

# Contingency Management Treatment in Substance Abusers With and Without Legal Problems

Nancy M. Petry, PhD, Carla J. Rash, PhD, and Caroline J. Easton, PhD

Drug and alcohol abusers frequently have legal difficulties, and the legal system often provides negative reinforcement for substance abuse treatment. In contrast, contingency management (CM) treatments utilize positive reinforcement procedures to improve patient outcomes. This study evaluated whether substance-abusing patients with legal problems at treatment entry had differential outcomes, in general and in response to CM, compared with those without legal problems. Data from three randomized CM trials ( $n = 393$ ) were used in an evaluation of main and interactive effects of legal status and treatment condition, with respect to retention and abstinence. Compared with patients without legal difficulties, those with legal problems remained in treatment for shorter durations and achieved shorter periods of abstinence. CM was positively and significantly associated with longer durations of abstinence, regardless of legal status. Results suggest that substance abusers with legal problems have generally poor outcomes, but that CM is effective regardless of the patient's legal status.

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More than five million individuals in the United States are on probation or parole, and most of them have drug-related problems.<sup>1,2</sup> Rates of substance abuse among offender populations are more than four times that of the general population.<sup>3</sup> Further, estimates indicate that the criminal justice system is responsible for 40 to 50 percent of referrals to community-based substance abuse treatment programs.<sup>4–6</sup>

Legal problems can precipitate substance abuse treatment entry, and pressure from the legal system may serve as an impetus for some patients to remain engaged in treatment. Among patients for whom drug abuse treatment is a condition of release, dismissal from or failure to attend treatment can result in incarceration.<sup>7</sup> For those with trials pending, en-

gaging and progressing in treatment can influence sentencing decisions.<sup>8</sup>

Despite the potentially negative reinforcing impact of the legal system on drug abuse treatment, data are mixed regarding how legal system involvement affects treatment outcomes. Criminal justice system involvement can be associated with good outcomes when outpatient treatment immediately follows a stay in a controlled environment, such as jail or prison.<sup>9</sup> However, other studies find no differences, and in some cases poorer prognoses in patients with legal difficulties than in those without any legal involvement at the time of treatment entry.<sup>10–13</sup>

The inconsistent findings related to legal status and substance abuse treatment outcomes may result, at least in part, from a failure to follow basic behavioral principles<sup>14</sup> when attempting to apply legal sanctions to treatment-related behavior. Probation and parole officers often do not monitor treatment attendance and drug-using behavior. When drug use or absenteeism from treatment occurs, contingencies are rarely applied consistently or in proximity to the inappropriate behavior. Formal discharge from a treatment clinic may not occur, for example, until a patient misses 30 days in a row, and probation officers may not be informed of urine

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Dr. Petry is Professor and Dr. Rash is Post-doctoral Fellow, Cardiology Center, Department of Medicine, University of Connecticut Health Center, Farmington, CT. Dr. Easton is Associate Professor, Yale University, New Haven, CT. This study and preparation of this report were supported by National Institutes of Health Grants P30-DA023918, AA-T3207290, R01-DA022739, R01-DA018883, R01-DA016855, R01-DA13444, R01-DA027615, P60-AA03510, P50-DA09241, and M01-RR06192. Address correspondence to: Nancy M. Petry, PhD, Calhoun Cardiology Center, Department of Medicine, University of Connecticut Health Center, 263 Farmington Avenue (MC 3944), Farmington, CT 06030-3944. E-mail: npetry@uchc.edu.

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toxicology results until days or weeks after the samples are collected and screened.

Although provision of negative reinforcers can have a strong effect on behavior, positive reinforcement procedures can also be very effective for shaping substance-abusing patients' behavior. Contingency management (CM) treatments involve three basic principles: frequently monitor for change in the behavior desired; reinforce, in close temporal proximity, the desired behavior each time it occurs; and when the desired behavior does not occur, withhold positive reinforcers. In CM treatments, patients receive tangible items (such as the chance to win prizes of various magnitudes) each time they submit drug-negative samples. Numerous randomized trials,<sup>15–24</sup> as well as meta-analyses,<sup>25,26</sup> have established the efficacy of CM for substance-abusing patients.

The purpose of this study was to assess the impact of legal problems on treatment outcomes of cocaine-abusing patients receiving standard care, with and without CM in community-based treatment programs. Consistent with findings from the primary studies,<sup>18,19,22</sup> we expected that CM would improve outcomes compared with standard care. Because of the robustness of behavioral principles, we hypothesized that CM may be equally beneficial in patients with and those without legal difficulties. We evaluated both short-term, during-treatment effects and outcomes from a nine-month follow-up evaluation.

## Methods

### Participants

Participants ( $n = 393$ ) were enrolled in one of three studies that involved randomization to CM conditions or standard care (SC).<sup>18,19,22</sup> Studies were conducted at four New England community clinics, and participants were recruited from new admissions to intensive outpatient treatment at the clinics. Content and structure of services were similar across clinics, and key patient variables (e.g., mean age, years of cocaine and other substance use, and education) did not differ across clinics (all  $p > .05$ ).

The three clinical trials had similar inclusion and exclusion criteria. All participants were 18 years of age or older, were able to comprehend study procedures, and met past-year Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text

Revision (DSM-IV-TR)<sup>27</sup> criteria for cocaine abuse or dependence. Exclusion criteria included uncontrolled psychopathology (e.g., active suicidal ideation or mania) and, because of the potential similarity of prize-oriented CM with gambling, being in recovery for pathological gambling (even though prize-based CM does not increase the tendency to gamble<sup>28</sup>). All participants provided written informed consent, and the study was approved by the Institutional Review Board of the University of Connecticut.

Baseline and demographic characteristics are presented in Table 1 for those with ( $n = 148$ ) and those without ( $n = 245$ ) current legal problems. Legal problems were defined by scores greater than .00 on the Addiction Severity Index<sup>29</sup> legal scale. Legal scale scores greater than .00 occur when one endorses awaiting legal charges, trial, or sentencing; committing illegal activities on one or more days in the past month; having legal problems of a minor or more substantial nature; or desiring referral for legal concerns.

### Procedures

As noted above, analyses for this study combined individuals participating in three randomized clinical trials.<sup>18,19,22</sup> All three trials had the primary goal of evaluating the efficacy of CM plus SC relative to SC alone. Across the three studies, SC conditions were similar, but CM conditions differed in each trial (e.g., reinforcement targets and nature or magnitude of reinforcement). All studies were consistent with respect to sample characteristics, duration and intensity of treatment, length of follow-up, and assessment instruments and intervals. This consistency provides a rationale for combining SC conditions and CM conditions, across trials, but effects of the study were also taken into account in the analyses (see Data Analysis).

In the baseline assessment, patients completed questionnaires and structured interviews. Research staff administered substance use modules of the Structured Clinical Interview for the DSM-IV<sup>30</sup> and the ASI.<sup>29</sup> The ASI assesses psychosocial functioning in seven areas, including legal problems. Composite scores, ranging from 0.00 to 1.00, provide information on problem severity for each domain, with higher scores indicating more severe problems.

## Legal Problems and Treatment Outcomes

**Table 1** Baseline and Demographic Characteristics by Legal Status

Variables	No Current Legal Problems	Current Legal Problems	Statistic <sub>df</sub>	<i>p</i>
<i>N</i>	245	148	—	—
Treatment condition, <i>n</i> (%)			$\chi^2_1 = 2.35$	.13
Standard care	65 (26.5)	50 (33.8)		
Standard care + CM	180 (73.5)	98 (66.2)		
Study, <i>n</i> (%)			$\chi^2_2 = 7.30$	.03
Petry <i>et al.</i> <sup>18</sup>	63 (25.7)	57 (38.5)		
Petry <i>et al.</i> <sup>19</sup>	93 (38.0)	49 (33.1)		
Petry <i>et al.</i> <sup>22</sup>	89 (36.3)	42 (28.4)		
Age	36.6 (7.6)	35.3 (8.8)	$t_{275} = 1.49$	.14
Earned Income	\$10,137 (\$16,017)	\$8,811 (\$23,748)	$t_{391} = 0.86$	.39
Years of education	11.6 (1.7)	11.6 (1.8)	$t_{391} = 0.30$	.78
Male gender, <i>n</i> (%)	114 (46.5)	83 (56.1)	$\chi^2_1 = 3.37$	.07
Race, <i>n</i> (%)			$\chi^2_2 = 3.58$	.17
African American	136 (56.9)	70 (47.6)		
Caucasian	76 (31.8)	60 (40.8)		
Other	27 (11.3)	17 (11.6)		
Marital Status, <i>n</i> (%)			$\chi^2_2 = 3.17$	.21
Never married	131 (53.5)	79 (53.4)		
Married	37 (15.1)	14 (9.5)		
Other	77 (31.4)	55 (37.2)		
Employment status, <i>n</i> (%)			$\chi^2_3 = 5.46$	.14
Full-time	120 (49.0)	59 (39.9)		
Part-time	50 (20.4)	33 (22.3)		
Unemployed	55 (22.4)	47 (31.8)		
Not in labor force	20 (8.2)	9 (6.1)		
Cocaine dependence diagnosis, <i>n</i> (%)	209 (85.3)	127 (85.8)	$\chi^2_2 = 0.02$	.89
Alcohol dependence diagnosis, <i>n</i> (%)	125 (51.0)	83 (56.1)	$\chi^2_1 = 0.95$	.33
Opioid dependence diagnosis, <i>n</i> (%)	49 (20.0)	28 (18.9)	$\chi^2_1 = 0.07$	.79
Sample negative for alcohol, cocaine and opioids at baseline, <i>n</i> (%)	196 (80.3)	123 (83.1)	$\chi^2_1 = 0.47$	.49
Addiction severity index scores				
Alcohol	0.21 (.22)	0.25 (.22)	$t_{391} = -1.58$	.12
Drug	0.16 (.09)	0.16 (.09)	$t_{391} = -0.07$	.94
Medical	0.21 (.32)	0.25 (.35)	$t_{391} = -0.33$	.75
Employment	0.73 (.30)	0.74 (.28)	$t_{391} = -0.43$	.67
Legal	0.00 (.00)	0.35 (.19)	$t_{147} = -21.95$	<.001
Family/social	0.18 (.23)	0.20 (.22)	$t_{391} = -0.72$	.47
Psychiatric	0.28 (.23)	0.28 (.24)	$t_{391} = -0.01$	.99

Values are means (standard deviations) unless otherwise indicated. CM, contingency management.

At baseline, during treatment, and at three- and nine-month follow-up assessments, patients provided breath samples that were tested for recent alcohol use with an Alco-sensor IV Alcometer (Intoximeters, St. Louis, MO) and urine samples that were screened for cocaine and opioids by OnTrak TesTstiks (Varian Inc., Walnut Creek, CA). Specimen collection occurred three days/week in weeks 1 to 3 of study participation (e.g., Monday, Wednesday, and Friday), two days/week in weeks 4 to 6 (e.g., Tuesday and Friday), and one day per week in weeks 7 to 12. Although the number of samples scheduled was identical across studies and conditions, the total mean (SD) number of samples ob-

tained differed across the studies (Petry *et al.*<sup>18</sup>: 9.3 (6.1); Petry *et al.*<sup>19</sup>: 12.7 (5.8); Petry *et al.*<sup>22</sup>: 11.1 (5.4);  $F_{2,390} = 10.73$ ,  $p < .001$ ) and treatment conditions (SC: 9.2 (5.3); CM: 11.9 (6.0);  $F_{1,391} = 16.9$ ,  $p < .001$ ). However, sample submission rates during the study were comparable for those with and without legal problems (no legal problems: 11.4 (6.0); legal problems: 10.7 (5.7);  $t_{391} = 1.19$ ,  $p = .24$ ).

Three and nine months after study initiation, patients received \$30 to \$35 for completing follow-up evaluations. The ASI was readministered, and breath and urine were collected. Completion rates at the two evaluations were 81.2 percent, and 69.0 percent,

respectively. Completion rates did not differ by treatment condition or study ( $p > .25$ ), but significantly fewer patients with legal problems completed the nine-month follow-up relative to those without legal problems: 57.4 percent ( $n = 85$  of 148) versus 75.9 percent ( $n = 186$  of 245).

### Treatments

After the baseline assessment, patients who met study eligibility requirements were randomly assigned to a treatment condition. The main papers<sup>18,19,22</sup> provide full descriptions of treatments, and so they are only briefly described herein.

#### Standard Care

In all three studies, SC involved intensive outpatient substance abuse treatment, consisting primarily of group therapy sessions. Topics covered included daily planning, relapse prevention, coping and life skills training, and AIDS education; all programs encouraged 12-step involvement. Treatment consisted of an intense phase (three to five days per week with three to five groups per day for two to four weeks), followed by aftercare, which gradually reduced to one group per week for 12 months. In addition to SC, patients submitted up to 21 breath and urine samples during the 12-week study period, as described earlier. Results of those tests were for research purposes, and they were not shared with the clinical staff or others.

#### CM Treatment

Patients randomized to the CM conditions received SC as detailed above, and they also were reinforced for submission of negative samples, completion of goal-related activities, or both. To receive reinforcement for abstinence, patients were required to test negative for alcohol, cocaine, and opioids simultaneously. To receive reinforcement for completion of goal-related activities, patients contracted with research staff weekly to do specified activities congruent with their treatment plans (e.g., if a goal related to education, then the activity might be signing up for a course or completing homework), and objective verification was necessary for reinforcement (i.e., receipt or completed forms<sup>31</sup>). In CM conditions that reinforced both activities and abstinence,<sup>18,19</sup> reinforcement schedules were independent (e.g., failure to provide a negative sample did not affect activity reinforcement).

### Data Analysis

Independent  $t$ -tests and  $\chi^2$  tests evaluated associations between legal status at treatment initiation and other baseline variables. Although all continuous dependent variables were not normally distributed,  $t$ -tests are robust to departures from normality with large sample sizes,<sup>32</sup> and analyses with nonparametric tests yielded results similar to those reported herein.

Univariate ANOVAs evaluated treatment outcomes. Main during-treatment outcome data were available from 100 percent of patients: weeks retained in treatment, longest duration of abstinence (LDA), and proportion of negative samples. LDA was defined as the longest number of consecutive weeks of negative samples submitted for alcohol, cocaine, and opioids (range, 0–12). Positive samples for one or more of these substances and missed and unexcused samples broke the string of abstinence. The proportion of negative samples submitted was calculated with the number of samples submitted as the denominator, such that missing samples did not affect this value. This variable was also calculated with respect to abstinence from all three substances. Independent variables included baseline legal status (no versus some legal problems), treatment condition (SC versus CM), study (Petry *et al.*<sup>18</sup> versus Petry *et al.*<sup>19</sup> versus Petry *et al.*<sup>22</sup>), and baseline urine toxicology result (negative for all three substances versus positive for one or more). These latter two variables were included in the analyses because legal status differed by study and because baseline toxicology result is a robust predictor of treatment outcomes.<sup>33–36</sup>

Logistic regression examined predictors of abstinence (again from alcohol, cocaine, and opioids) at the nine-month follow-up. The same variables as outlined above were included in the analyses. We conducted the logistic regression twice: first using available data from patients who completed the nine-month follow-up, and second with data from patients who failed to complete the follow-up coded as positive.

We also present data on the proportion of patients whose legal status changed between baseline and three and nine months. Legal status at three months was utilized in parallel analyses as those described above to evaluate its impact on during and post-treatment outcomes. All analyses were conducted with SPSS for Windows (ver. 15).

## Legal Problems and Treatment Outcomes

**Table 2** Past and Present Legal Difficulties

Variables	No Current Legal Problems	Current Legal Problems	Statistic <sub>df</sub>	<i>p</i>
<i>n</i>	245	148		
Days of illegal activity in past month	0.0 (0.0)	1.4 (3.9)	$t_{391} = 5.53$	<.001
Awaiting charges or sentencing, <i>n</i> (%)	0 (0.0)	81 (54.7)	$\chi^2_1 = 168.90$	<.001
Current severity of perceived problems*	0.0 (0.0)	2.2 (1.4)	$t_{391} = 24.77$	<.001
Current desire for legal referral*	0.0 (0.0)	2.0 (1.7)	$t_{391} = 18.44$	<.001
Arrests in lifetime	6.7 (11.6)	10.7 (15.6)	$t_{391} = 2.87$	<.01
Convictions in lifetime	3.1 (6.3)	4.3 (7.2)	$t_{391} = 1.72$	<.09
Arrests with charges				
Drug charges, <i>n</i> (%)	86 (35.1)	80 (54.1)	$\chi^2_1 = 13.58$	<.001
Shoplifting, <i>n</i> (%)	45 (18.4)	45 (30.4)	$\chi^2_1 = 7.57$	<.01
Burglary, <i>n</i> (%)	53 (21.6)	51 (34.5)	$\chi^2_1 = 7.80$	<.01
Assault, <i>n</i> (%)	58 (23.7)	58 (39.2)	$\chi^2_1 = 10.68$	<.001
Disorderly conduct, <i>n</i> (%)	54 (22.0)	48 (32.4)	$\chi^2_1 = 5.18$	<.05
Major driving violations, <i>n</i> (%)	47 (19.2)	43 (29.1)	$\chi^2_1 = 5.09$	<.05
Ever incarcerated, <i>n</i> (%)	103 (42.0)	98 (66.2)	$\chi^2_1 = 21.58$	<.001

\* Item rated on a 0–4 scale. Values are the mean (standard deviation), unless otherwise noted.

## Results

### Baseline Characteristics

Baseline and demographic characteristics are presented by legal status in Table 1. Overall, about a third of the patients had a legal problem at the time of treatment entry. No statistically significant differences emerged between those with and without legal problems on any demographic or drug use characteristic other than study. Patients in the earliest study<sup>18</sup> were the most likely to have legal difficulties at the time of study entry, and subsequent analyses controlled for study effects.

Table 2 shows variables related to lifetime and recent legal problems. As expected, patients with current legal problems evidenced more severe difficulties on all of the items assessing past-month legal difficulties, including days of illegal activities and awaiting charges or sentencing. In addition, they also ex-

perienced greater lifetime legal problems, such as greater rates of prior incarcerations and more overall arrests. The most common illegal activities for which patients were arrested are also listed, and in each case, patients with legal difficulties at baseline were significantly more likely to have reported arrests for each activity. Because lifetime legal problems do not factor into ASI composite scores, some patients classified with no current legal difficulties had also experienced prior legal problems and incarcerations, with an average of nearly seven arrests and three convictions.

### During-Treatment Outcomes

Table 3 shows primary treatment outcomes for patients with and without baseline legal problems. Multivariate analyses, controlling for study, baseline toxicology result, and treatment condition, indicated a significant effect of legal status on treatment reten-

**Table 3** Treatment Outcomes by Current Legal Problem Status and Treatment Condition

	No Current Legal Problems		Current Legal Problems	
	Standard Care ( <i>n</i> = 65)	CM ( <i>n</i> = 180)	Standard Care ( <i>n</i> = 50)	CM ( <i>n</i> = 98)
Primary treatment outcomes				
Retention in treatment, wk	5.3 (3.5)	7.9 (4.0)	5.9 (3.7)	6.5 (3.7)
Longest duration of abstinence, wk	3.4 (2.6)	6.2 (4.5)	3.6 (3.4)	4.9 (4.1)
Proportion of negative samples	0.83 (0.31)	0.85 (0.26)	0.84 (0.31)	0.84 (0.29)
Nine-month follow-up				
Negative samples, % (available data)	71.2 ( <i>n</i> = 31 of 43)	70.4 ( <i>n</i> = 88 of 125)	82.8 ( <i>n</i> = 24 of 29)	72.3 ( <i>n</i> = 34 of 47)
Negative samples, % (missing coded positive)	47.7 ( <i>n</i> = 31 of 65)	48.9 ( <i>n</i> = 88 of 180)	48.0 ( <i>n</i> = 24 of 50)	34.7 ( <i>n</i> = 34 of 98)

Data are the unadjusted mean (standard deviation). CM, contingency management + standard care.



tion ( $F_{1,386} = 3.67$ ;  $p = .05$ ), and LDA ( $F_{1,386} = 4.89$ ;  $p < .05$ ). Patients with legal problems remained in treatment for significantly shorter durations of time and achieved shorter durations of abstinence than those without legal difficulties. No effect of baseline legal problems was noted on proportion of negative samples submitted ( $p > .60$ ).

Treatment condition also had a significant effect on retention and LDA ( $F_{1,386} = 17.25$ ,  $p < .001$ ; and  $F_{1,386} = 27.02$ ,  $p < .001$ , respectively), with CM resulting in greater retention and longer durations of abstinence than SC (Table 3). When interaction terms were included in the analyses, the interactions between legal status and treatment condition (and other independent variables) were not significant ( $p > .26$ ).

Study was unrelated to retention ( $p = .63$ ), but was significantly associated with LDA and proportions of negative samples submitted ( $F_{2,386} = 9.05$  and  $3.60$ ; both  $p < .05$ ). Patients in the Petry *et al.*<sup>19</sup> study had longer LDAs and higher proportions of negative samples than those in one or both of the other two studies. The respective average (SD) LDAs for Petry *et al.*<sup>19</sup> versus Petry *et al.*<sup>22</sup> versus Petry *et al.*<sup>18</sup> were 6.5 (4.3), 4.8 (3.8), and 3.7 (4.0) weeks, and the respective proportions of negative samples were 0.91 (0.21), 0.91 (0.19), and 0.71 (0.38), respectively. The baseline urine toxicology result was significantly associated with all three outcome variables ( $F_{1,386} = 3.98$ ,  $46.11$ , and  $353.5$ , respectively; all  $p < .05$ ). In each case, a negative sample at baseline was associated with better outcomes. Mean retention, LDA, and proportions of negative samples were 7.0 (3.9) versus 5.6 (4.0) weeks, 5.8 (4.1) versus 2.1 (2.9) weeks, and 0.94 (0.13) versus 0.42 (0.36) week, respectively, for those initiating treatment with negative versus positive urinalysis results.

### Posttreatment Outcomes

Table 3 also presents the raw or unadjusted percentages of negative samples submitted at nine months by legal status at baseline. The logistic regression using data from treatment completers ( $n = 244$ ) to predict abstinence at nine months was statistically significant ( $\chi^2_4 = 13.88$ ;  $n = 244$ ;  $p < .01$ ), and the classification accuracy was 74.2 percent. The only significant predictor of post-treatment abstinence was baseline urine toxicology result, with an odds ratio of 0.30 (95% confidence interval (CI): 0.14–0.62; Wald  $\chi^2_1 = 10.40$ ;  $p < .001$ ). Submission of

a positive sample at baseline was associated with a 70 percent reduced probability of abstinence at nine months, but legal status at time of treatment initiation was not significantly related to abstinence at that time point.

The results of the second logistic regression, using the full sample with missing data coded as positive, were significant as well ( $\chi^2_4 = 13.09$ ;  $n = 393$ ;  $p = .01$ ), but correctly classified less of the sample (59.7%). Again, the baseline toxicology result was significantly related to post-treatment abstinence (odds ratio, 0.46; 95% CI, 0.26–0.81; Wald  $\chi^2_1 = 7.22$ ;  $p < .001$ ). Patients with baseline legal problems were significantly less likely to be abstinent at the follow-up, (odds ratio, .65; 95% CI, 0.43–0.99; Wald  $\chi^2_1 = 3.86$ ;  $p < .05$ ). Thus, baseline legal problems were associated with a 35 percent reduced probability of abstinence at the nine-month follow-up evaluation when patients who failed to attend the evaluation were considered to have relapsed.

### Changes in Legal Status Over Time

The proportion of patients experiencing legal difficulties decreased over time. At baseline, 37.7 percent reported some level of legal problems, and at three and nine months, these proportions dropped to 19.4 and 14.4 percent, respectively. Few patients ( $n = 10$  of 331; 3.0%) reported incarcerations during the 12-week treatment period. Only a small number of patients who reported no legal difficulties at baseline endorsed legal problems at subsequent interviews: 10.7 percent ( $n = 22$  of 205) at three months and 9.1 percent ( $n = 17$  of 186) at nine months.

Using the three-month (rather than baseline) legal status in the analysis confirmed that legal difficulties were associated with treatment outcomes. Legal difficulties at three months were negatively associated with retention, LDA, and proportions of negative samples submitted during treatment ( $F_{1,313} = 7.54$ ,  $17.34$ , and  $6.07$ , respectively; all  $p < .02$ ). For those with versus without legal problems at three months, the mean (SD) weeks retained was 6.4 (3.6) versus 7.8 (3.9), LDA was 3.8 (3.6) versus 6.1 (4.4), and proportion of negative samples was 0.77 (0.34) versus 0.86 (0.27). Significance of other variables in the model (study, treatment condition, and baseline toxicology results) remained consistent with results reported when baseline legal difficulties were included in the model. In predicting abstinence at nine

months, the presence or absence of legal difficulties at three months was not significantly associated with abstinence six months later, whether follow-up completers only ( $n = 244$ ) were considered in the analyses or all patients ( $n = 393$ ) were included, coding noncompleters as using a substance ( $p > .13$ ).

## Discussion

These results confirm high rates of legal problems among substance abusers on initial entry into outpatient substance abuse treatment programs. Although negative reinforcement from the criminal justice system can positively affect drug abuse treatment outcomes,<sup>8</sup> the presence of legal problems in general was inversely associated with outcomes in this sample. Most likely, the failure of the criminal justice system to positively influence outcomes among substance abuse treatment patients reflects heterogeneity in the intensity and type of legal system involvement. Some patients were awaiting sentences or charges, others had recently been released from jail, and still others reported participating in illegal activities without having been apprehended. Although the degree and type of involvement from the legal system could be differentially associated with treatment outcomes, data from this study suggest that any legal difficulties at time of treatment initiation are related to poorer overall outcomes.

Legal problems assessed at treatment entry were significantly and negatively associated with abstinence nine months later, but only when patients with missing data were coded as nonabstinent. Although legal status at baseline was a significant predictor of long-term abstinence, a more proximal measure of legal status at three months was not. Thus, legal status as assessed by the ASI does not appear to have a profound or consistent impact on long-term post-treatment drug use.

In addition, legal status generally was not associated with proportion of negative samples submitted during treatment. The overall high percentage of negative samples submitted may have created a ceiling effect, making further improvement with respect to this variable difficult to achieve. Similar results have been reported in other CM studies conducted in outpatient settings.<sup>18,19,21,22</sup>

Consistent with the main findings from each study<sup>18,19,22</sup> and with the CM literature more

globally,<sup>25,26</sup> the addition of CM to standard care resulted in longer periods of continuous objectively verified abstinence than standard care alone. As in prior studies,<sup>33–36</sup> the baseline urine toxicology result was a strong predictor of during- and post-treatment outcomes. Those who began outpatient treatment while still actively using substances were significantly less likely to do well in treatment, as measured by retention or abstinence outcomes, whether or not they had legal difficulties.

This study has some notable strengths. The heterogeneous sample, broad study inclusion criteria, and use of multiple clinics support generalization of results. The sample size was large and allowed for adequate power to detect even small effect sizes of the impact of legal problems on outcomes. Further, studies of CM are somewhat unique in that they provide frequent objective indicators of drug use and abstinence during the treatment period. Because study urine toxicology results were not shared with clinicians at the sites or probation or parole officers, these data are likely to be representative of actual drug use patterns.

Our study was limited, in that legal status groups were not differentiated with respect to types or severity of legal difficulties experienced. Groups would have become small if differentiated in this manner, but type or severity of legal problems may have influenced outcomes. In addition, in this and another sample,<sup>13</sup> participants with legal difficulties were significantly less likely to complete follow-ups than those without legal problems, so long-term analyses can be biased. We attempted to correct for this bias by considering missing samples to be positive, but this practice may have resulted in an over-correction for missing samples, as presumably not all participants who missed assessments were using substances. In addition, self-reports of legal problems were not confirmed by independent sources, and so patients could have over- or under-reported legal difficulties. Future studies may benefit from corroboration of legal system involvement. In addition, longer follow-up evaluations and higher rates of follow-up completion would help confirm effects.

In summary, legal problems of even a very low or modest level were associated with poor outcomes in outpatient substance abuse treatment. Patients who self-reported any level of legal involvement or concerns in the month before initi-

ating substance abuse treatment remained in treatment for shorter durations and achieved shorter periods of abstinence than those who indicated no illegal activities or involvement with the legal system. CM was positively and significantly associated with treatment retention and abstinence, regardless of legal status. These data are consistent with prior reports suggesting that substance abusers, even those referred from the criminal justice system,<sup>37,38</sup> respond well to CM approaches. Given the high prevalence rates of legal problems in outpatient substance abusing populations, the treatment system may benefit by expanding its use of CM to enhance retention and improve outcomes.

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