

PREDICTORS OF DRUG ABUSE TREATMENT UTILIZATION AMONG FREQUENT COCAINE USERS

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1. INTRODUCTION

Although cocaine use in the general US household population has been decreasing since 1985 according to the National Household Survey on Drug Abuse (NHSDA) (Substance Abuse and Mental Health Services Administration [SAMHSA], 1994), cocaine remains the most common primary drug of abuse among drug treatment clients across the nation (SAMHSA, 1993a). The key to this apparent paradox may lie with frequent cocaine users, whose estimated numbers did not change significantly between 1985 and 1993. Frequent cocaine users, generally defined as those who used the drug at an average of one day a week or more often in the past year, are more likely than occasional cocaine users to develop abuse and dependence problems (Adams & Gfroerer, 1991) and other adverse consequences. They are also more likely to require and to receive drug abuse treatment. In an analysis of 1991 NHSDA data, Gfroerer and Brodsky (1993) reported that 30.0 percent of frequent cocaine users, compared to 11.2 percent of occasional cocaine users, had received drug abuse treatment in the year before the survey. Using bivariate analyses, these investigators found that treatment was more likely to be reported by frequent cocaine users who had used the drug daily, those who felt dependent on cocaine, those who had tried to cut down on their use of the drug, those who had used heroin sometime during the past year, and those who were older. Health insurance coverage did not affect the proportion receiving treatment. Frequent cocaine users who had been treated were less likely than those not treated to report cocaine use in the past month, suggesting that treatment may have been effective.

This study focuses on frequent cocaine users (defined somewhat more broadly than in the studies referenced above) and applies multiple logistic regression analysis to identify predictors of the likelihood of receiving drug abuse treatment. Factors considered include severity of cocaine use, use of heroin and alcohol, health and emotional problems resulting from cocaine use, social support, availability of treatment, health insurance coverage, income,

involvement with the legal system, positive drug test results, and demographic characteristics. More severe cocaine use may impose financial burdens and increase the likelihood of abuse and dependence symptoms, either of which may cause users to seek treatment. Other drug use (heroin and alcohol in this study) may result in the need for treatment in its own right or may be associated with more severe cocaine use. Health and emotional problems may motivate users to seek relief through treatment, and social support may encourage them in this direction. Health insurance coverage may remove a financial barrier to treatment. Contact with the legal system may provide an entree into treatment, perhaps as a condition of release, probation, or parole, and a positive result to an employer-administered drug test may lead users to accept treatment to ensure continued employment. Age, sex, and race/ethnicity may operate as moderating factors.

2. METHODS

2.1 Data Source and Case Selection Criteria

The data for this study were taken from the NHSDA, which is conducted by SAMHSA and is the primary source of data on the prevalence of illicit drug use in the US. Data for 1991 (n=32,594), 1992 (n=28,832), and 1993 (n=26,489) were combined to obtain an adequate sample of frequent cocaine users. During these years, the respondent universe was the US civilian noninstitutionalized population 12 years of age and older; persons with no fixed address, residents of institutional quarters (e.g., jails and hospitals), and active military personnel are excluded. Respondents are selected using a multistage stratified area probability sampling procedure that entails sampling PSUs, segments, dwelling units, and eligible individuals. In 1991, the screener and interview response rates were 96.5 and 84.2 percent, respectively, for an overall rate of 81.3 percent. The rates in 1992 were 95 percent for the screener, 83 percent for the interview, and 79 percent overall. The 1993 rates were 94 percent for the screener, 79 percent for the interview, and 74 percent overall. NHSDA data are collected by interviewers using questionnaires that include respondent self-administered answer sheets for drug use, drug-related problems, drug abuse treatment, and other sensitive items. Demographic,

income, household composition, and other related items are interviewer administered.

Cases selected for modeling were those in which the respondent reported using cocaine in any form "several times a month (about 25 to 51 days a year)" or more often during the past year, based on a question asking average frequency of use. Because of the phrasing of the item, respondents in some of the selected cases could have used cocaine only a couple of months of the year and, during those months, have used it almost every day. Cases with missing and bad data for the frequency item were excluded. A total of 608 cases met these criteria; applying composite weights for the 3 years, this resulted in an average annual estimate of 665,318 frequent cocaine users (12.8 percent of all past-year users and 18.9 percent of past-year users for whom frequency data were available). Use of imputed data on frequency of use of cocaine would have resulted in 826 cases and represented a total of 942,191 users.

As indicated previously, this is a broader definition of frequent cocaine users than that used in certain other analyses (e.g., SAMHSA, 1994; Gfroerer & Brodsky, 1993), which required that individuals use the drug at least 1-2 days per week (52 or more days per year). The selection criteria were relaxed for this study to increase precision. A separate analysis of cases added by the broader definition (i.e., those who had used cocaine "several times a month") shows that their rate of reporting cocaine-related problems is more similar to weekly users than to less frequent users (Greenblatt, et al., 1994). This suggests that respondents may see little distinction between the adjacent categories of "several times a month" and "1-2 times a week."

2.2 Variables Selected for Modeling

Treatment Variables The dependent variables used in the models were binary responses indicating whether individuals had received drug abuse treatment in the past year from any source and from seven specific types of sources: emergency rooms (ERs), hospital inpatient units, doctors' offices, drug treatment or rehabilitation facilities, mental health centers, self-help groups, and a residual, "some other place." These items do not ask which drug created the need for treatment; positive cases include an unknown number of individuals who had received treatment for primary drug problems other than cocaine.

Predictor Variables Demographic variables were considered as possible moderating factors in the models. Age was entered as a continuous variable directly, and the square of age was included to take

account of any nonlinear effects. Race/ethnicity was entered as three-category variable, non-Hispanic black, Hispanic, and residual, with the residual as the standard for comparisons. *Severity of cocaine use* was reflected in the models by three variables: (1) daily or almost daily cocaine use in the past year; (2) use of cocaine at least 200 times in the lifetime, which is an indicator of longer term use and overall volume of use; and (3) use of cocaine by injection or smoking freebase or crack, which are higher-risk routes of administration than sniffing or snorting the drug. *Use of alcohol and other drugs* is common among cocaine users. Any heroin use in the lifetime and daily or almost daily use of alcohol in the past year were chosen to reflect this factor in the analysis.

The *cocaine-related health and emotional problems* variables were constructed from responses to tandem items asking whether individuals had experienced, in the past 12 months, various problems as a result of drug use anytime in their lives. Positive responses with cocaine identified as the cause were targeted. The cocaine-related health problems variable was based on a single item, and the emotional problems variable was based any positive response to the following items: "become depressed or lose interest in things," "feel completely alone or isolated," "feel very nervous and anxious," "feel irritable and upset," and "feel suspicious and distrustful of people." The *social support* variable was living with at least one relative, including mother, father, biological children, step- or adopted children, spouse, brother, sister, in-laws, or other relatives. The *health insurance coverage* variable included both public and private health insurance and was specific to coverage in the last full calendar month preceding the survey. *Annual family income* was entered as a three-category variable with under \$9,000, \$9,000 to \$39,999, and \$40,000 and over as groups; the \$9,000 to \$39,999 group was the standard. *Contact with the legal system* was based on responses to the item "Not counting minor traffic violations, have you ever been arrested and booked for breaking a law?" The *positive drug test* variable was based on the item, "During the past 12 months, did a drug test given to you by your employer indicate the presence of any drug?"

Treatment availability was calculated using data from the 1991 and 1992 National Drug and Alcohol Treatment Unit Surveys (NDATUS), which are attempted censuses of US treatment programs conducted by SAMHSA. Because of suspected response error in the NDATUS treatment capacity data, the number of clients in treatment on the survey point prevalence date was used as a proxy for

treatment availability. Numbers of clients in treatment for drug or combined drug and alcohol problems were aggregated to the county level, and rates were calculated using estimated county populations 18-59 years old, the age group accounting for most treatment clients. Rates for 1991 and 1992 were averaged, and outliers were topcoded to offset a positive skew. The variable was regarded as continuous in the models.

Cases with missing values for key items were excluded, but use of logically edited and statistically imputed values for some variables reduced the number of cases with missing values. After the exclusions, the number of cases available for modeling varied from 576 to 580, depending on the response variable.

2.3 Model Development

Multiple logistic regression was used to develop models for the overall and source-specific treatment response variables. The SUDAAN LOGISTIC procedure (Research Triangle Institute, 1992) was used; SUDAAN software takes account of multistage sample design effects using Taylor series linearization. The same independent variables were used with each model. Data were weighted using composite 1991-1993 weights that considered sampling rate differences, nonresponse at the household and individual levels, and poststratification to Census Bureau projections by age, sex, race, and Hispanic origin. Odds ratios reflecting estimated relative risk of receiving treatment as a joint function of the predictor variables and 95 percent confidence intervals for these odds ratios are reported.

3. RESULTS

In the combined data for 1991, 1992, and 1993, 64.9 percent of frequent cocaine users were male; 56.1 percent were white non-Hispanic and 26.9 percent were black non-Hispanic; 35.5 percent were 18-25 years old and 38.4 percent were 26-34 years old; 11.2 percent were daily cocaine users in the past year and another 18.3 percent used the drug almost daily (2-6 days a week); 22.8 percent had taken cocaine by injection; and 64.5 percent had smoked or freebased it. One-fourth (25.0 percent) reported heroin use at least once in their lives, 10.0 percent acknowledged experiencing cocaine-related health problems in the past year, and 47.6 percent reported cocaine-related emotional problems in the same period. Over two-thirds (67.9 percent) were living with one or more relatives, and 58.1 percent were covered by some type of health insurance. One-fourth (25.1 percent) had an annual family income less than \$9,000, and 16.9 percent reported incomes of \$40,000 or more. Over

one-half (53.2 percent) had been arrested for breaking the law sometime in their lives, and 6.0 percent had been found positive for one or more drugs when tested by their employer in the past year.

Overall, an estimated 27.6 percent of frequent cocaine users had received treatment from some source in the past year. Across the independent variables used in modeling, the most striking difference in the proportion receiving treatment was associated with cocaine-related emotional problems; 45.1 percent of frequent cocaine users who reported these problems also reported having received treatment, compared to 11.1 percent of users who did not report emotional problems attributed to cocaine use.

The results of the logistic regression modeling for the response variable of treatment from any source in the past year are shown in table 1. The Wald F for the overall model was 6.73 with 20 df, $p < .0001$. After adjustment for correlation among the independent variables, the strongest predictor of treatment utilization was cocaine-related health problems; the odds of receiving treatment were 6.03 times higher for frequent cocaine users who reported these problems than for those who did not ($p < .01$). Having experienced cocaine-related emotional problems ($OR = 4.88$, $p < .001$) was a strong predictor in the same general category. Having used heroin at least once in their lives more than doubled the likelihood that frequent cocaine users would receive treatment ($OR = 2.42$, $p < .05$).

Among the variables related to financing treatment, health insurance coverage tripled frequent cocaine users' odds of receiving treatment ($OR = 3.02$, $p < .01$).

Frequent cocaine users who had been arrested and booked for breaking the law at least once in their lives had a higher likelihood of receiving drug treatment than those who had never been arrested ($OR = 2.53$, $p < .05$). Users who are arrested may enter treatment to avoid sanctions or may have treatment opportunities that otherwise might not be available.

Considering demographic factors, being female and being of Hispanic origin were found to reduce the odds of receiving treatment (for females, $OR = 0.38$, $p < .01$; for Hispanics, $OR = 0.32$, $p < .05$). Age and the square of age, which were treated as continuous variables in the model, were not significantly associated with the likelihood of receiving treatment.

Treatment availability, as measured by NDATAUS data, had no statistically significant effect on frequent cocaine users' rate of treatment. The mean availability rate was 3.97 ($SE = 0.45$) per 1000 population among users who had received treatment, compared with 4.06 ($SE = 0.31$) among those who had not.

Table 2 presents the odds ratios from models developed separately for each of the seven sources of treatment and identifies factors that proved to be significant predictors for each treatment source. All of the models had Wald F values significant at or beyond the .001 level of confidence. Among other things, these models indicated that: (1) high income increased the likelihood of receiving hospital treatment, both in inpatient units and emergency rooms; (2) daily cocaine use in the past year and heroin use at least once in the lifetime increased the likelihood of hospital inpatient treatment; (3) health problems attributed to cocaine were associated with increased likelihood of treatment in a doctor's office; (4) cocaine-related emotional problems increased the likelihood of receiving treatment in self-help groups, drug treatment and rehabilitation facilities, and mental health centers; (5) low income was associated with receiving treatment in a hospital emergency room; and (6) ever having been arrested for breaking the law was associated with increased likelihood of receiving treatment in drug treatment and rehabilitation facilities and in doctors' offices.

4. DISCUSSION

The results of this study support some of the common sense ideas about possible facilitators of and barriers to treatment. Personal motives for treatment surely include health, emotional, social, and other problems, and this study found that the strongest single predictor of frequent cocaine users' receiving treatment was health problems attributed to the drug. Cocaine-related emotional problems (i.e., feeling depressed, anxious, upset, isolated, or suspicious) also were predictive of receiving treatment.

In interpreting the findings for these two variables, however, it should be recognized that the data are self reported. Previous work (Carroll and Rounsaville, 1992) has found that cocaine abusers not in treatment tend to minimize the negative consequences of their cocaine use. Being willing to admit negative consequences to the extent of reporting them on the confidential NHSDA answer sheets could be almost as important as the negative consequences themselves in determining the willingness to enter treatment. An alternative interpretation might be that treatment makes people more willing to admit the problems they previously were having. This hypothesis cannot be investigated using retrospective cross-sectional data of the type collected by the NHSDA.

It is not surprising to find that having health insurance coverage is associated with an increased likelihood of receiving treatment. Like health insurance, high family income was hypothesized to

increase access to treatment, but this variable had little overall effect, as discussed below.

Having been arrested for breaking the law increased the likelihood of treatment, presumably by providing an entree into a program or the threat of possible sanctions for declining treatment. Having a positive drug test result in an employment context was hypothesized to increase the likelihood of treatment in a similar way to being arrested, but this variable only affected treatment in a doctor's office.

Frequent cocaine users who had used heroin at least once in their lives were more likely than those who had never used heroin to receive treatment, particularly in a hospital inpatient setting. The majority (59.3 percent) of the lifetime heroin users in this study had used the drug in the past year. The treatment data in the NHSDA do not specify the drug(s) that caused the individual to enter treatment, and problems with heroin may have been the primary impetus to treatment in some cases. Also, polydrug use may operate in several ways to increase the likelihood of needing treatment. In addition, cocaine users who have used heroin may have more advanced drug use careers than those who have not and may be more likely than others to inject cocaine. The reason for the differential effect of this variable on hospital inpatient units as a treatment location is not known.

Contrary to expectations, the likelihood of receiving treatment failed to show systematic increases associated with more severe cocaine use as indicated by higher volume and frequency of use and by high-risk routes of administration (injection or smoking/freebasing). Prior to modeling, these variables had been associated with large differences in the proportion receiving treatment from any source, but they were not strong predictors of treatment after adjustment for correlations with other variables.

The failure to find a strong positive effect of local area treatment availability rates also was surprising. One possible explanation is that the rate of clients in treatment, which was used because of suspected response error in the NDATUS treatment capacity data, might not be an adequate proxy for availability. High rates of clients in treatment might be more reflective of high rates of utilization than of availability; high rates may indicate numerous treatment slots which are usually filled. Another possibility is that, although distance may be an important factor, counties, the unit of analysis used in this study, are not large enough or sufficiently far apart to act as geographic barriers to treatment. Facility catchment areas may extend beyond county boundaries in many cases. Further research is needed to resolve these issues.

As mentioned above, high family income (\$40,000 or above) was not a significant predictor of receiving treatment overall, although it did emerge as significant in the model for treatment in hospital inpatient units. Hospitals are the most expensive locations in which to receive residential drug treatment (SAMHSA, 1993b), so it is not surprising that high income emerged as a predictor of treatment in hospital inpatient settings. Both high income and low income (below \$9,000) significantly increased the odds of receiving treatment in an ER. This finding is consistent with the observation that lower-income persons are less likely than those with higher incomes to have a regular source of primary medical care and consequently more likely to use an ER (Baker, et al., 1994). The higher rates of ER treatment for higher income persons is more difficult to explain; two possibilities are that (1) these persons can afford to use cocaine in sufficient quantities to precipitate an acute medical reaction and (2) wealthier users may be older and more vulnerable to medical emergencies associated with cocaine use.

Two findings in the models for individual sources of treatment are difficult to explain: (1) the increased rate of hospital inpatient treatment for Hispanics, relative to persons of other racial/ethnic groups, and (2) the elevated rate of treatment in doctors's offices for persons arrested and booked for breaking the law at least once in their lifetime. As these seems to be no obvious mechanism underlying these relationships, it would be interesting to see if they can be replicated.

The data from this study show that past-month cocaine use was reported by 52.5 percent of past-year frequent cocaine users who had received treatment (regardless of source) in the past year, compared with 73.0 percent of those who had not received treatment. While it is possible that some respondents were receiving inpatient treatment during part of the month prior to the survey and thus had less opportunity to use cocaine, it is not unreasonable to believe that much of the 20.5 percentage point difference between these groups reflects the benefits of treatment. The fact that 52.5 percent of those who had received treatment were still using cocaine in the past month does not negate the possibility that treatment may have enabled them to reduce their use of the drug; items on the NHSDA do not permit evaluation of differences in frequency of use in the past month, and cocaine may not have been the primary drug problem in some of the cases.

In summary, this study shows that, controlling for a number of possible predictors, the probability of frequent cocaine users' receiving treatment is higher for those who report cocaine-related health and emotional problems, those with health insurance

coverage, those who have been arrested at some time in their lives, and those who report heroin use at least once in their lives. The likelihood of receiving treatment is lower for women and for Hispanics.

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Table 1. Results of Logistic Regression on Treatment Received From Any Source in the Past Year by Frequent Cocaine Users: 1991-1993

Variable	Odds Ratio	Lower Limit	Upper Limit	p
Female	0.38	0.18	0.77	0.009
Daily or almost daily cocaine use	1.82	0.75	4.41	0.190
Used cocaine 200+ times in life	0.99	0.43	2.27	0.977
Injected or smoked cocaine	1.62	0.77	3.43	0.210
Heroin use in lifetime	2.42	1.05	5.54	0.040
Health problems related to cocaine	6.03	1.89	19.20	0.003
Emotional problems related to cocaine	4.88	2.24	10.63	0.000
Living with relative(s)	1.95	0.80	4.77	0.146
Health insurance coverage	3.02	1.54	5.93	0.002
Low income	1.35	0.49	3.70	0.561
High income	2.07	0.83	5.15	0.121
Alcohol use daily or almost daily	0.82	0.39	1.71	0.592
Ever arrested for breaking law	2.53	1.17	5.47	0.021
Positive drug test result	2.08	0.65	6.63	0.219
Black non-Hispanic	1.19	0.51	2.79	0.684
Hispanic	0.32	0.11	0.97	0.047
Age	1.11	0.78	1.57	0.571
Age squared	1.00	0.99	1.00	0.657
Treatment availability rate	0.92	0.84	1.01	0.090

SOURCE: SAMHSA and NIDA, National Household Survey on Drug Abuse, 1991, 1992, and 1993.

Table 2. Odds Ratios for Predictor Variables Based on Models for Treatment from Specific Sources: 1991-1993

Variable	Any Source	Self-Help Group	Treatment/Rehab. Facil.	Hospital Inpatient Unit	Mental Health Center	Doc-tor's Office	Emerg-ency Room	Some Other Place
Female	0.38b	0.45	0.46	0.88	0.70	2.13	0.74	0.30c
Daily or almost daily cocaine use	1.82	1.92	1.89	6.63b	0.80	0.76	1.13	1.63
Used cocaine 200+ times in life	0.99	1.49	2.03	0.73	2.11	0.22	1.19	0.23c
Injected or smoked cocaine	1.62	2.60c	2.12	1.76	1.64	1.49	2.80	2.17
Heroin use in lifetime	2.42c	1.85	1.40	8.27a	1.42	2.58c	0.89	3.10c
Health problems related to cocaine	6.03b	2.24	3.40c	0.94	2.13	8.01b	2.03	5.47b
Emotional problems related to cocaine	4.88a	4.47a	4.42a	2.47	3.62c	3.15	3.25	1.97
Living with relative(s)	1.95	1.60	1.24	0.40	2.02	0.84	0.48	3.26
Health insurance coverage	3.02b	3.09b	2.10	1.30	1.78	2.51	1.32	2.20
Low income	1.35	1.31	1.77	0.92	2.61	1.68	5.06c	1.02
High income	2.07	1.83	2.10	11.27a	1.14	0.55	7.01b	1.09
Alcohol use daily or almost daily	0.82	0.78	0.95	0.49	1.11	1.09	0.87	1.25
Ever arrested for breaking law	2.53c	3.11c	5.96b	2.03	1.47	13.28b	1.34	1.04
Positive drug test result	2.08	2.26	2.65	5.61	1.89	5.39c	2.54	3.99
Black non-Hispanic	1.19	0.66	1.50	5.08c	1.73	0.57	2.36	0.41
Hispanic	0.32c	0.26c	0.44	1.78	1.69	0.60	1.56	0.48
Age	1.11	1.04	1.14	1.57c	1.08	1.24	1.22	0.95
Age squared	1.00	1.00	1.00	0.99c	1.00	1.00	1.00	1.00
Treatment availability rate	0.92	0.90	0.94	0.93	0.91	1.01	0.88	1.05

a: p<.001 b: p<.01 c: p<.05

SOURCE: SAMHSA and NIDA, National Household Survey on Drug Abuse, 1991, 1992, and 1993.