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Substance Abuse Treatment Patients in Housing Programs Respond to Contingency Management Interventions

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Abstract

Use of homeless and transitional housing (e.g., recovery homes) programs can be associated with success in substance abuse treatment, perhaps because many of these programs encourage or mandate sobriety. In this study, we examined whether contingency management (CM) protocols that use tangible incentives for submission of drug-free specimens or other specific behaviors are effective for treatment-seeking substance abusers whose behavior may also be shaped by housing programs. Of 355 participants in randomized trials of CM, 56 (16%) reported using transitional housing during the 12-week treatment period. Main and interaction effects of housing status and treatment condition were evaluated for the primary substance abuse treatment outcomes: a) longest duration of abstinence from alcohol, cocaine, and opioids, b) percentage of samples submitted that were negative for these substances, and c) treatment retention. After controlling for demographic and clinical characteristics, those who accessed housing programs submitted a higher percentage of negative samples (75%) compared to those who did not access housing programs (67%). Housing status groups did not differ in terms of longest duration of abstinence (accessed housing: $M = 3.1$ weeks, $SE = 0.6$; did not access housing: $M = 3.9$ weeks, $SE = 0.3$) or retention in substance abuse treatment (accessed housing: $M = 6.4$ weeks, $SE = 0.6$; did not access housing: $M = 6.6$ weeks, $SE = 0.3$). Regardless of housing status, CM was associated with longer durations of abstinence and treatment retention. No interactive effects of housing and treatment condition were observed ($p > .05$). Results suggest that those who accessed housing programs during substance abuse treatment benefit from CM to a comparable degree as their peers who did not use such programs. These effects suggest that CM remains appropriate for those accessing housing in community-based programs.

Keywords

incentives; homelessness; unstable housing; non-permanent housing; sober house; transitional housing; recovery housing

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1. Introduction

Housing is an important issue in substance abuse treatment. Unstable housing and homelessness are associated with greater substance use severity (Eyrich-Garg, Cacciola, Carise, Lynch, & McLellan, 2008) and higher service utilization costs (Buchholz et al., 2010), and a substantial number of those in substance abuse treatment are affected. Among a sample of 5,629 treatment-seekers at 158 substance abuse treatment programs across the US, 12% were homeless and an additional 20% were marginally housed and at risk for homelessness (Eyrich-Garg et al., 2008). Several studies (Krupski, Campbell, Joesch, Lucenko, & Roy-Byrne, 2009; Milby et al., 1996; Milby et al., 2000; Winn et al., 2013) conclude that the provision of housing or housing assistance services to homeless substance abusers increases the propensity for them to initiate substance abuse treatment as well as improves their treatment outcomes. In particular, abstinent-contingent housing improves substance abuse treatment outcomes relative to non-contingent housing (Milby, Schumacher, Wallace, Freedman, & Vuchinich, 2005).

The abstinent-contingent housing used in these studies (Milby et al., 1996; 2000; 2005; Tuten, DeFulio, Jones, & Stitzer, 2012) is a form of the behavioral intervention contingency management (CM), in which objective testing of alcohol and drug use occurs frequently and positive samples result in immediate removal from housing. Alcohol- and drug-free housing, including recovery, sober living, half-way, or aftercare housing (e.g., Jason, Olson, Ferrari, & Lo Sasso, 2006; Polcin, Korcha, Bond, & Galloway, 2010ab), can be viewed as a milder form of abstinent-contingent housing. These alcohol- and drug-free housing programs differ in their organizational structure and governance, but all aim to provide an environment supportive of sobriety (Polcin, 2009). While use of alcohol or drugs can result in eviction, whether and to what extent alcohol and drug testing occurs varies considerably (Mericle, Miles, & Cacciola, 2015).

Drug testing may range from cued (e.g., based on suspicion of intoxication) to random to regularly scheduled. Contingencies, such as eviction, can also be implemented differently, such as only as a last resort for repeated intoxications or positive samples versus for a single positive sample. As such, we might expect fewer benefits from variably applied contingencies in heterogeneous community-based housing programs compared to the tightly controlled evidence-based abstinent-contingent housing programs as implemented in research studies (e.g., Milby et al., 1996; 2000; 2005; Tuten et al., 2012). Despite variabilities in program policies and contingencies, substance abusers in alcohol- and drug-free housing programs appear to benefit from participating in housing programs in terms of abstinence and psychosocial improvements (e.g., Jason et al., 2006; Jason et al., 2007b; Polcin, 2009; Polcin et al., 2010ab), and a recent meta-analysis of these programs (Reif et al., 2014) found moderate benefits of recovery housing relative to usual aftercare treatment (i.e., without housing) in terms of drug and alcohol use outcomes and some psychosocial domains.

Tuten et al. (2012) investigated whether those in abstinent-contingent housing benefit from the addition of CM integrated into intensive outpatient treatment. They randomized patients who had undergone opioid detoxifications to usual care, abstinent-contingent recovery

housing, or abstinent-contingent housing plus reinforcement-based intensive outpatient treatment in which access to the full range of treatment group activities (e.g., skills-building group, recreational activities) was abstinent-contingent. Those randomized to the enhanced CM group achieved the highest rates of abstinence (50%) compared to abstinent-contingent housing alone (37%) and usual care (13%). These results suggest that although abstinent-contingent housing improves treatment outcomes, the addition of CM in the context of intensive outpatient treatment can further improve outcomes.

CM interventions typically use tangible incentives as reinforcers (Higgins et al., 1994; Petry, 2000) rather than housing or access to other treatment activities. These incentives come in the form of vouchers exchangeable for goods or services or prizes such as electronics, gift certificates, or toiletries. These voucher and prize-based CM interventions for the reduction of substance use are efficacious (see meta-analyses Benishek et al., 2014; Lussier, Heil, Mongeon, Badger, & Higgins, 2006; Prendergast, Podus, Finney, Greenwell, & Roll, 2006). CM can also be used to increase other behaviors, such as treatment attendance (Branson, Narbuti, Clemmey, Herman, & Bhutia, 2012; Kidorf et al., 2013; Fitzsimons, Tuten, Borsuk, Lookatch, & Hanks, 2015; Ledgerwood, Alessi, Hanson, Godley, & Petry, 2008), completion of treatment goal-related activities such as completing a resume or attending a medical appointment (Petry et al., 2006; Petry, Weinstock, Alessi, Lewis, & Dieckhaus, 2010), and adherence to addiction pharmacotherapies (Carroll & Rounsaville, 2007; Johansson, Berglund, & Lindgren, 2006).

CM's efficacy is well established, but questions remain about the subgroups for which this intervention may be most effective and best targeted. Substance abuse treatment patients residing in substance-free housing programs may be living under a potentially powerful contingency (access to or loss of housing) that may decrease the benefits of voucher or prize-based CM programs as delivered within substance abuse treatment settings. Tuten et al. (2012) suggest additive effects of CM are possible above and beyond contingent-housing, but that study was conducted in an experimenter-managed living setting. No studies have examined the extent to which community-based housing programs impact response to CM delivered in the context of standard psychosocial substance abuse treatment settings. In this study, we investigated whether substance abuse treatment patients who accessed community housing programs benefited from voucher or prize-based CM. These housing programs, with their variable approaches to alcohol and drug testing and implementation of contingencies, lack the systematic features of a well-designed CM program and likely leave room for additional improvements in substance abuse treatment outcomes. Based on the above literature, we anticipated that substance abuse treatment patients who accessed community housing programs during their participation in outpatient substance abuse treatment would have better substance use outcomes overall than their counterparts not using such housing settings and that they would benefit similarly from CM. If these hypotheses are supported, they would suggest that CM should be applied to patients accessing outpatient substance abuse treatment services, regardless of whether they are residing in housing programs.

2. Materials and Methods

2.1 Participants

Data for these secondary analyses were collected as part of three randomized clinical trials (Petry et al., 2004; Petry, Alessi, Marx, Austin, & Tardif, 2005; Petry et al., 2006) examining the efficacy of contingency management interventions for reducing substance use. Across studies, the targeted population, treatment intensity and duration, assessment and outcomes measures, procedures, and clinic settings were comparable. All participants ($N = 355$) were adult, English-speaking substance users initiating intensive outpatient substance abuse treatment at local community clinics who reported *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV*; American Psychiatric Association, 1994) cocaine abuse or dependence. Exclusion criteria across trials included: (1) severe cognitive impairment; (2) severe and uncontrolled psychiatric conditions (e.g., actively suicidal, psychotic); and (3) currently in recovery for pathological gambling. Age, education level, employment status, years of cocaine use, and proportion of those who accessed housing facilities were similar across studies ($ps > .05$), suggesting that the samples were similar demographically.

Of the full sample ($N = 393$) enrolled in these trials, 38 (10%) did not complete the during-treatment assessments or did not respond to the items related to housing due to experimenter error and were excluded from analyses. Excluded cases do not differ from those retained for analyses on education level, employment status, or years of cocaine use but do differ on age, $M = 33.9$ ($SD = 7.7$) versus $M = 36.6$, ($SD = 7.6$), $t(391) = -2.04$, $p = .04$, and hence primary analyses below controlled for age.

Sixteen percent of the sample (56 of 355) reported use of housing programs during the 12-week treatment period. Among these individuals, cumulative number of nights in housing facilities during the 12-week treatment period averaged 35.6 days ($SD = 30.5$; Mode = 30; IQR = 14-60 days). Those accessing housing used 34 different programs. In an attempt to better characterize the housing programs, we calculated rough estimates of the number of participants who appeared to use homeless-focused programs (e.g., emergency shelters, transitional living) versus programs oriented toward recovery (e.g., sober houses, recovery houses, halfway houses). Of the 56 persons who reported staying in a housing program, 57% ($n = 32$) appeared to access homeless-focused programs, and they had an average of 27.1 days housed ($SD = 28.2$); 38% ($n = 21$) seemed to have stayed in recovery-oriented services and had an average of 45.4 days housed ($SD = 30.8$). Two other participants accessed both types of housing and housing type was unknown for one participant. Due to the retrospective nature of these categorizations, we consider them preliminary and not without error. Thus, owing to this limitation and the small sample size, we did not conduct more nuanced analyses by housing type.

2.2 Measures

Participants submitted breath samples (Intoximeters, St. Louis, MO) that were screened for alcohol and urine samples that were screened for cocaine and opioids using OnTrak TestSticks (Varian, Inc., Walnut Creek, CA). They also completed a baseline questionnaire battery that included the Addiction Severity Index (ASI; McLellan et al., 1985) and an

adaptation of the Service Utilization Form (SU; Rosenheck & Lam, 1997). These questionnaires were also completed 4 weeks after starting treatment and at the end of the 12-week treatment period.

The ASI, a semi-structured clinical interview, provides composite severity scores in several domains (e.g., medical, employment, drug) over the past 30 days. Scores range 0.0-1.0, with higher scores indicating greater severity in a given domain. The SU assesses service utilization, including the number of admissions to housing services and the number of nights housed in various settings. This study focused on the use of any non-permanent housing programs, including halfway houses, sober living houses, recovery homes, transitional living, emergency shelters, etc. accessed during the 12-week study treatment period that began at start of treatment and randomization to a study treatment condition (see below).

2.3 Procedure

Data (Petry et al., 2004; Petry et al., 2005; Petry et al., 2006) were collected from 1998 to 2003 in intensive-outpatient substance abuse clinics in Hartford and Waterbury, CT, and Springfield, MA. Participants were randomized to standard care or one of two reinforcement conditions. For the purposes of this report and to increase statistical power, participants randomized to standard care were examined as one group without distinction by site and study, as were participants randomized to CM conditions. In each study, CM improved outcomes relative to standard care, and none of the studies demonstrated differences across CM conditions, providing support for combining them here. Nevertheless, all analyses controlled for study (see Data analyses). The treatments are described briefly below with more extensive details available from the primary reports (Petry et al., 2004; Petry et al., 2005; Petry et al., 2006).

2.4 Treatments

2.4.1 Standard care—Standard care was consistent across trials and involved group intensive outpatient therapy as delivered by the community clinics. Therapy content included psychoeducation, skills-based instruction, and 12-step treatment. Frequency and intensity of treatment decreased over time, with initial treatment consisting of up to 5 hours per day, 3 to 5 days per week. Following the intensive phase, treatment frequency decreased according to the patient's needs to an aftercare phase consisting of once-weekly group sessions.

Participants also submitted up to 21 urine and breath samples on a tapered schedule that matched the reduced intensity of clinical care over time. The expected schedule for samples was 3 days in weeks 1-3, 2 days per week in weeks 4-6, and 1 day per week in weeks 7-12. All data, including breath and urine sample results, were considered confidential and were not shared with clinic staff at the substance abuse treatment settings, or at any housing programs. Research assistants encouraged patients with positive samples and those reporting recent use to discuss such use with their substance abuse treatment clinicians.

2.4.2 Standard care plus contingency management—All participants randomized to CM conditions received the same standard care as described above. In addition, CM participants earned reinforcement for achieving target behaviors. The behavioral target (i.e.,

abstinence, completion of goal-related activities), CM type (prizes versus vouchers), and reinforcement magnitude (range = \$80-\$882) differed across CM conditions. Petry et al. (2004) used prize-based CM to compare two different magnitudes of reinforcement (\$80 versus \$240) and reinforced both abstinence and activities. Goal-related activities included tasks such as attending AA or NA meetings, writing a resume, or submitting job applications. The reinforcement schedules for abstinence and activities were independent and a participant could earn reinforcement for abstinence even if they failed to complete their weekly activities. Petry et al. (2005) held magnitude and behavioral targets (abstinence and activities on independent schedules) constant, but varied the CM type. Participants were randomized to either a prize-based CM or a voucher CM condition (\$882 maximum). Petry et al. (2006) varied the behavioral target (abstinence only versus activity completion only), and both conditions used prize-based CM and had similar average expected maximum earnings of \$455 and \$460.

2.5 Data Analysis

Demographic and baseline characteristics were compared between those who accessed housing programs at any time during treatment versus those who did not access these programs. We used chi square tests of independence for nominal variables and independent *t*-tests for continuous variables, corrected as needed for variance inequality.

We examined the relation of during-treatment housing status and treatment condition to the primary treatment outcomes using multivariate analysis of variance (MANOVA). Dependent variables included longest duration of abstinence (LDA), percentage of negative samples submitted, and treatment retention. These primary outcomes were available for 100% of participants. LDA ranged 0 to 12 weeks and represented the longest string of consecutive negative samples uninterrupted by positive, refused, or unexcused samples. Percentage of negative samples submitted was calculated with the number of samples negative for alcohol, cocaine, and opioids divided by the number of total samples submitted, thereby not affected by attendance or retention. Treatment retention ranged 0 to 12 weeks.

Independent variables included during-treatment housing status (use of any housing programs versus none), treatment condition (standard care versus standard care plus CM), and their interaction. We included gender because use of transitional housing accommodations skews more heavily toward men (e.g., Jason, Davis, & Ferrari, 2007; Milby et al., 2005; Polcin et al., 2010ab). Baseline toxicology results, although not significantly different between the housing status groups, are strongly related to treatment outcome (Stitzer et al., 2007) and were included as a covariate. We included study to control for differences across protocols, and ASI employment and psychiatric scores were included given significant differences between the housing status groups noted below. Age was also included as noted above. We used two-tailed tests where possible and an alpha level of less than .05. Analyses were conducted using SPSS version 21.

3. Results

3.1 Prevalence and Baseline Characteristics

Table 1 presents the comparisons of demographic and baseline characteristics for those who accessed housing programs versus those who did not endorse use of any housing services during the treatment period. Employment status differed across housing status groups, with those who accessed housing programs more likely to report being unemployed (45% versus 23%) compared to those who did not endorse use of housing services. Related, those who accessed housing programs had higher ASI employment severity and less earned income relative to those not using housing services in the past year. Those who accessed housing services also had more severe ASI psychiatric scores.

3.2 Primary Treatment Outcomes

Table 2 displays the means and standard errors for the three primary outcomes by housing status and treatment condition, after controlling for covariates. Significant multivariate effects on treatment outcomes were identified for treatment condition, $F(3, 341) = 5.93, p = .001$, and housing status, $F(3, 341) = 5.33, p = .001$. The interaction term of treatment condition and housing status was not significant, $F(3, 341) = 0.08, p = .97$. Among covariates, study, baseline toxicology sample, and ASI employment scores were significantly associated with the primary substance abuse treatment outcomes ($ps < .02$).

Follow-up univariate tests found significant effects of housing status on the percentage of negative samples submitted during treatment, $F(1, 343) = 6.17, p = .01$. Those who accessed housing services during the 12-week treatment period submitted a higher percentage of negative samples ($M = 75\%$, $SE = 3.3$) compared to those who did not access housing services ($M = 67\%$, $SE = 1.5$). Housing status was not significantly associated with LDA (accessed housing programs: $M = 3.1$ weeks, $SE = 0.6$; did not access housing programs: $M = 3.9$ weeks, $SE = 0.3$), $F(1, 343) = 1.83, p = .18$, or retention in substance abuse treatment (accessed housing programs: $M = 6.4$ weeks, $SE = 0.6$; did not access housing programs: $M = 6.6$ weeks, $SE = 0.3$), $F(1, 343) = 0.05, p = .82$.

Treatment condition was significantly associated with LDA, $F(1, 343) = 15.76, p < .001$, and retention, $F(1, 343) = 10.38, p = .001$. Participants randomized to CM achieved longer durations of abstinence ($M = 4.8$ weeks, $SE = 0.4$) and stayed in treatment longer ($M = 7.5$ weeks, $SE = 0.4$) compared to those randomized to standard care (LDA: $M = 2.3$ weeks, $SE = 0.6$; Treatment retention: $M = 5.5$ weeks, $SE = 0.6$). Treatment condition was not significantly associated with proportion of negative samples submitted.

Among covariates, baseline toxicology result was associated with all three treatment outcomes, $ps < .03$, such that those who submitted positive samples at baseline evidenced poorer performance on all three metrics of treatment outcome. Study was significantly associated with LDA and percent negative samples, $ps < .002$, with better outcomes overall in the Petry et al. (2005) study compared to Petry et al. (2004) or Petry et al. (2006). ASI employment scores were negatively associated with percent negative samples, $p = .006$, but not treatment retention or LDA.

4. Discussion

These secondary data analyses examined whether treatment-seeking substance abusers who were using housing programs during treatment benefited from CM. Our results suggest that individuals accessing housing services do relatively well in substance abuse treatment, and despite the potential contingencies associated with residing in housing programs, they still benefit from CM. Participants randomly assigned to CM conditions, regardless of whether or not they resided in housing programs during the course of substance abuse treatment, stayed in treatment longer and achieved longer durations of abstinence than those randomized to standard care. These results are consistent with other studies suggesting that CM is efficacious across demographic (Barry, Sullivan, & Petry, 2009; Rash & Petry, 2015; Rash, Olmstead, & Petry, 2009; Rash, Andrade, & Petry, 2013; Wong, Badger, Sigmon, & Higgins, 2002), comorbid substance abuse (Alessi, Rash, & Petry, 2011; Garcia-Fernandez et al., 2011; Rash, Alessi, & Petry, 2008a), and other clinical characteristics (Garcia-Fernandez, Secades-Villa, Garcia-Rodriguez, Pena-Suarez, & Sanchez-Hervas, 2013; Petry, Rash, & Alessi, 2013; Petry, Rash, & Easton, 2011; Rash, Alessi, & Petry, 2008b). Our findings add to this literature by suggesting that individuals who use housing programs, many of which are alcohol- and drug-free, also respond to CM.

We found that use of housing programs was associated with better outcomes on one of the three primary substance abuse treatment outcomes. Specifically, participants who accessed housing programs submitted a higher percentage of samples negative for alcohol, cocaine, and opioids compared to those who did not access housing programs. The significant main effect of housing status is consistent with prior studies (Jason et al., 2006; Milby et al., 2005) reporting better abstinence outcomes up to 24 months post-treatment among those in housing programs compared to those in usual care. Although it is encouraging that participants who accessed housing programs submitted a higher percentage of negative samples, we believe this finding should be interpreted with caution. Durations of consecutive abstinence were lower, although not significantly, for those who accessed housing programs compared to those who did not use these programs. LDA is a more conservative and difficult to achieve measure of abstinence than proportion of negative samples when that ratio is derived based on the number of samples submitted as it was herein. In other words, patients who only submitted two samples and both were negative would have 100% negative samples, but only a single week of abstinence. Nevertheless, the results suggest that participants using and not using housing programs do comparably well in terms of abstinence and retention outcomes during substance abuse treatment. The similar rate of retention in substance abuse treatment across housing status groups is of note. Individuals accessing housing programs are often perceived as transient and difficult to engage in treatment, yet our results suggest that they were equally likely as persons stably housed to remain in substance abuse treatment.

It is important to note that results of urine toxicology testing conducted as part of the research study were never shared with the housing programs. Programs wishing to implement CM that involves toxicology monitoring must be careful that patients are not at higher risk for penalties because of their participation in CM treatments. More frequent assessment of substance use, as done in CM interventions, increases chances of detecting

positive samples. If positive samples are shared with housing programs and can lead to eviction, those in CM interventions would be at a substantial disadvantage compared to their peers not in CM. It is critical that clinicians implementing CM are fully cognizant of the potential harms associated with regular urine testing so that patients can most benefit from this treatment. With these cautions in mind, CM is appropriate for and yields benefits among those accessing community-based housing programs.

In this sample, the housing status groups were largely similar in terms of demographics and baseline clinical characteristics. However, participants who accessed housing programs during treatment had greater psychiatric severity, and a substantial difference in terms of employment was evident. About half of participants in housing programs reported some type of employment prior to treatment entry; these rates of employment are consistent with patterns of those in sober living environments (51% with some employment; Polcin et al., 2010b), but lower than employment rates of recovery house residents (83% with some employment; Jason et al., 2007a). The rates of employment may reflect growing societal concerns about the ability to sustain housing and other basic necessities on minimum wage incomes (Bindman, 2015; Morris, Donkin, Wonderling, Wilkinson, & Dowler, 2000). Not surprisingly, participants in housing programs also had lower incomes and worse ASI employment problems. Collectively, these differences point to unique treatment needs among those in housing programs, and treatment interventions, particularly CM, could be tailored to these vocational and housing goals for individuals in these programs.

These analyses used a large, heterogeneous sample of treatment-seeking substance abusers randomized to standard intensive outpatient treatment or the same standard care plus CM. All trials used broad inclusion criteria and minimal exclusion criteria and recruited from community clinics. These features enhance generalizability, as does the inclusion of multiple clinical trials not limited to a specific CM protocol or trial. However, the use of data from several clinical trials also means that some individuals may have participated in more than one study, although this event is unlikely given that the clinics were in different cities.

These results should also be considered in light of other study limitations. Given the nature of secondary data analysis, we used available data related to housing program use. These variables collected the number and extent of admissions, but did not differentiate program type (e.g., emergency housing versus transitional living) or alcohol- and drug-free policies within the programs, and the results must be viewed within these limitations. Our analyses answered the question of whether participants who accessed housing programs, broadly defined, differ from their counterparts who did not access housing programs in terms of outcomes related to substance abuse treatment in general and in conjunction with CM. While our data were sufficient for an initial examination of this issue, additional questions remain. Housing programs can differ markedly in services provided, permitted duration of stay, and populations served.

Unfortunately, our retrospective coding of housing types was preliminary at best, and our sample size too small to attempt to distinguish outcomes based on housing program type; such analyses are strongly encouraged for future studies. Other questions of interest might focus on characteristics of housing programs, such as funding source and whether clients

pay to use them. Treatment outcomes and needs might also be evaluated according to whether clients are stably housed versus marginally/transitionally housed versus literally homeless during a treatment episode, as these categorizations may highlight unique outcomes and differences among these groups.

The average number of nights in housing programs was relatively brief in comparison to the 12 week study and substance abuse treatment period. Because few patients were housed in these programs throughout the study period, potential impacts of housing status on response to CM interventions may have been attenuated. Additional analyses from samples that more consistently access housing services throughout treatment may yield stronger, or different, effects. Investigating within-subject response to CM across housing status changes over time may also provide a more nuanced analysis of how housing programs impact substance abuse treatment outcomes.

To our knowledge, no housing programs in this region allowed active use of substances in the facility during the study periods. However, housing programs do often differ in terms of whether individuals known to be using substances are allowed access to or continued access to housing, and these policies, in addition to toxicology monitoring procedures, may impact outcomes. Future studies might categorize housing programs with an eye toward their specific alcohol and drug use policies, to examine whether these features impact treatment response.

Lastly, these studies did not collect data on homelessness per se and it is possible that some homeless individuals were classified as non-users of housing programs if they did not access such services during this time period. Such classification may impact results in that homeless individuals typically have worse substance abuse outcomes relative to those with permanent housing (Eyrich-Garg et al., 2008). However, these substance abuse treatment clinics all offered comprehensive services, and it is likely that clients who were homeless at any point were referred to a shelter or other appropriate housing.

5. Conclusions

Despite these limitations, this study addresses an unexplored question about whether substance abuse treatment patients who are also accessing housing programs are appropriate candidates for CM interventions. Our results suggest that individuals who accessed housing programs benefit from CM to a similar extent as those who did not access housing programs. As CM moves more and more into clinical settings, there appears to be little reason to exclude these persons from CM interventions.

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Highlights

- About 16% of clients accessed housing programs during substance abuse treatment.
- Treatment outcomes were similar regardless of housing status.
- Contingency management is appropriate for treatment clients using housing programs.

Table 1
Comparison of baseline characteristics by housing status during substance abuse treatment

Baseline variables	Did not access housing programs(<i>n</i> =299)	Accessed housing programs(<i>n</i> =56)	Statistic	<i>p</i>
Study, % (<i>n</i>)			$\chi(2) = 0.44$	.80
Petry et al. (2004)	30 (89)	30 (17)		
Petry et al. (2005)	36 (109)	32 (18)		
Petry et al. (2006)	34 (101)	38 (21)		
Treatment condition (%)			$\chi(1) = 0.52$	.47
Standard care	30 (89)	25 (14)		
Standard care + CM	70 (210)	75 (42)		
Male, % (<i>n</i>)	50 (149)	50 (28)	$\chi(1) = 0.001$	.98
Race, % (<i>n</i>)			$\chi(2) = 1.83$	.40
African American	55 (163)	50 (28)		
Caucasian	34 (102)	32 (18)		
Other	11 (34)	18 (10)		
Employment, % (<i>n</i>)			$\chi(4) = 16.93$	.002
Full-time	48 (145)	21 (12)		
Part-time	21 (63)	25 (14)		
Unemployed	23 (68)	45 (25)		
Disabled/retired	5 (15)	5 (3)		
Other	3 (8)	4 (2)		
Positive sample at intake, % (<i>n</i>)	20 (58)	16 (9)	$\chi(1) = 0.35$	.55
Age	37 (8)	37 (7)	$t(353) = -0.47$	.66
Education (years)	12 (1)	11 (2)	$t(62) = 1.33$	.19
Past year earned income	\$9,933 (\$15,275)	\$5,685 (\$11,461)	$t(96) = 2.40$	.02
Lifetime years of				
alcohol use	10 (11)	12 (11)	$t(353) = -1.54$	.13
heroin use	2 (7)	2 (6)	$t(353) = 0.07$	.94
cocaine use	11 (8)	11 (7)	$t(353) = 0.01$	.94
Addiction Severity Index score				
Medical	0.22 (0.33)	0.27 (0.37)	$t(353) = -1.01$	.32
Employment	0.71 (0.30)	0.85 (0.22)	$t(100) = -4.03$	<.001
Alcohol	0.23 (0.23)	0.22 (0.18)	$t(91) = 0.23$	.82
Drug	0.16 (0.09)	0.15 (0.07)	$t(353) = 1.19$	.24
Legal	0.13 (0.21)	0.13 (0.20)	$t(353) = -0.04$	.97
Family/social	0.18 (0.22)	0.22 (0.24)	$t(353) = -1.27$	.21
Psychiatric	0.26 (0.24)	0.35 (0.24)	$t(353) = -2.68$	.008

Notes. Values are means and standard deviations unless otherwise specified. Differences in degrees of freedom across baseline variables reflect use of tests adjusted for variance inequality. CM = contingency management.

Table 2
Primary substance abuse treatment outcomes by housing status and treatment condition

Primary Outcomes	Did not ac process housing grams		Accessed housing programs	
	SC (n = 89)	SC+CM (n = 210)	SC (n = 14)	SC+CM (n = 42)
LDA(wks) ^a	2.8 (0.4)	5.0 (0.3)	1.7 (1.0)	4.5 (0.6)
Percent Negative Samples ^b	65.9 (2.3)	67.9 (1.6)	74.2 (5.5)	76.4 (3.3)
Treatment Retention (wks) ^a	5.7 (0.4)	7.5 (0.3)	5.3 (1.0)	7.5 (0.6)

Notes. Values are means and standard errors, controlling for study, age, gender, baseline toxicology result, and baseline ASI employment and psychiatric scores. Treatment retention is the number of weeks retained in treatment (0-12 weeks). Percent negative samples ranges 0-100%. LDA = Longest duration of consecutive abstinence achieved during treatment (0-12 weeks). SC = standard care. CM = contingency management.

^aSignificant univariate main effect of treatment condition.

^bSignificant univariate main effect of housing status.

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