused on the prevalence of drug use or an indicator of potential drug abuse (3,13–18). A few population-based studies have examined an aggregated category of any illicit drug dependence and generally have found a higher prevalence of drug dependence among males than among females (19–21).

However, females may have greater odds than men of using prescription stimulants nonmedically and becoming dependent on them because of greater exposure to these substances. Studies have shown that women were more likely than men to be prescribed psychotropic drugs (e.g., antidepressants and anxiolytics) in office visits and to use these drugs (22,23). Women have also been found to have a greater tendency than men to use psychotropic drugs for relieving the mental distress related to their caregiving (24). Further, methamphetamine's weight-reducing effect is one of the reasons cited by users, primarily women, for their initial use (25). Methamphetamine use during pregnancy, however, is associated with fetal loss and developmental defects (25).

In light of the rise in the nonmedical use of psychostimulants, we sought to identify subgroups of recent (past year) stimulant users in the community who were likely to experience stimulant dependence problems. This study addressed two questions:

- Were female stimulant users more likely than male users to be dependent on stimulants?
- Were correlates of stimulant dependence different by gender?

Analyses are based on a subsample of respondents in the 1995 to 1998 National Household Surveys on Drug Abuse (NHSDAs) who reported stimulant use in the prior year. The aggregated data allowed us to include statistical adjustment for potential confounders. In addition to gender, we examined age, race/ethnicity, level of education, region of residence, population density, patterns of stimulant use, and characteristics of gateway substance use.

METHODS

Study data were drawn from the 1995 to 1998 NHSDAs (26–29). The NHSDA is designed primarily to provide annual national estimates on the use of illicit drugs, alcohol, and tobacco by the U.S. civilian, noninstitutionalized population aged 12 or older. The survey assesses the use of nine different categories of illicit drugs: marijuana/hashish, cocaine/crack, heroin, hallucinogens, inhalants, and nonmedical use of prescription drugs (i.e., pain relievers, tranquilizers, stimulants, and sedatives).

Target populations included such groups as household residents, residents of noninstitutional group quarters, and civilians dwelling on military installations. They were selected for participation in the survey via a stratified, multistage area probability sampling method. Substance use was assessed via personal interviews conducted in respondents' homes.

Sample sizes of the 1995 to 1998 surveys ranged from 17,747 in 1995 to 25,500 in 1998. The distribution of age, gender, and race/ethnicity was consistent across the four annual cross-sectional samples. In each year, about 10% of the respondents were youths aged 12 to 17 and 52% were females. Approximately 25% were nonwhite minority groups: 11% blacks, 10% Hispanics, and 4% Native Americans or Asians. The interview response rates were within the range of 77% to 81%. Other details of the survey design have been reported elsewhere (26–29).

Study Sample

This study focused on participants who reported nonmedical use of prescription stimulant drugs (i.e., the use of a stimulant drug without a prescription or for the experience or feeling caused by the drug) and excluded legitimate uses under a doctor's prescription. Included were such drugs as Benzedrine, amphetamine, biphetamine, Dexamyl, Dexedrine, Fastin, Ionamin, methamphetamine, methedrine, methylphenidate, or Preludin. It should be noted that some of these drugs may be purchased illegally "on the street," particularly methamphetamine, which can be easily manufactured in clandestine laboratories using ingredients from some over-the-counter cold/asthma medications.

The prevalence of past year stimulant use during the 4 survey years ranged from 0.7% to 0.9% (N = 196 in 1995, 210 in 1996, 364 in 1997, and 277 in 1998).

Definition of Study Variables

We examined demographics, characteristics of stimulant use (e.g., age at first stimulant use and frequency of use), and other substance use (e.g., number of illicit drugs used in the past year and age at onset of alcohol, cigarette, and marijuana use).

Demographic characteristics included age group (i.e., 12 to 25 vs. 26 or older), gender, race/ethnicity, education (i.e., less than high school, high school graduate, and at least some college), population density, and residential region.

Consistent with NHSDA studies (29), race/ethnicity was categorized as white, not Hispanic; black, not Hispanic; Hispanic; and Asian/Pacific Islander or American Indian/Alaska Native, not Hispanic. "Hispanic" includes anyone who identified himself/herself as being of Hispanic origin and may include individuals who are racially white, black, or other (29). Population density was grouped into three categories: large metropolitan (population ≥1 million), small metropolitan (population <1 million), and nonmetropolitan (populations outside metropolitan statistical areas). Residential region was categorized into four regions: Northeast, North Central, South, and West in conformity with 1990 Census specifications (Fig. 1).

Characteristics of stimulant use included age at onset of stimulant use and frequency of stimulant use in the past year. Age at onset of stimulant use was defined as the age of first use and was categorized into three groups: before age 13, between ages 13 and 17, and age 18 or older. Past year frequency of stimulant use referred to the total number of days of stimulant use in the past year and was applied a natural logarithm transformation to reduce its skew.

We also examined the number of illicit drugs other than stimulants used in the past year; the number of days of drunkenness in the past year (with a natural logarithm transformation applied to reduce the skew); and the age at onset of cigarette smoking, alcohol use, and marijuana use. For cigarette smoking only, age at first use and age at first becoming a daily smoker were examined. Age at first daily alcohol use was not assessed by the survey.

Our outcome of interest was stimulant dependence in the year preceding the interview. Six of the seven stimulant dependence criteria specified by the *Diagnostic and Statistical Manual of*

Mental Disorders, Version IV (DSM-IV) (30) were assessed in the 1995 to 1998 NHSDAs: (1) tolerance; (2) using the substance in larger amounts than the person intended; (3) being unable to cut down on or stop using the substance; (4) spending a great deal of time getting the substance; (5) reducing important social, occupational, or recreational activity because of substance use; and (6) manifesting health or psychological problems because of substance use. The withdrawal criterion was not assessed. Consistent with the logic of the DSM-IV criteria (30) and other reports (31), "stimulant dependence" referred to individuals who met three or more of the six dependence items on stimulant use in the prior year. The term "dependence problems" was used to include individuals who had one to two dependence problems (i.e., subclinical dependence).

Data Analyses

SUDAAN software (32) was used to conduct statistical analyses that took into account the complex design features of the NHSDA (e.g., weighting). Multinomial logistic regression analyses were conducted to identify characteristics related to stimulant dependence.

RESULTS

Characteristics of the Study Sample

Of all respondents aged 12 or older who were interviewed in the 1995 to 1998 NHSDAs (N = 86,021), a total of 1047 individuals reported nonmedical use of stimulants in the past year. Table 1 displays demographic and substance-use characteristics of these stimulant users. Also included are cross-tabulations of each characteristic with stimulant dependence (categorized as three or more dependence problems, one to two problems, and no problems).

Recent (i.e., past year) stimulant users typically were younger than age 35 (70%), male (60%), and non-Hispanic white (79%). They also had not attended college (68%), resided in the West (41%), and lived in metropolitan areas (82%). Approximately one-half of stimulant users began their first stimulant use before age 18. Many had recently used other illicit drugs (86%); reported drunkenness in the past year (77%); initiated the use of cigarettes (85%), alcohol (88%), and marijuana before age 18 (72%); and started to smoke cigarettes daily before age 18 (54%).

Conditional Prevalence of Stimulant Dependence Among Users

Of all past year stimulant users in the 1995 to 1998 NHSDAs (N = 1047), 19% (N = 244) met criteria for stimulant dependence in the prior year, and an additional 16% (N = 209) reported having one to two stimulant dependence problems.

Chi square tests showed that the conditional prevalence of stimulant dependence varied significantly by age group, race/ethnicity, region of residence, and age of first substance use (Table 1). Increased proportions of stimulant dependence problems were observed among users who were between the ages of 12 and 25, were non-Hispanic white or Hispanic, resided in the western or southern U.S. regions, or initiated the use of stimulants and other substances before adulthood.

Multiple Multinomial Logistic Regression

Adjusted odds ratio estimates obtained from multiple multinomial logistic regression analyses are reported in Table 2. This adjusted model constrains the potentially confounding influences of the sociodemographic and other variables listed in the table. Variables that were found to be not significant in the model adjusting for age, gender, race/ethnicity, education, and region were not included in the final model.

Gender, region of residence, age at first stimulant use, number of illicit drugs used in the past year, and age at first daily cigarette smoking were independently associated with the odds of stimulant dependence (i.e., ≥three dependence problems). Female stimulant users were an estimated 2.6 times more likely than male users to develop dependence. Increased odds of stimulant dependence were also found among stimulant users living in the West, with an onset of stimulant use before age 13, using at least two illicit drugs other than stimulants in the past year, and starting to smoke cigarettes daily between the ages of 13 and 17.

With respect to the odds of having one to two stimulant dependence problems, age group, region of residence, and age at onset of stimulant use had an independent association with dependence problems. Recent stimulant users aged 12 to 25 were an estimated 2.7 times more likely than those aged 26 or older to have dependence problems. Stimulant users living in the West and those initiating stimulants before age 13 had increased odds of having dependence problems.

To constrain gender differences in the drug use, we generated gender-specific multinomial logistic regression models, summarized in Table 3 (for females) and Table 4 (for males). Among female stimulant users, the following characteristics were found to be associated with increased odds of stimulant dependence: being between the ages of 12 to 25, living in the West, experiencing an onset of stimulant use before age 13, and using multiple illicit drugs in the past year. None of these variables was significant in predicting the odds of having one to two stimulant dependence problems.

Among male stimulant users, the following characteristics were related to increased odds of stimulant dependence: being non-Hispanic white (relative to being non-Hispanic black), living in the West, and having an onset of daily cigarette smoking before age 13. The following characteristics were related to increased odds of having one to two stimulant dependence problems among male users: ages 12 to 25 (relative to ages 26 or older), living in the West, and having an onset of daily cigarette smoking before age 13.

In addition, these gender-specific models revealed a significant association of survey year with stimulant dependence among female stimulant users and with stimulant dependence problems among male users. For females, greater odds of stimulant dependence were noted among users in 1998 compared with users in 1995. For males, greater odds of stimulant dependence problems were found among users in 1998 relative to users in 1996 or 1997. In brief, 21% of female stimulant users were dependent on stimulants in 1995 compared with 29% in 1998. For male users, the prevalence of having one to two dependence problems increased from 10% in 1996 to 16% in 1997 and 22% in 1998.

DISCUSSION

This study examined the prevalence and characteristics of recent stimulant dependence among past year stimulant users. One of the striking findings is the high proportion of recent stimulant users who reported having one or more dependence problems in the past year (i.e., 35%). Of all persons reporting DSM-IV dependence problems, more than one-half met criteria for stimulant dependence. Multiple multinomial logistic regression analyses found elevated odds of stimulant dependence among female stimulant users and increased odds of dependence problems among users younger than age 26. Stimulant users who had increased odds of dependence were characterized by an early onset of stimulant use, coexisting multiple illicit drug use, and an onset of daily cigarette smoking between the ages of 13 and 17.

The use of stimulants and the problems associated with their use affect some areas of the United States disproportionately. Not only did the western region have more recent stimulant users than other regions, users living in that area had greater odds of stimulant dependence. Although

previously reported findings from the arrestee population were limited by their exclusion of potential drug users outside the criminal justice system and might not accurately reflect the use of stimulant drugs in the general population (14), our community-based finding confirms a regional variation in stimulant use. It also adds a new finding to the literature: an emerging stimulant-dependence problem within the western U.S. region.

Use of stimulants, such as methamphetamine, is associated with long-term damage to human brain cells, and the damage may last even after the drug use has stopped (33). The commonly abused stimulants, such as amphetamine and methamphetamine, have a high potential for abuse because they are less expensive (than cocaine) and produce a longer-lasting "high" (1,34). Our findings suggest that females, youths, and young adults should be targeted by efforts to prevent initial use and, among users, to reduce their level of use. At particular risk are women for whom methamphetamine offers a quick and effective method of weight control (25). Women of childbearing age may need to receive additional prevention messages regarding the harmful effect of stimulants on the fetus. In Iowa, methamphetamine use was estimated to account for a vast majority of newborns affected by drug use (35). Use of methamphetamine during pregnancy can adversely affect the fetus through reduced blood flow or direct toxic effects on the developing brain (35).

Reasons for the increased likelihood of dependence among some stimulant users warrant further investigation. Prior studies have shown that individual variation in the effect of methylphenidate on brain chemistry might have predisposed some people to misuse this drug (36). Epidemiological studies also have suggested possible subgroup differences in the threshold of determining drug dependence. Kandel and Chen (37) found that women and young people were more likely than men and older people to develop nicotine dependence while using a similar number of cigarettes. If the future NHSDA is to collect more detailed information on the level and dose of stimulant use, more in-depth analyses by demographic group could be conducted to examine varying dependence problems in response to different levels of stimulant use.

Other psychosocial processes may have partially accounted for the gender difference in stimulant dependence, including self-medication and weight-related concerns among females. Persons with psychiatric problems might have used amphetamine as a self-treatment for their symptoms of depression (38). Studies on gender differences in mental distress and coping have revealed that women appear to be more likely than men to use psychotropic drugs for relieving their emotional distress (24). Among nonmedical users of psychotherapeutics, the prevalence of depression has been found to be higher among women than among men (39). A study of adolescents also has suggested a self-medication explanation for substance use among some females, but not among males (40). Female stimulant users might be more likely than male users to use stimulants for self-medicating their psychological problems and thus be more likely to continue using them.

Greater stimulant involvement among some females also may be partially related to their greater weight-related concerns than males. For instance, amphetamines are used clinically in treating obesity because they suppress appetite and accelerate metabolism (41). Gritz and Crane (42) found that females, whites, and individuals who used diet pills in the past year had an increased likelihood of using amphetamines for weight loss. Studies also have suggested that women between the ages 20 and 31 have used prescription stimulants for dieting (39).

Studies of methamphetamine, the third most commonly used illicit drug among female arrestees (4), have suggested some clues about the greater use of stimulants and dependence problems in the western U.S. region. Methamphetamine use-related problems have occurred in large areas of the western United States for more than a decade and have gradually spread

into midwestern and southern U.S. communities (43,44). Available data have suggested that the western U.S. region has higher methamphetamine manufacturing activities than other regions. More than 70% of all clandestine methamphetamine laboratories seized in 1988 were located in the West (45), and California continues to lead the nation in the number seized recently (3). The presence of local clandestine laboratories that produce methamphetamine has been considered an important factor in determining a community's risk for its abuse (46).

The utilization of substance user services among persons reporting dependence problems also deserves further investigation. Population-based studies have revealed a high prevalence of comorbid substance abuse/dependence with mental disorder (47) but a low prevalence of mental health service utilization among persons with a psychiatric diagnosis (48,49). Further, persons manifesting a substance use disorder generally are less likely than persons with a nonaddictive mental disorder to receive mental health care (49,50).

Health care providers may need to screen persons seeking help for stimulant dependence for the presence of other mental health problems and refer them to appropriate care providers, while as indicated. Currently, health insurance systems may not cover the cost of substance abuse and mental health services adequately. Utilization of substance abuse services is further complicated by the stigma associated with substance abuse. Drug-dependent women appear to have encountered more barriers to treatment services than drug-dependent men. These barriers include fear of stigma and labeling, concerns about parenting or domestic responsibilities, and lack of awareness of treatment options (51–53). To enhance access to substance user services for women and to increase their retention in treatment programs, these programs should provide a range of social services that respond to the unique needs of women (54).

Due to the localized nature of the methamphetamine problem in the United States, a comprehensive, community-based strategy has been considered a strong deterrent in the prevention of its use (55). Such community networks are formed by coalitions among federal, state, and local agencies. They encourage communication and cooperation among professionals from various disciplines and develop comprehensive prevention strategies based on community needs (55). Unfortunately, a recent review by Rawson et al. (25) concluded that methamphetamine use is likely to persist or even expand. To minimize the impact of this significant public health problem, a strategic program of research, prevention, and treatment must be developed, properly funded, and coordinated with multiple community agencies (25).

Some limitations of the study design should be noted. First, our analyses are based on self-reported data collected within a cross-sectional design. The accuracy of the information may be affected by respondents' recall capabilities and willingness to report the truth (56). Second, the target population of the NHSDA is limited to civilian, noninstitutionalized household residents in the United States. The generalization of our findings to the excluded population (e.g., homeless people and individuals living in institutional group quarters) is limited. Third, because of the lack of assessments about the withdrawal criterion, stimulant dependence is likely to be somewhat underestimated. Some heavy or prolonged stimulant users might have experienced symptoms of withdrawal.

Although the cross-sectional design of the NHSDA does not allow us to draw a definitive conclusion, these findings indicate that the problem of stimulant use nonmedically among females warrants further investigation. If the finding that an upward trend of stimulant dependence among female users is replicated in future annual NHSDA cross-sections, focused research is needed to identify factors related specifically to the choice of drugs by females. These factors could be psychosocial, contextual, cultural, or perceptual. Such a study should specify factors that may promote the continued use of stimulants, including coexisting mental

health problems, weight control-related issues, the effect of women's changing role and employment, and characteristics of the workplace (e.g., the type and intensity of work) (25, 39). Consequences of stimulant use also should be determined, such as episodes of violent behavior, family problems (e.g., divorce or poor child care), or problems at work (25,39,44).

Finally, methamphetamine is a dangerous, addictive drug, and the population of users is growing but is not well defined (44). Expanded education efforts are needed to improve public understanding about its health risks and consequences.

Acknowledgements

This work was supported by research grant R03DA13184 (Wu) from the National Institute on Drug Abuse. The authors thank the journal's anonymous reviewers for their helpful and constructive comments.

References

1. Murray JB. Psychophysiological aspects of amphetamine-methamphetamine abuse. Journal of Psychology 1998;132:227–237. [PubMed: 9529666]
2. Greenblatt JC, Gfroerer JC, Melnick D. Increasing morbidity and mortality associated with abuse of methamphetamine—United States, 1991–1994. Morbidity and Mortality Weekly Report 1995;44(47): 882–886. [PubMed: 7476843]
3. National Institute of Justice. 1998 Annual Report on Methamphetamine Use Among Arrestees. Research report, NCJ 175660. National Institute of Justice, Arrestee Drug Abuse Monitoring Program: Washington, DC, 1999.
4. National Institute of Justice. 1999 Annual Report on Drug Use Among Adult and Juvenile Arrestees. Research report, NCJ 181426. National Institute of Justice, Arrestee Drug Abuse Monitoring Program, Washington, DC, 2000.
5. Feucht TE, Kyle GM. Methamphetamine Use Among Adult Arrestees: Findings from the Drug Use Forecasting (DUF) Program, NIJ Research in Brief, NCJ 161842. National Institute of Justice, Washington, DC, 1996.
6. Henningfield JE, Clayton R, Pollin W. Involvement of tobacco in alcoholism and illicit drug use. British Journal of Addiction 1990;85:279–291. [PubMed: 2180511]
7. Kandel DB, Yamaguchi K, Chen K. Stages of progression in drug involvement from adolescence to adulthood: further evidence for the gateway theory. Journal of Studies on Alcohol 1992;53:447–457. [PubMed: 1405637]
8. Wu LT, Anthony JC. Tobacco smoking and other suspected antecedents of nonmedical psychostimulant use in the United States, 1995. Substance Use and Misuse 1999;34:1243–1259. [PubMed: 10419222]
9. Yamaguch K, Kandel DB. Patterns of drug use from adolescence to young adulthood: II. Sequences of progression. American Journal of Public Health 1984;74:668–672. [PubMed: 6742252]
10. Clark DB, Kirisci L, Tarter RE. Adolescent versus adult onset and the development of substance use disorders in males. Drug and Alcohol Dependence 1998;49:115–121. [PubMed: 9543648]
11. DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age at first alcohol use: a risk factor for the development of alcohol disorders. American Journal of Psychiatry 2000;157:745–750. [PubMed: 10784467]
12. Grant BF, Dawson DA. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: results from the national longitudinal alcohol epidemiologic survey. Journal of Substance Abuse 1997;9:103–110. [PubMed: 9494942]
13. Johnston LD, O'Malley PM, Bachman JG. College students and young adults. In: National Survey Results on Drug Use from the Monitoring the Future Study, 1975–1998. Vol. II, (NIH Publication 99–4661). Rockville, MD: National Institute on Drug Abuse, 1999.
14. Johnston LD, O'Malley PM, Bachman JG. Secondary school students. In: National Survey Results on Drug Use from the Monitoring the Future Study, 1975–1998. Vol. I, (NIH Publication 99–4660). Rockville, MD: National Institute on Drug Abuse, 1999.

15. National Institute on Drug Abuse. Methamphetamine abuse alert. NIDA Notes 1999, 13(6). NIH Publication 99–3478.
16. National Institute on Drug Abuse. Highlights and Executive Summary. In: Epidemiologic Trends in Drug Abuse: Vol. I. DHHS Publication 99–4526 (also available on-line at http://165.112.78.61/CEWG/Volumes/CEWG1299.pdf).NationalInstitute on Drug Abuse, Rockville, MD: Community Epidemiology Work Group, 2000.
17. Office of Applied Studies. Year-End Preliminary Estimates from the 1996 Drug Abuse Warning Network, DHHS Publication No. SMA 98–3175. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1997.
18. Office of Applied Studies. Treatment Episode Data Set (TEDS) 1992–1997. Drug and Alcohol Services Information System Series S-7, DHHS Publication No. SMA 99–3324. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1999.
19. Grant BF. Prevalence and correlates of drug use and DSM-IV drug dependence in the United States: results of the National Longitudinal Alcohol Epidemiologic Survey. Journal of Substance Abuse 1996;8:195–210. [PubMed: 8880660]
20. Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Wittchen HU, Kendler KS. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. Archives of General Psychiatry 1994;51:8–19. [PubMed: 8279933]
21. Robins LN, Helzer JE, Weissman MM, Orvaschel H, Gruenberg E, Burke JD Jr, Regier DA. Lifetime prevalence of specific psychiatric disorders in three sites. Archives of General Psychiatry 1984;41:949–958. [PubMed: 6332590]
22. Simoni-Wastila L. Gender and psychotropic drug use. Medical Care 1998;36:88–94. [PubMed: 9431334]
23. Roe CM, McNamara AM, Motheral BR. Gender- and age-related prescription drug use patterns. Annals of Pharmacotherapy 2002;36:30–39. [PubMed: 11816254]
24. Riska E, Ettorre E. Mental distress—Gender aspects of symptoms and coping. Acta of Oncology 1999;38:757–761.
25. Rawson RA, Anglin MD, Ling W. Will the methamphetamine problem go away? Journal of Addictive Diseases 2002;21:5–19. [PubMed: 11831500]
26. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1995, NHSDA Series H-1, DHHS Publication No. SMA 97–3127. Rockville, MD: Substance abuse and mental health services administration, 1997.
27. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1996, NHSDA Series H-5, DHHS Publication No. SMA 98–3200. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1998.
28. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1997, NHSDA Series H-8, DHHS Publication No. SMA 99–3295. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1999.
29. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1998, NHSDA Series H-11, DHHS Publication No. SMA 00–3381. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2000.
30. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Author: Washington, DC, 1994.
31. Epstein JF, Gfroerer JC. Estimating substance abuse treatment need from a national household survey. In: Epstein J, Rivero M, eds. Analyses of Substance Abuse and Treatment Need Issues, Analytic Series A-7, DHHS Publication No. SMA 98–3227, Rockville, MD: Substance Abuse and Mental Health Services Administration, 1998:113–125.
32. Shah BV, Barnwell BG, Bieler GS. SUDAAN Software for the Statistical Analysis of Correlated Data. Research Triangle Park, NC: Research Triangle Institute, 1996.
33. Ernst T, Chang L, Leonido-Yee M, Speck O. Evidence for long-term neurotoxicity associated with methamphetamine abuse: a 1H MRS study. Neurology 2000;54:1344–1349. [PubMed: 10746608]
34. Office of National Drug Control Policy. Pulse Check Trends in Drug Abuse, January–June 1998. The White House: Washington, DC, 1998.

35. Lucas SE. Proceedings of the National Consensus Meeting on the Use, Abuse, and Sequelae of Abuse of Methamphetamine with Implications for Prevention, Treatment, and Research. DHHS Publication No. SMA 96–801 3. Rockville, MD: U.S. Department of Health and Human Services, 1997.
36. Volkow ND, Wang GJ, Fowler JS, Logan J, Gatley SJ, Wong C, Hitzemann R, Pappas NR. Reinforcing effects of psychostimulants in humans are associated with increases in brain dopamine and occupancy of D(2) receptors. J Pharmacological Experiment and Therapy 1999;291:409–415.
37. Kandel DB, Chen K. Extent of smoking and nicotine dependence in the United States: 1991–1993. Nicotine Tobacco Research 2000;2:263–274. [PubMed: 11082827]
38. Baberg HT, Nelesen RA, Dimsdale JE. Amphetamine use: return of an old scourge in a consultation psychiatry setting. American Journal of Psychiatry 1996;153:789–793. [PubMed: 8633691]
39. Clayton RR, Voss HL, Robbins C, Skinner WF. Gender differences in drug use: an epidemiological perspective. NIDA Research Monograph 1990;65:80–99. [PubMed: 3090446]
40. Wu LT, Schlenger WE, Galvin DM. The relationship between substance use and work among adolescents. Journal of Adolescent Health. In press.
41. Bray GA. Use and abuse of appetite-suppressant drugs in the treatment of obesity. Annal of Internal Medicine 1993;119:707–713.
42. Gritz ER, Crane LA. Use of diet pills and amphetamines to lose weight among smoking and nonsmoking high school seniors. Health Psychology 1991;10:330–335. [PubMed: 1935868]
43. Rawson RA, Simon SL, Ling W. If a US drug abuse epidemic fails to include a major east coast city, can it be called an epidemic? Journal of Addict Diseases 2002;21:1–4.
44. National Institute of Justice. Methamphetamine: an update on an emerging problem. NIJ Journal 2000;245:8–9.
45. Drug Enforcement Administration. Clandestine laboratory seizures in the United States: calendar year 1988. Washington: DC: Drug Enforcement Administration, Office of Intelligence, 1989.
46. National Institute on Drug Abuse. Statistical Series 1–8, Annual Data, 1988. DHHS Publication No. ADM 89–1634. Washington, DC: U.S. Government of Printing Office, 1989.
47. Kessler RC, Nelson CB, McGonagle KA, Edlund MJ, Frank RG, Leaf PJ. The epidemiology of co-occurring addictive and mental disorders: implications for prevention and service utilization. American Journal of Orthopsychiatry 1996;66:17–31. [PubMed: 8720638]
48. Regier DA, Shapiro S, Kessler LG, Taube CA. Epidemiology and health service resource allocation policy for alcohol, drug abuse, and mental disorders. Public Health Report 1984;99:483–492.
49. Kessler RC, Zhao S, Katz SJ, Kouzis AC, Frank RG, Edlund M, Leaf P. Past-year use of outpatient services for psychiatric problems in the national comorbidity survey. American Journal of Psychiatry 1999;156:115–123. [PubMed: 9892306]
50. Regier DA, Narrow WE, Rae DS, Manderscheid RW, Locke BZ, Goodwin FK. The de facto US mental and addictive disorders service system: epidemiologic catchment area prospective 1-year prevalence rates of disorders and services. Archives of General Psychiatry 1993;50:85–94. [PubMed: 8427558]
51. Allen K. Barriers to treatment for addicted African–American women. Journal of National Medical Association 1995;87:751–756.
52. Copeland JA. Qualitative study of barriers to formal treatment among women who self-managed change in addictive behaviours. Journal of Substance Abuse Treatment 1997;14:183–190. [PubMed: 9258863]
53. McMahon TJ, Winkel JD, Suchman NE, Luthar SS. Drug dependence, parenting responsibilities, and treatment history: why doesn't mom go for help? Drug and Alcohol Dependence 2002;65:105–114. [PubMed: 11772472]
54. Marsh JC, D'Aunno TA, Smith BD. Increasing access and providing social services to improve drug abuse treatment for women with children. Addiction 2000;95:1237–1247. [PubMed: 11092071]
55. Hall JN, Broderick PM. Community networks for response to abuse outbreaks of methamphetamine and its analogs. NIDA Research Monograph 1991;115:109–120. [PubMed: 1661851]
56. Shi L. Health Services Research Methods. NY: Delmar Publishers Albany, 1997.

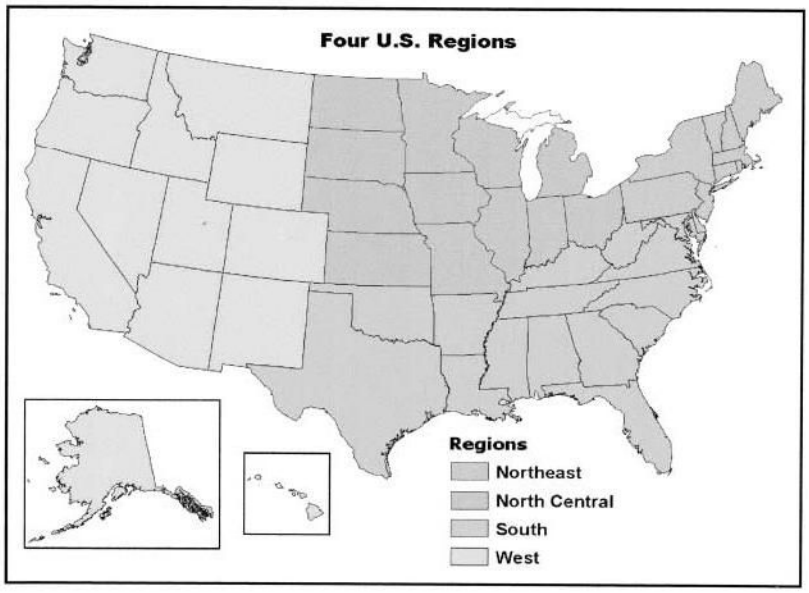

Figure 1.
Four U.S. regions.

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Table 1

Social and demographic characteristics by number of stimulant dependence problems among past year stimulant users, 1995 to 1998 National Household Surveys on Drug Abuse. (unweighted $N = 1047$).

Demographics	All stimulant users	Number of stimulant dependence problems			
	%	3 or more %	1 to 2 %	None %	χ^2 Test (*df*) p-value
Age in years					
12–17	19.3	21.6	18.4	60.0	13.94 (6)
18–25	30.4	21.7	23.4	54.9	0.035
26–34	24.5	15.4	15.1	69.5	
35 or 35+	29.8	16.5	8.8	74.7	
Gender					
Female	39.6	23.3	15.1	61.6	3.76 (2)
Male	60.4	15.9	17.3	66.9	0.156
Race/Ethnicity					
Black, Non-Hispanic	7.1	5.6	9.5	84.9	24.55 (8)
Hispanic	9.4	21.8	19.3	58.8	0.003
White, Non-Hispanic	78.9	20.1	16.5	63.3	
Native American	3.0	9.3	11.2	79.5	
Asian	1.5	11.9	34.1	54.0	
Education					
Less than high school	36.9	22.3	20.2	57.5	6.27 (4)
High school	30.9	19.6	15.3	65.1	0.185
College	32.2	14.0	13.1	72.9	
Region of residence					
Northeast	8.2	7.2	11.6	81.3	33.93 (6)
North Central	21.9	7.6	11.1	81.3	<0.000
South	28.4	11.2	18.8	70.1	
West	41.4	32.4	18.5	49.1	
Population density					
Large metropolitan area	38.4	19.5	13.4	67.1	3.40 (4)
Small metropolitan area	43.8	17.3	18.5	64.3	0.495
Not metropolitan area	17.8	21.2	17.8	61.0	
Onset age of stimulant use					
<12 Years	5.5	42.0	19.3	38.6	14.70 (4)
13–17	45.5	23.1	20.1	56.9	0.007
18 or older	49.1	16.7	15.4	67.9	
Past year number of illicit drugs used					
3 or more drugs	67.4	21.1	17.1	61.7	6.40 (4)
2 drugs	18.3	14.9	18.7	66.4	0.176
1 drug (stimulants only)	14.3	12.9	10.1	77.0	
Drunkenness in the past year					
Drunkenness weekly	22.3	21.0	16.4	62.6	3.37 (6)
Drunkenness less than weekly	54.9	20.3	16.8	62.9	0.760
No drunkenness	14.9	12.7	16.3	71.1	
No alcohol use	7.9	13.9	14.0	72.1	
Onset age of any cigarette smoking					
<12 Years	39.3	23.4	20.7	55.9	25.12 (6)
13–17	45.6	17.2	15.4	67.5	<0.001
18+	7.3	8.7	3.7	87.6	
No cigarette smoking	7.8	16.4	14.1	69.5	
Onset age of daily cigarette smoking					
<12 Years	11.0	23.8	25.8	50.4	15.72 (6)
13–17	42.9	24.9	17.6	57.5	0.019
18+	22.6	12.2	10.3	77.5	
No daily cigarette smoking	23.5	12.2	15.1	72.7	

Demographics	All stimulant users	Number of stimulant dependence problems			
	%	3 or more %	1 to 2 %	None %	χ^2 Test (*df*) p-value
Onset age of any alcohol use					
<12 Years	33.1	23.4	21.0	55.6	14.95 (6)
13–17	55.2	18.6	14.3	67.1	0.024
18+	3.0	8.7	10.1	81.3	
No alcohol use	8.7	9.7	13.5	76.8	
Onset age of marijuana use					
<12 Years	17.9	22.5	18.2	59.3	35.13 (6)
13–17	54.2	22.6	18.9	58.5	<0.001
18+	11.0	2.4	7.9	89.8	
No marijuana use	16.8	13.8	12.2	74.1	

Table 2

Adjusted odds ratios (AOR) and 95% confidence intervals (CI) of past year stimulant dependence among past year stimulant users from the multiple multinomial logistic regression model (N = 1047).

Characteristics	AOR (95% CI) of having ≥ 3 dependence problems vs. none	AOR (95% CI) of having 1–2 dependence problems vs. none
Age in years		
12–25	1.46 (0.70–3.06)	2.68 (1.38–5.20)[c]
26+	Ref	Ref
Gender		
Female	2.60 (1.40–4.84)[c]	1.15 (0.64–2.09)
Male	Ref	Ref
Race/Ethnicity		
Black, Non-Hispanic	0.23 (0.03–1.74)	0.45 (0.05–3.93)
Hispanic/Other[a]	0.68 (0.30–1.55)	1.02 (0.53–1.98)
White, Non-Hispanic	Ref	Ref
Education		
Less than high school	1.76 (0.84–3.65)	1.64 (0.68–3.94)
High school	1.19 (0.54–2.60)	0.98 (0.47–2.07)
College	Ref	Ref
Region		
Northeast	0.04 (0.01–0.26)[d]	0.25 (0.09–0.73)[c]
North Central	0.09 (0.01–0.24)[d]	0.24 (0.11–0.56)[d]
South	0.10 (0.05–0.20)[d]	0.41 (0.21–0.79)[c]
West	Ref	Ref
Onset age of stimulant use		
<12 Years	19.94 (2.91–136.51)[c]	8.71 (1.37–55.36)[b]
13–17	0.76 (0.36–1.58)	0.66 (0.30–1.43)
18 or older	Ref	Ref
Past year number of illicit drugs used		
3 or more drugs	3.44 (1.60–7.41)[c]	1.42 (0.66–3.05)
<3 Drugs	Ref	Ref
Onset age of daily cigarette smoking		
<12 Years	2.47 (0.76–7.98)	3.19 (0.85–12.00)
13–17	2.23 (1.10–4.55)[b]	1.57 (0.92–2.69)
18+/nondaily smokers	Ref	Ref
Survey year		
1995	0.57 (0.22–1.51)	0.73 (0.32–1.66)
1996	1.52 (0.63–3.68)	0.72 (0.34–1.52)
1997	0.52 (0.24–1.13)	0.54 (0.27–1.11)
1998	Ref	Ref

Note: Ref = Reference group.

[a] "Other" refers to Asians, Pacific Islanders, American Indians, and Alaska Natives.

[b] $p<0.05$.

[c] $p \leq 0.01$.

[d] $p \leq 0.001$.

Table 3

Adjusted odds ratios (AOR) and 95% confidence intervals (CI) of past year stimulant dependence among past year *female* stimulant users from the multiple multinomial logistic regression model (N = 499).

Characteristics	AOR (95% CI) of having ≥3dependence problems vs. none	AOR (95% CI) of having 1–2dependence problems vs. none
Age in years		
12–25	4.56 (1.91–10.90)[d]	2.18 (0.71–6.66)
26+	Ref	Ref
Race/Ethnicity		
Black, Non-Hispanic	1.07 (0.25–4.59)	0.66 (0.11–4.13)
Hispanic/Other[a]	0.31 (0.08–1.17)	1.15 (0.36–3.68)
White, Non-Hispanic	Ref	Ref
Education		
Less than high school	1.25 (0.46–3.42)	0.82 (0.24–2.83)
High school	1.18 (0.42–3.30)	0.62 (0.24–1.62)
College	Ref	Ref
Region		
Northeast	0.18 (0.06–0.52)[c]	0.45 (0.19–1.07)
North Central	0.12 (0.03–0.54)[c]	0.27 (0.02–3.61)
South	0.08 (0.03–0.23)[d]	0.53 (0.22–1.29)
West	Ref	Ref
Onset age of stimulant use		
<12 Years	12.27 (2.65–56.77)[c]	6.87 (0.88–53.94)
13–17	1.03 (0.48–2.22)	2.11 (0.64–7.00)
18 or older	Ref	Ref
Past year number of illicit drugs used		
3 or more drugs	4.73 (1.82–12.32)[c]	0.83 (0.40–1.71)
<3 Drugs	Ref	Ref
Onset age of daily cigarette smoking		
<12 Years	0.59 (0.18–1.90)	0.85 (0.20–3.64)
13–17	1.12 (0.48–2.61)	1.04 (0.41–2.69)
18+/nondaily smokers	Ref	Ref
Survey year		
1995	0.30 (0.13–0.72)[c]	0.68 (0.20–2.29)
1996	0.55 (0.21–1.47)	1.56 (0.46–5.24)
1997	0.38 (0.10–1.41)	0.76 (0.21–2.71)
1998	Ref	Ref

Note: Ref = Reference group.

[a] "Other" refers to Asians, Pacific Islanders, American Indians, and Alaska Natives.

[b] $p<0.05$.

[c] $p \leq 0.01$.

[d] $p \leq 0.001$.

Table 4

Adjusted odds ratios (AOR) and 95% confidence intervals (CI) of past year stimulant dependence among past year male stimulant users from the multiple multinomial logistic regression model (N = 548).

Characteristics	AOR (95% CI) of having ≥ 3 dependence problems vs. none	AOR (95% CI) of having 1–2 dependence problems vs. none
Age in years		
12–25	0.82 (0.28–2.42)	2.32 (1.00–5.36)[c]
26+	Ref	Ref
Race/Ethnicity		
Black, Non-Hispanic	0.02 (0.00–0.51)[b]	0.61 (0.03–14.38)
Hispanic/Other[a]	1.10 (0.34–3.56)	0.71 (0.23–2.16)
White, Non-Hispanic	Ref	Ref
Education		
Less than high school	2.20 (0.66–7.37)	3.30 (0.89–12.24)
High school	1.61 (0.50–5.17)	1.61 (0.53–4.93)
College	Ref	Ref
Region		
Northeast	0.01 (0.00–0.10)[d]	0.09 (0.01–1.00)[b]
North Central	0.10 (0.02–0.50)[c]	0.31 (0.10–0.91)[b]
South	0.15 (0.06–0.41)[d]	0.51 (0.18–1.41)
West	Ref	Ref
Onset age of stimulant use		
<12 Years	2.37 (0.52–10.85)	0.40 (0.07–2.35)
13–17	0.54 (0.19–1.51)	0.44 (0.17–1.19)
18 or older	Ref	Ref
Past year number of illicit drugs used		
3 or more drugs	1.88 (0.66–5.33)	2.29 (0.63–8.41)
<3 drugs	Ref	Ref
Onset age of daily cigarette smoking		
<12 Years	10.44 (1.51–72.08)[b]	15.21 (2.81–82.24)[c]
13–17	2.74 (0.97–7.74)	2.13 (0.90–5.05)
18+/nondaily smokers	Ref	Ref
Survey year		
1995	0.96 (0.26–3.50)	0.85 (0.27–2.62)
1996	1.03 (0.28–3.71)	0.24 (0.09–0.65)[c]
1997	0.39 (0.06–2.35)	0.33 (0.11–0.96)[b]
1998	Ref	Ref

Note: Ref = Reference group.

[a] "Other" refers to Asians, Pacific Islanders, American Indians, and Alaska Natives.

[b] $p<0.05$.

[c] $p \leq 0.01$.

[d] $p \leq 0.001$.