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Abstinence trajectories among treated crack cocaine users

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Abstract

This article reports findings from a study that investigated treatment outcomes among crack/cocaine users over a 18-month period. From a cohort of 229 subjects, three groups emerged: (1) those who had reported ongoing, stable abstinence from crack/cocaine; (2) those who had consistently used during the period; and (3) those who reported cycling between abstinence and use during the follow-up period. Analyses of variance (ANOVA) were conducted to compare the three groups in terms of intake characteristics, including demographic profile, previous treatment, motivational factors, and functioning in seven Addiction Severity Index (ASI) domains. Length of time involved in aftercare and Twelve Step participation after treatment were also contrasted among the three groups. Results showed that subjects who achieved sustained abstinence from crack/cocaine also did better in other domains such as employment, family, legal, and psychiatric than others. Stable abstinence was also significantly associated with a longer period of aftercare and frequent attendance at Twelve Step programs. Logistic regression analyses further estimated the significant impact of the posttreatment factors on the achievement of sustained abstinence. The implications of these findings for treatment services research are discussed.

Keywords: Treatment outcomes; Abstinence; Crack cocaine use

1. Introduction

With the persistence of cocaine use and related problems, treatment demand for cocaine abuse is growing (GAO, 1996; Higgins & Wong, 1998). Effective treatment for cocaine addiction has been measured by patients' achievements of long-term abstinence and enhanced

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quality of life. Although some disagreement exists on the relationship of posttreatment abstinence and other aspects of life functioning (Fiorentine, 1998; Kleinman et al., 1992; McLellan, Luborsky, O'Brien, Woody, & Druley, 1982; Rounsaville, Kosten, & Kleber, 1987), abstinence still remains as a fundamental goal for the treatment of cocaine and/or other drug problems. Evaluators continue to judge the effectiveness of treatment by examining the extent of abstinence among those receiving the services. For example, the Drug Abuse Treatment Outcome Study confirmed the effectiveness of drug abuse treatment by documenting abstinence rates after treatment across all major treatment modalities (Leshner, 1997). In the case of cocaine treatment, however, high relapse rates have prompted researchers to describe cocaine users as presenting special challenges (Leukefeld & Tims, 1993; Washton & Stone-Washton, 1990).

Treatment researchers have examined pretreatment characteristics such as gender, age, employment, criminality, drug use and treatment history, psychiatric status, and motivation on outcomes (De Leon, 1984; Harrison & Asche, 1999; Hubbard, Racha, Craddock, & Cavanaugh, 1984; Miller, Ninonuevo, Klamen, Hoffmann, & Smith, 1997; Roberts & Nishimoto, 1996; Simpson & Sells, 1982). Their conclusions have been inconsistent with some suggestions that pretreatment factors are predictive of favorable outcomes and other findings to the contrary. Washton and Gold (1986) speculated that patients with lower severity of use and a history of good functioning in other areas have a better chance of achieving stable abstinence. Simpson, Joe, Fletcher, Hubbard, and Anglin (1999) reported that problem severity at intake, including drug history and psychosocial measures, was predictive of relapse to weekly cocaine use after treatment. Others such as Means et al. (1989) reported that severity of abuse and other functioning factors such as employment did not correlate with their treatment outcome measures. Rounsaville et al. (1987) concluded that abstinence could not be successfully predicted by patient characteristics are intake.

The most consistently noted predictor for abstinence and other successful outcomes has been treatment retention, especially the length of time in treatment (Bell, Richard, & Feltz, 1996; Galney, Wells, & Hawkins, 1993; Rapp, Siegal, Li, & Saha, 1998; Simpson et al., 1999). Posttreatment services and/or support, sometimes known as "aftercare," is also seen as predictive of longer-term abstinence. Drug abuse treatment clients who attended outpatient aftercare and Twelve Step programs such as Alcoholics Anonymous, Cocaine Anonymous, or Narcotics Anonymous after treatment were more likely to maintain abstinence than non-attenders (Miller et al., 1997; Ouimette, Moos, & Finney, 1998; Siegal, Rapp, Li, Saha, & Kirk, 1997). More recently, however, Fiorentine (1999) reported that it was long-term, frequent Twelve Step participation that assisted in the maintenance of abstinence rather than posttreatment aftercare or recovery motivation.

While there is general agreement that abstinence is a desirable treatment goal, measuring it has proven to be a complex task. Conceptually, the field has had some difficulty in agreeing on a definition of relapse and defining the relationship of abstinence to relapse; specifically, whether an episode or episodes of drug use constituted a relapse. This ambiguity can be particularly troublesome in that current definitions of chemical dependency recognize the chronic and relapsing nature of the condition encouraging clinical researchers to focus on the

client's overall situation including abstinence as a part of the picture (National Institute on Drug Abuse [NIDA], 1999). In this study, however, our attention will be focused on reports of ''reuse'' of cocaine.

The literature has recognized as well that when examined longitudinally, abstinence organizes itself into identifiable patterns and these in turn, seem to correlate with overall adjustment. For example, Rounsaville et al. (1987), in studying treatment outcomes for opioid addicts, compared three abstinence groups: those with lasting abstinence, those with abstinence followed by use, and those who were never abstinent. The lasting-abstinence groups demonstrated the most favorable functioning and the never-abstinent group exhibited the worst (Rounsaville et al., 1987). Another study of opiate users examined the length of abstinence during the 1-year follow-up period and found that sustained abstinence from opiates was associated with increased employment and social stability (Sheehan, Oppenheimer, & Taylor, 1993). Similar approaches were also applied in studying abstinence stability over time for treated alcohol abusers. For instance, Curran and Booth (1999) reported that predictors of continued abstinence varied across follow-up periods as they examined abstinence rates with 3-, 6-, 9-, and 12-month intervals.

Currently, little is known about abstinence and reuse patterns for cocaine — especially crack — abusers who have participated in treatment. Questions have been raised about appropriate definitions of relapse or abstinence for this population (Havassy, Wasserman, & Hall, 1993; Tims & Leukefeld, 1993). Carroll et al. (1994), studying the delayed effects of psychopathology, acknowledged the difficulty of examining the dynamic nature of abstinence, since only a small number of subjects could be expected to be continuously abstinent throughout the follow-up period.

The purpose of this article is to explore abstinence as a dynamic outcome for a treated population of cocaine users. We examine patterns or abstinence trajectories for individuals reporting cocaine or crack as their most problematic substance. The resulting groups will be compared on pretreatment characteristics, posttreatment care, Twelve Step program involvement, and adjustment in several areas including employment, health, family, legal, and psychiatric functioning.

2. Methods

2.1. Participants and procedures

This study was conducted as part of the Enhanced Treatment Project (ETP), a 5-year NIDA-supported research demonstration program, located at Department of Veterans Affairs Medical Center, Polysubstance Rehabilitation Program (PRP) in Dayton, OH. Project participants were veterans who were admitted for services at the PRP from September 17, 1991, through December 16, 1994. Eligibility was based on: any use of cocaine or opiates in the last 6 months, or a regular pattern of use of any other drugs (excluding alcohol) for three consecutive weeks, and no formal drug treatment in the 3 months prior to entry into this treatment episode.

Interviewers approached subjects at the time of their admission to PRP and described the study. After the completion of university IRB-approved consent procedures, all subjects underwent a series of structured interviews administered at intake and three consecutive 6-month follow-up intervals — 6, 12, and 18 months — after discharge from primary treatment. Subjects were paid US$30 for each interview. A total of 632 veterans were admitted to the project. Among them, 419 reported cocaine or crack cocaine as their most problematic substance at intake.

Of those 419 subjects with cocaine or crack cocaine problems, 229 (54.6%) completed all intake, 6-, 12-, and 18-month interviews, and were included in this study. Thus, data used for this study represent 229 cocaine users who were successfully contacted and interviewed at all three follow-up points. Potential response biases were assessed by comparing the demographics of the sample and those who were not included in the study. Both groups had similar demographic characteristics. For instance, an average age of 37.4 years was reported by the study sample, compared to 37.6 years for those lost to follow-up; average years of education were 12.6 and 12.5, respectively A slightly higher percentage of unemployment (76.3%) was found in the study sample, compared to 67.7% in the other group. Moreover, the comparison of subjects included in the study and those lost to follow-up also revealed similar problem severity at baseline with Addiction Severity Index (ASI) drug severity scored .24 for the both groups.

Since veterans were the subjects, the study sample was overwhelmingly male (98.7%) in gender. Two-thirds (67.7%) were currently unemployed. Eighty-five percent (85.2%) were in their 30s and 40s; 90% reported at least high school education. The majority of the sample was either divorced (35.4%), separated (18.3%), or never married (24.5%). Approximately 23% of the sample reported that they were currently involved with the legal system, either on probation or parole or awaiting charge, trial, or sentence. About 58.5% of the sample reported having previous treatment for alcohol or drug use problems prior to admission to this treatment. Additional sociodemographic data are presented in Table 1.

Although all the 229 subjects reported cocaine or crack cocaine as their most serious problems, the frequencies of use varied. In the year preceding treatment, 87% reported using cocaine or crack at least one time a week and 51.6% used at least once a day. About 28% of the sample admitted that they used cocaine or crack cocaine four or more times a day.

2.2. Measures

Data were collected using the ASI (Version 5, McLellan et al., 1992), the ETP Interview Form, developed specifically for this project, and the Self-Rating Form, developed at the Institute of Behavioral Research, Texas Christian University (Knight, Holcom, & Simpson, 1994; Simpson & Joe, 1993). The ASI is a widely used assessment and research instrument tested in numerous treatment settings with diverse client groups. The ETP Interview Form is a 350-item questionnaire about lifetime and 1-year information about drug use, housing and employment patterns, HIV risk behaviors, treatment history, and social and peer

Table 1
Description of sample ($N = 229$)

Intake characteristics	Mean	S.D.
Age	37.36	6.80
Years of education	12.57	1.49
Age of first drug use	14.15	3.26
Number of previous treatments	1.03	0.93
Desire for help	31.66	3.47
Readiness for treatment	34.40	4.74
ASI severity at intake		
Alcohol	.34	.27
Drugs	.24	.10
Legal	.29	.26
Employment	.56	.28
Family	.29	.24
Medical	.31	.36
Psychiatric	.24	.23
	Percent	*n*
Unemployed	67.7	155
Not involved with legal system	77.0	174
Self-referred to treatment	69.7	159
Expected complete abstinence	71.6	164

relationships. The Self-Rating Form gathered information on psychological adjustment, social functioning, and motivation including problem recognition, desire for help, and treatment readiness.

For this study, a primary outcome measure was abstinence status over time. The pattern was identified by the subject's abstinence status at each of the three follow-up points, based on self-reports of any cocaine or crack cocaine use during the 6 months prior to each follow-up interview. For example, a subject would be placed in the "sustained abstinence" category if he had consistently reported not using any cocaine/crack at the 6-, 12-, and 18-month interviews; "lack of abstinence" designated those who reported using cocaine/crack during the previous 6 months at each of the three follow-up points. Subjects who switched at least once between abstinence and use or use and abstinence would be in the "inconsistent abstinence" group. Achievement of "sustained abstinence" was employed as an indicator of successful treatment outcomes in the regression analyses.

Posttreatment aftercare was defined as the length of time in aftercare following primary treatment and measured by self-reported weeks of contacts with either counselors or case managers during the first 6 months after treatment. The possible range for this variable was 0 to 30 weeks. Participation in Twelve Step programs after primary treatment was measured as number of meetings attended during the first 6-month follow-up period. In multivariate analyses, both indicators were defined as dichotomous variables: with "1" for participation in Twelve Step program meetings at least twice a week; and participation in aftercare treatment was also dichotomized as "1" for more than 4 weeks of aftercare.

Seven standard ASI composite scales of medical, employment, alcohol, drugs, legal, family/social, and psychiatric domains were used to assess problems associated with drug abuse. All seven ASI composite scores, ranging from "0" to "1" with higher scores indicating more severe problems, were used in these analyses.

Motivational factors, desire for help and readiness for treatment, were measured by the Self-Rating Form (Knight et al., 1994). Scales had from seven to eight items each and each item was rated on a five-point scale. Negatively worded items on each scale had their scores reversed. Internal consistency, measured by Cronbach's alpha, ranged from .74 for readiness for treatment and .79 for desire for help in this study.

2.3. Data analysis

Data were analyzed with SAS/STAT. Descriptive analyses described sample characteristics and baseline severity scores on the ASI domains. These intake data were further compared among the three abstinence groups based on self-reports on cocaine or crack use at 6-, 12-, and 18-month follow-ups. A series of models with unequal cells for analysis of variance (ANOVA) were used for the intake comparison as well as other outcome indicators. Because of the unequal cell size, least-square means were used in the ANOVA analyses. Scheffe multiple comparison tests were conducted to investigate differences between groups. Based on the bivariate analysis, logistic regression analyses were performed to estimate effects of aftercare and Twelve Step program participation on sustained abstinence while drug and alcohol severity measures at intake were controlled.

3. Results

3.1. Abstinence patterns

Fig. 1 illustrates the prevalence and patterns of abstinence and reuse at each of the follow-up points among the 229 subjects in this study. At the 6-month follow-up, 45.4% of the subjects reported use while 54.6% were abstinent from cocaine or crack. Among 125 subjects reporting abstinence at the 6-month, 30.4% (38 people) reported using cocaine or crack between 6 and 12 months after treatment. The overall abstinence rate at 12 months was 46.3%, which included 19 subjects who reported using during the first 6 months but claimed abstinence for the second 6-month period. While the majority of those who achieved abstinence at 12-months remained abstinent at the 18-month follow-up, about 23% claimed a change in status during this period switching from either abstinence to reuse or reuse to abstinence. The overall abstinence rate was 48.9% during the 6 months prior to the 18-month follow-up. Of the 112 subjects who reported abstinence at 18-month, 71 subjects or 63.4%, reported consistent abstinence during the 18 months after treatment, as 66 reported consistently using at 6-, 12-, and 18-month follow-ups. Based on the trajectory paths of abstinence or reuse delineated in Fig. 1, three groups emerged: (1) "sustained abstinence" — those who had achieved ongoing, stable abstinence ($n = 71$,

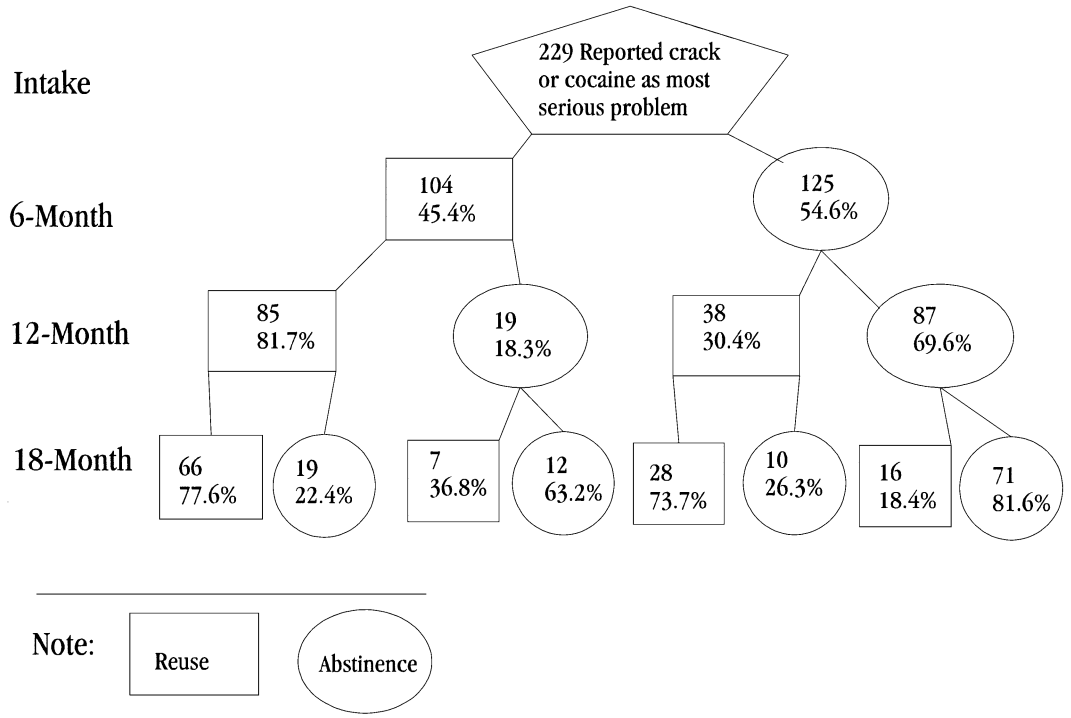

Fig. 1. Patterns of abstinence and reuse.

31.0%); (2) "lack of abstinence" — those who had consistently used cocaine or crack at each of the follow-up periods ($n = 66$, 28.8%); and (3) "inconsistent abstinence" — those had cycled between abstinence and reuse during the follow-up period after treatment ($n = 92$, 40.2%).

3.2. Intake comparison

Group comparisons of sociodemographic, ASI severity scores, and motivational variables at intake were conducted and summarized in Table 2. No significant differences were found among the three abstinence groups in 16 of the 17 baseline characteristics. Each group had similar average ages, years of education, age at first use of drugs, number of previous alcohol or drug treatment, and unemployment rates. Comparable percentages were also found for current legal system involvement and self-referral to treatment. Groups did not differ on the motivation factors — desire for help, and readiness for treatment. ASI severity scores were also similar for each group as well. The only significant difference noted among the three groups at intake related to treatment expectation, as the sustained abstinence group (85.9%) expected "complete abstinence" at intake, compared to 62.1% and 67.4%, respectively, for the other two groups.

Table 2
Comparisons on intake characteristics among three abstinence groups ($N = 229$)

Intake characteristics	Group 1: sustained abstinence ($n = 71$)	Group 2: lack of abstinence ($n = 66$)	Group 3: inconsistent abstinence ($n = 92$)	F
Age	36.69	38.48	37.08	1.33
Years of education	13.43	12.56	12.68	0.55
Age of first drug use	13.67	14.83	14.02	2.30
Number of previous treatments	0.83	1.14	1.12	2.51
Desire for help	31.68	31.30	31.91	0.59
Readiness for treatment	34.59	34.05	34.50	0.25
ASI severity at intake				
Alcohol	.32	.37	.33	0.45
Drugs	.22	.26	.23	2.60
Legal	.27	.29	.30	0.35
Employment	.59	.61	.51	2.52
Family	.25	.28	.32	1.54
Medical	.36	.29	.29	0.75
Psychiatric	.21	.26	.25	0.70
	Percent			χ^2
Unemployed	69.0	66.7	67.4	0.09
Not involved with legal system	82.9	75.4	73.6	2.04
Self-referred to treatment	70.4	66.7	71.4	0.43
Expected complete abstinence	85.9	62.1	67.4	10.88**

** $P \leq .01$.

3.3. Follow-up comparison

To determine the relationship between abstinence patterns and improvement in other areas of functioning, seven ASI group mean scores were compared at the 18-month follow up. The results are displayed in Table 3. The sustained abstinence group demonstrated the best functioning levels across six of the seven areas. Not surprisingly, those subjects who consistently used had the highest drug use severity score while inconsistent drug users had significantly higher drug severity scores than those who achieved sustained abstinence. Subjects who maintained consistent abstinence also demonstrated better functioning in employment status than the other two groups. Significant differences were also found in legal, family, and psychiatric functioning between the sustained abstinence group and the lack of abstinence group.

Table 3 also presents posttreatment service participation among the three abstinence groups. Achieving sustained abstinence appeared to be associated with longer aftercare participation and frequent attendance at Twelve Step program meetings during the first 6 months after primary treatment. On average, subjects with sustained abstinence participated in about 11 weeks of posttreatment aftercare, almost double that of the lack of abstinence group. Similarly, the sustained abstinence group reported attending Twelve Step meetings more often than the other two groups.

Table 3
Comparisons on ASI composites and posttreatment factors among three abstinence groups ($N = 229$)

	Group 1: sustained abstinence ($n = 71$)	Group 2: lack of abstinence ($n = 66$)	Group 3: inconsistent abstinence ($n = 92$)	F
ASI severity at 18-month				
Alcohol	.09	.26[a]	.16	13.48***
Drugs	.02[a]	.16[a]	.08[a]	32.33***
Legal	.10[b]	.21	.16	6.11*
Employment	.37[a]	.60[a]	.48[a]	11.25***
Family	.08[b]	.18	.14	5.64**
Medical	.25	.26	.28	0.10
Psychiatric	.09[b]	.21	.15	4.15*
Posttreatment factors at 6-month				
Weeks of aftercare contacts	10.94[b]	6.70	8.94	3.70*
Number of Twelve Step meetings	103.8[a]	45.1	68.1	8.33***

[a] Scheffe multiple comparison tests indicate that average score for this group was significantly different from the other two groups.

[b] Scheffe multiple comparison tests indicate that average scores for Group 1 was significantly different from Group 2.

* $P \leq .05$.

** $P \leq .01$.

*** $P \leq .001$.

3.4. Impact of aftercare and Twelve Step participation

To further assess the effects of aftercare participation and Twelve Step fellowship attendance on stable abstinence achievement (sustained abstinence = 1), multiple logistic regression analyses were performed, controlling for drug and alcohol severity scores at intake. Results are presented in Table 4. These analyses suggest the effects of the two posttreatment variables on sustained abstinence remain significant. The likelihood of achieving sustained abstinence was more than doubled among those who had at least 4 weeks of aftercare and

Table 4
Standardized coefficients and odds ratios for sustained abstinence, results from logistic regression analysis ($N = 229$)

Independent variable	Standardized estimate (β)	Odds ratio	95% CI	
More than 4 weeks aftercare ($n = 119$, 52.0%)	0.21**	2.14	1.20	3.83
At least 2 Twelve Step program meetings a week ($n = 101$, 44.1%)	0.17*	1.89	1.07	3.33

ASI alcohol and drug severity scores at intake were also controlled in these analyses.

* $P \leq .05$.

** $P \leq .01$.

doubled for those who attended at least 2 Twelve Step meetings a week during the first 6 months after treatment.

4. Discussion

The data provided by this study present a close look at the posttreatment outcomes of crack cocaine users, focusing on patterns of abstinence and reuse. Our results are consistent with the findings of other researchers examining treatment outcomes for opiate and powdered cocaine abusers (Rounsaville et al., 1987; Sheehan et al., 1993). We, too, identified three groups: those that were consistently abstinent, those that were consistently using, and those that were inconsistently abstinent at each follow-up point. Our findings also associated with other studies that document sustained abstinence with the best posttreatment outcomes in other life areas such as employment, domestic relations, legal, and psychiatric status. Our data also demonstrate the positive relationship between sustained abstinence and longer participation in aftercare and more frequent attendance at Twelve Step Fellowship meetings (Fiorentine, 1999; Ouimette et al., 1998). In fact, multivariate analyses indicated that those who more frequently participated in either aftercare case management, aftercare treatment, or Twelve Step were more than twice as likely to be consistently abstinent throughout the follow-up period.

Several limitations to the study should be acknowledged. First, the sample was composed solely of veterans, and the study was conducted in a medium-sized Midwestern city. Also, the sample represented 54.6% of those actually eligible, due to the fact that some could not be located, declined to be interviewed, or did not participate in all the follow-up interviews. The fact that virtually the entire sample was male limits its generalizability. We also recognize that our standard logistic regression analyses may be subject to selection bias identified by Fortney, Booth, Zhang, Humphrey, and Wiseman (1998) in evaluating posttreatment factors. It is possible that some unobserved factors, such as transportation and the accessibility to aftercare or AA meetings, might affect our estimation of the effects of aftercare contacts and self-help group participation. A final limitation is that virtually all of the outcome data involves self-report; reports of abstinence were not confirmed using any biological assays such as hair or urine analyses. Similarly, changes in posttreatment psychosocial adjustment were determined by self-report data.

Our findings confirm that for these cocaine abusers, length of time in aftercare treatment and Twelve Step Fellowship involvement are associated with positive outcomes. This association endures regardless of the individual's level of problem severity, demographic, social, or historical characteristics at admission to treatment. This finding has proven to be inconsistent with some studies suggesting that pretreatment characteristics, including problem severity, do have a bearing on outcome and others finding no association. Our data seem to suggest that what happens in treatment is most influential on the recovery process. This, of course, calls for research on the process of treatment itself. How different people are differently affected by treatment, why some even with very similar characteristics seem to benefit and others do not, constitute interesting, even vital research questions.

Our findings suggested that neither "desire for help" nor "readiness for treatment" are associated with abstinence or improved functioning. Curiously, the individual's "expectation of complete abstinence" did positively associate with sustained abstinence. Whether "expectation" is a more sensitive measure of motivation or is reflective of another dimension such as self-efficacy cannot be addressed by these data. It raises intriguing questions about pretreatment expectations and how they might influence the treatment process. It certainly encourages speculation about whether treatment could be enhanced by manipulating expectations about outcome.

Finally, the study leaves us with several conceptually and methodological challenges. It suggests that recovery from crack or cocaine abuse is a complex process and not a discreet event. This study implies that we need to develop the conceptual and methodological tools capable of examining recovery trajectories and analyzing abstinence/reuse at numerous data collection points.

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