An Experimental Evaluation of Residential and Nonresidential Treatment for Dually Diagnosed Homeless Adults

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Reprinted from The Effectiveness of Social Interventions for Homeless Substance Abusers

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Drugs, Alcohol, and Mental Health
An Experimental Evaluation of Residential and Nonresidential Treatment for Dually Diagnosed Homeless Adults

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SUMMARY. Homeless adults with both a serious mental illness and substance dependence (N = 276) were randomly assigned to: (1) a social model residential program providing integrated mental health and substance abuse treatment; (2) a community-based nonresidential program using the same social model approach; or (3) a control

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group receiving no intervention but free to access other community services. Interventions were designed to provide 3 months of intensive treatment, followed by 3 months of nonresidential maintenance. Subjects completed baseline interviews prior to randomization and reinterviews 3, 6, and 9 months later. Results showed that, while substance use, mental health, and housing outcomes improved from baseline, subjects assigned to treatment conditions differed little from control subjects. Examination of the relationship between length of treatment exposure and outcomes suggested that residential treatment had positive effects on outcomes at 3 months, but that these effects were eroded by 6 months. [Article copies available from The Haworth Document Delivery Service: 1-800-342-9878.]

INTRODUCTION

Following the movement in the 1960s and '70s to deinstitutionalize seriously mentally ill patients from long-term state hospital care, and in concert with the growth of the homeless population in the '80s and '90s, a new population of dually diagnosed individuals—those with both serious mental illness and substance dependence—has increasingly concerned providers in both mental health and substance abuse treatment settings. The literature indicates that these dually diagnosed individuals are at high risk of becoming homeless or relying on marginal housing arrangements. Indeed, studies of homeless populations suggest that about 1 in 5 homeless adults have dual diagnoses.

This new population poses difficult challenges for already strained public treatment and social welfare systems. Public mental health and substance abuse treatment have historically been delivered through separate funding streams and institutional settings, and the dually diagnosed present a clinical picture that exceeds the expertise and signals a poor prognosis in either of these separate systems. While coordinating care across the two systems is theoretically possible, in practice differing treatment philosophies and barriers to clients presented by fragmented care have deterred the development of viable linkages between systems to better serve the needs of the dually diagnosed. Treatment success for many dually diagnosed individuals may also be impeded by overarching needs for basic necessities such as stable housing, food, and clothing.

Such gaps in care for the dually diagnosed have stimulated the development of a number of pilot and demonstration treatment programs over the past several years. These have in common an integrated approach for treating the dually diagnosed that combines elements of traditional mental health care and substance abuse rehabilitation. While these programs vary in their conceptual orientations, settings, service components, and intensi-
ty, most attempt to strike a balance between the typically nurturant and supportive approaches characterizing community-based treatment for the seriously mentally ill, and the more demanding and confrontational approach characterizing substance abuse therapeutic communities. Drug-free goals are modified to encourage appropriate use of psychotherapeutic medications. The few programs described in the literature that include a focus on persons who are both dually diagnosed and homeless have also emphasized the importance of assertive case management to assist clients in obtaining housing, income assistance, primary health care, and other needed social or educational services.

Although these emerging models of integrated treatment for dually diagnosed individuals are promising, the evaluation of such interventions to date has been greatly limited by small sample sizes, serious sample attrition, limited follow-up periods, and narrowly defined outcomes. For example, studies by Kofod, Kania, Walsh, et al., Hellerstein and Meehan, Ries and Ellingson, Drake, McHugo, and Noordsy, and Hoffman, DiRito, and McGill all presented outcomes of treatment for dually diagnosed samples using post-assessment only designs, and none had sample sizes greater than 32. The most rigorous test of a treatment program for the dually diagnosed to date has recently been reported by Blankertz and Cnaan who studied 84 subjects using a quasi-experimental design in which two treatment programs for the dually diagnosed were compared. The main outcomes that have been examined in these studies are retention in the program or abstinence rates during or shortly following the treatment. No studies in the literature to date have included an experimental design that randomizes subjects to conditions.

This report presents treatment outcome results of a research demonstration project focusing on dually diagnosed and homeless adults. The demonstration interventions were based on a social model recovery approach which combined elements of substance abuse recovery and mental illness management. The goal of this social model approach is to assist clients in developing an independent life in the community through abstinence from alcohol and street drugs and by enhancing their social and vocational abilities. The program philosophy is that this goal is best achieved in small, structured, therapeutic environments in which clients learn by interaction with one another, with staff, and with the surrounding community. Principles of this philosophy are that: (1) abstinence is prerequisite for effective program participation; (2) a program environment that is designed and maintained to dignify both clients and staff is an essential aspect of the treatment process; (3) a structured schedule of activities is needed to develop new behavior patterns; (4) a well-trained staff should provide compre-
hensive therapeutic services; (5) a strong, long-term case management
effort is essential; (6) participation in self-help groups is an essential and
ongoing aspect of recovery; and (7) each client should be respected and
valued as someone with an important contribution to make to the commu-
nity and society as a whole.

DEMONSTRATION INTERVENTIONS

To evaluate this intervention approach, we studied 276 homeless and
dually diagnosed individuals who were randomly assigned to one of three
conditions; a social model residential treatment program; a nonresidential
program using the same social model approach; and a control group.

The residential treatment program was in existence prior to the initia-
tion of the research demonstration. As part of this demonstration, treat-
ment slots were made available to research participants without the usual
2- to 3-month waiting period that had effectively served as a barrier to
homeless persons. The nonresidential program was newly implemented as
part of the demonstration, and was modeled after the residential program,
so that the programs operated under the same philosophy and were de-
signated to have many common service elements. Common activities in-
cluded: (1) curriculum-based groups focused on substance abuse and men-
tal health education and rehabilitation; (2) 12-step programs including
participation in community-based AA or NA meetings; (3) process-ori-
ented groups to facilitate discussion of issues of importance to the clients;
(4) individual counseling and case-management; (5) psychiatric consulta-
tion and ongoing medications management; and (6) general community
activities including doing chores, helping with meal preparation, partici-
pating in sports and recreational activities, and personal time.

While the residential program was by definition a 24 hour, 7 day per
week program, the nonresidential program operated in the afternoon and
evening (1:00 pm to 9:00 pm) five days a week. Differences between the
programs in the schedule of activities, emphasis on case management, ex-
pectations, and program rules were necessary to adapt the residential mod-
el to a nonresidential setting. For example, abstinence from drugs or alco-
hol was a requirement for remaining in the residential community and a
single infraction confirmed with drug testing resulted in expulsion from
the program. In the nonresidential setting, clients were not allowed to attend
the program on any day that they were discernibly intoxicated on alcohol
or drugs, but staff continued to work with these clients to engage them in
the program and encourage their sobriety, irrespective of number of re-
lapses. In addition, nonresidential clients received much more case man-
agement assistance from program staff than did residential clients, given their often pressing needs for shelter, meals, transportation, and income assistance.

Both interventions were designed to consist of a 3-month intensive phase. Successful completion of this first phase was followed by another period of 3 months during which both residential and nonresidential graduates were encouraged to continue to participate in program activities in the nonresidential setting. After the second three-month period (Phase 2), those who wished could continue to engage in program activities of their choosing. Upon completion of Phase 1, clients were invited to reside in a lightly supervised sober-living residence sponsored by the program and operated along an Oxford House model. Residents of the sober-living houses could remain as long as they wished as long as they were able to pay their share of the rent, remain sober, and get along reasonably well with other residents. Those who preferred other living arrangements were assisted in locating permanent housing. Further descriptions of the intervention can be found in McGlynn et al.24 and Stecher et al.25

Those who were assigned to the control group received no special intervention, but were free to access other available community services (such as homeless shelters, a mental health clinic, a day socialization center, and AA groups). While both a public mental health clinic and a nonprofit substance abuse treatment facility serving homeless individuals were located in the community, clients who were dually diagnosed were known to be shunned by these programs.

RESEARCH METHODS

Community Setting and Research Participants

The study focused on homeless persons in the Westside area of Los Angeles County, a predominantly residential urban area that includes the two beach communities of Santa Monica and Venice, and contains a large concentration of homeless persons. While several agencies provide food, shelter and a variety of social services to homeless persons in this community, the cost of housing is generally high, access to moderately priced housing is intensely competitive, and there is substantial community resistance to the development of facilities that serve the homeless. As a result, transitional and low-income housing is very scarce, and emergency shelter facilities are able to house only about one quarter of the homeless (about 15% of men and 45% of women) on any given night.26 Prior to this research demonstration, there were no programs on the Westside that were
specifically designed to address the problems and needs of homeless and dually diagnosed individuals.

Participants were recruited from existing community agencies serving the homeless, including shelters, day centers, a substance abuse program, and a mental health clinic. Potential participants were either individually referred from an agency to research staff, or research staff visited agencies and directly approached their clients. Those who agreed to be interviewed by research staff participated in a brief screening interview which established whether or not participants met criteria for homelessness (either literally homeless or lived in two or more dependent housing situations in the past 6 months), and screened for symptoms of serious mental illness and a history of problems with alcohol or drugs. Those who met criteria at this stage were asked to participate in a structured diagnostic interview administered by nonclinician interviewers (the Diagnostic Interview Schedule, Version III-R) to confirm diagnoses. Those meeting lifetime DSM III-R criteria for schizophrenia or major affective disorder, and also criteria for substance dependence (with some substance abuse or dependence problems in the past year) were eligible for the study. Of those who participated in the initial screening interview (N = 1112), 64% met initial eligibility criteria. Among screener eligibles (N = 717), 81% completed the diagnostic interview. Of those completing the diagnostic interview (N = 583), 83% (N = 484) were fully eligible for study participation.

Among persons determined to be eligible, 57% (N = 276) agreed to participate in the study and be randomly assigned to conditions. After completing baseline interviews, these subjects were randomly assigned to nonresidential treatment (N = 144), residential treatment (N = 67), or the control group (N = 65). Probability of assignment to the nonresidential group was set at twice that of the other groups because we expected a higher degree of variability in exposure to treatment for those assigned to this intervention, and would therefore need a relatively larger sample size to detect a treatment effect. Random assignment was made within two blocking variables, gender and primary type of mental disorder (schizophrenia versus affective). Study participants were asked to complete follow-up interviews at 3 months, 6 months, and 9 months following their baseline interviews. The 3-month interview occurred around the time of completing treatment Phase 1 (among those who stayed in treatment). Participants were sought for follow-up interviews during a 2-month window of time spanning their scheduled follow-up date whether or not they were in treatment. Those who were not found for one follow-up interview were again sought for subsequent interviews. Participants were paid $2 for completing the initial screening interview, and $10 for completing each of
the diagnostic interview, baseline interview, and follow-up interviews. Those who called in to schedule an appointment for their follow-up interviews (using a toll-free number) were given an additional $2.

Measures

The evaluation of the treatment interventions focused on the three major outcome domains: substance use, severity of mental illness symptoms, and housing status. Questions regarding substance use asked about frequency (and in the case of alcohol, quantity) of use of different categories of drugs in the past 30 days. Four measures of substance use were constructed: (1) number of days consumed any alcohol in the past 30; (2) number of days used any illicit drugs in the past 30; (3) a quantity index reflecting 3 levels of alcohol use in the past 30 days: abstinence, low quantity consumption (less than 3 oz. absolute alcohol or 5 drinks on any day), and high quantity consumption (at least 3 oz. absolute alcohol or 5 drinks on at least one day), based on a measure developed by Pollini and colleagues; and (4) a drug use index weighting frequency of use by the severity of the drug used, as suggested by Phin, and modified by Bray and colleagues. Mental illness symptom questions referred to the past 7 days, and covered dimensions of depression, anxiety, psychoticism, anger/hostility, taken from the SCL-90 with mania and self-esteem scales included from the Psychiatric Epidemiologic Research Interview (PERI). Internal reliability of each of these scales was high (Cronbach's alphas ranged from .60 for mania to .82 for self-esteem). The depression and anxiety scales were combined into one because of lack of discriminant validity between the separate scales, and the resulting scales adequately reflect discrete dimensions, with interscale correlations ranging from 0 to .5. To assess recent housing and homelessness patterns, the interview asked subjects to provide a history of their living arrangements over the past 60 days, which were classified into the following categories: on the streets (including abandoned buildings, parked cars, bus depots, parks); independent housing (own house, apartment, room, boarding house, group home); and dependent housing (emergency shelters, health and correctional facilities, doubled up with family or friends). The housing status measures we used in analyses of outcomes were the percentage of nights in the past 60 that respondents spent on streets and the percentage of nights spent in independent housing, with the percentage of nights spent in dependent housing as the omitted category.

Prognostic and history variables measured at baseline that were considered as covariates in analyses of outcomes included demographic characteristics (gender, age, race, marital status, veteran status, educational level),
primary thought versus mood disorder, number of symptoms of alcohol
dependence in the past year, number of symptoms of drug disorder in the
past year, presence of antisocial personality, number of years homeless,
satisfaction with physical health, prior hospitalization for psychiatric prob-
lems, and prior substance abuse treatment. In addition, other history vari-
able were considered as covariates for specific outcome domains. For sub-
stance use outcomes, we examined the number of years subjects had regularly
used alcohol to the point of getting high or drunk, number of years they
had used any other drugs regularly, ever had alcohol DTs, ever overdosed
on drugs (all taken from The Addiction Severity Index,34 and the Alcohol
Dependence Scale).35 For housing outcomes, we included age at which
subjects first became homeless. For mental health symptom outcomes, we
considered age of first major symptom of schizophrenia or affective disor-
der, and the presence of episodes of schizophrenia, major depression, and
mania in the past year.

The study also assessed out-of-program treatment received by both the
experimental treatment and control groups at baseline and in each follow-
up period. Measures used in analyses to control for out-of-program treat-
ment exposure included: (1) the log of days of attendance at AA (12-step)
meetings in the past 30 days (not counted if the client was active in the
experimental treatment interventions during the past month, since attend-
dance at AA meetings was a component of the intervention); (2) any use of
prescribed psychotherapeutic medications in the past 30 days; (3) any inpa-
tient or outpatient treatment for a mental health problem in the past 30 days;
and (4) any formal treatment (residential or nonresidential) for a substance
abuse problem in the past 30 days.

Analysis

Two sets of analyses were conducted to examine the effects of treatment
on outcomes, testing whether: (1) outcomes differ across subjects assigned
to nonresidential vs. residential treatment groups; and (2) outcomes differ
between those assigned to treatment vs. control groups (with residential
and nonresidential conditions combined). General linear regression mod-
els were used to examine treatment effects, with the difference score
between baseline and follow-up outcome measures constituting the depen-
dent variable, and treatment assignment as the independent variable. Be-
cause we did not adjust the variances for our stratified random design
effect that resulted from blocking prior to randomization, our regression
coefficient tests are conservative. Separate analyses were performed for
each baseline to follow-up difference score (i.e., baseline to 3 months,
baseline to 6 months, baseline to 9 months) and for each of the 11 outcome
measures. Difference scores were constructed so that, across all outcome measures, a positive score indicated improvement in functioning, while a negative score indicated decline in functioning. Unadjusted regression models included only treatment assignment as a predictor of outcome difference scores, while adjusted regression models included both treatment assignment and relevant baseline covariates as predictors. Given our relatively small sample size, a parsimonious covariate selection procedure was required to deal with the large number of potential covariates. Relevant covariates to include in the models were thus selected using backwards stepwise linear regression to identify those significantly associated with the outcome domain irrespective of group assignment. The stepwise selection procedure was used within each outcome domain (such as substance use), and covariates which were consistently significant for outcomes within this domain were selected. The set of selected covariates was therefore identical for each outcome within a domain but differed across domains.

A final set of regression analyses tested whether level of treatment exposure predicted outcomes at each of the follow-up periods, with exposure measured as the log number of days subjects participated in the treatment program. Because exposure to treatment was self-selected, each of these models included baseline covariates to control as much as possible for self-selection biases. Indicators of out-of-program exposure to substance use and mental health services were then added to the models to control for potential contamination of the treatment versus control group comparisons.

RESULTS

Study Sample and Attrition

The characteristics of the 276 persons who completed a baseline interview and were randomly assigned to one of the three study conditions are shown in Table 1. The large majority were unmarried males in their 30s and 40s with at least a high school degree. The sample was nearly equal in the distribution of primary schizophrenia versus major affective disorder. Both drug and alcohol dependence were highly prevalent, with many individuals reporting problems across multiple substances. In the past month, 53% of the sample had used cocaine, 47% used marijuana, 24% used sedatives, 9% used opiates, 8% used amphetamines, 6% used hallucinogens, and 3% used barbiturates and inhalants. While the three study groups were closely comparable at baseline in most characteristics that
### TABLE 1. Characteristics of Sample by Treatment Group Assignment.

<table>
<thead>
<tr>
<th></th>
<th>Nonresidential Treatment (N = 144)</th>
<th>Residential Treatment (N = 67)</th>
<th>Controls (N = 65)</th>
<th>Total (N = 276)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Male</td>
<td>83</td>
<td>81</td>
<td>89</td>
<td>84</td>
</tr>
<tr>
<td>Mean Age (in years)</td>
<td>37</td>
<td>36</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% White</td>
<td>56</td>
<td>57</td>
<td>65</td>
<td>58</td>
</tr>
<tr>
<td>% Black</td>
<td>30</td>
<td>31</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>% Other</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Marital Status**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Currently married</td>
<td>5</td>
<td>15</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>% Previously married</td>
<td>47</td>
<td>46</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>% Never married</td>
<td>48</td>
<td>39</td>
<td>60</td>
<td>49</td>
</tr>
<tr>
<td>% Veteran</td>
<td>34</td>
<td>33</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% &lt; High School</td>
<td>29</td>
<td>27</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>% High School</td>
<td>29</td>
<td>39</td>
<td>41</td>
<td>34</td>
</tr>
<tr>
<td>% Some College</td>
<td>42</td>
<td>34</td>
<td>34</td>
<td>38</td>
</tr>
<tr>
<td>Mean Years Homeless</td>
<td>4.9</td>
<td>3.7</td>
<td>5.1</td>
<td>4.7</td>
</tr>
<tr>
<td>Mean no. of nights slept on street of past 60</td>
<td>49</td>
<td>49</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Mental Disorder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Schizophrenia only</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>% Major affective only</td>
<td>56</td>
<td>60</td>
<td>48</td>
<td>55</td>
</tr>
<tr>
<td>% Both</td>
<td>37</td>
<td>34</td>
<td>44</td>
<td>38</td>
</tr>
<tr>
<td>Alcohol Disorder in past year</td>
<td>79</td>
<td>76</td>
<td>80</td>
<td>79</td>
</tr>
<tr>
<td>Mean no. symptoms</td>
<td>3.8</td>
<td>3.4</td>
<td>3.8</td>
<td>3.7</td>
</tr>
<tr>
<td>Drug Disorder in past year</td>
<td>74</td>
<td>72</td>
<td>69</td>
<td>72</td>
</tr>
<tr>
<td>Mean no. symptoms</td>
<td>3.9</td>
<td>4.2</td>
<td>3.5</td>
<td>3.9</td>
</tr>
</tbody>
</table>

**Significant difference among groups at p < .01**
were examined, there was a significant difference across groups in their marital status. We note that only this 1 significant difference was found among 15 variables tested that included 4 not shown in Table 1: presence of antisocial personality, satisfaction with physical health status, prior hospitalizations for psychiatric problems, and prior treatment for substance abuse problems. This high degree of similarity across groups provides assurance that randomization procedures were appropriately implemented and resulted in comparable groups.

Rates of completed follow-up interviews among the 276 study participants were 79% for the 3-month follow-up, 76% for the 6-month follow-up, 70% for the 9-month follow-up, and 58% completed all three follow-ups. Follow-up completion rates were not different across the three treatment conditions, except at the 9-month follow-up, where the completion rate among those assigned to the control group (57%) was significantly lower than among those assigned to nonresidential treatment (76%).

While this is a relatively low level of attrition for a longitudinal study of homeless persons, we were concerned that it had the potential to introduce bias into the findings, if factors associated with study attrition differed across groups. To determine whether differential attrition was a concern, we tested whether the three treatment groups remained comparable at each of the follow-up periods with respect to the fifteen baseline variables described above. These analyses showed that the three study groups differed in satisfaction with physical health status at the three-month follow-up; the residential and nonresidential groups differed in marital status at six months; and the control group differed from both the residential and nonresidential groups in marital status at nine months. Considering that multiple tests were conducted, this relatively small number of significant results suggests that the study groups were largely comparable at each of the follow-up timepoints.

Nonresidential and Residential Treatment Outcomes

No significant differences were found between nonresidential and residential treatment groups at any of the three follow-up periods for any of the outcomes examined, with the exception of time spent in independent housing at the 3-month follow-up (see Table 2). Those assigned to nonresidential treatment were more likely to have increased the amount of time they spent in independent housing at 3 months following baseline, relative to those in residential treatment. This finding is expected because the 3-month follow-up was scheduled immediately after the first phase of treatment completion, and subjects in residential treatment were by definition not independently housed. While Table 2 provides adjusted mean differ-
### TABLE 2. Adjusted differences in substance use, mental health, and housing patterns over time by residential versus nonresidential treatment assignment.

<table>
<thead>
<tr>
<th>Group Assignment</th>
<th>Mean at Baseline&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean differences from Baseline to Follow-up Assessment&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonresidential (N = 144)</td>
<td>Residential (N = 67)</td>
</tr>
<tr>
<td>Substance Use in Past 30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days used alcohol</td>
<td>11.4</td>
<td>11.5</td>
</tr>
<tr>
<td>Level alcohol use</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Days used drugs</td>
<td>9.8</td>
<td>8.3</td>
</tr>
<tr>
<td>Severity drug use</td>
<td>4.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Current Mental Health Symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression and anxiety</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>Psychotic symptoms</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Anger and hostility</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Mania</td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>Self esteem</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>Housing Status in Past 60 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% time on streets</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>% time in independent housing</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

<sup>a</sup> Range for "days used alcohol" and "days used drugs" was 0 to 30 days. "Level alcohol use" ranged from 0 (none) to heavy (2) while "severity drug use" was scored from 0 to 10. Measures of mental health symptoms and housing status all ranged from 0 to 100.

<sup>b</sup> Underlined differences are significantly different from zero (no change from baseline) at p < .05. Positive numbers indicate improvement in outcome from baseline to follow-up (less substance use, better mental health, less time homeless on streets, more time independently housed); while negative numbers indicate poorer outcome from baseline to follow-up.

<sup>*</sup>Difference between residential and nonresidential treatment group is significant at p < .05.
ences in scores between baseline and follow-up measures, controlling for relevant baseline covariates, results were similar for analyses of unadjusted means. Table 2 also shows that both nonresidential and residential treatment groups reported significant improvement in many outcomes from baseline to follow-up assessments, especially for measures of substance use, symptoms of depression/anxiety, self-esteem, and indicators of housing status. No improvement was evidenced in measures of psychotic symptoms, mania, or anger/hostility.

We then combined residential and nonresidential treatment assignment groups and compared the outcomes of those assigned to treatment to those assigned to the no-treatment control group. In spite of significant improvements between baseline and follow-up assessments across most outcome measures in the treatment groups, there were few significant differences between the treatment and control groups in outcomes (see Table 3). The only outcome measure for which treatment groups displayed a significantly greater improvement than the control group was days of alcohol use at the 3-month follow-up. For many outcomes, the control group, like the treatment groups, showed improvements from baseline to follow-up assessments. Unadjusted mean comparisons gave similar results to the adjusted mean comparisons shown here.

**Exposure to Treatment and Its Relationship to Outcomes**

Although both the nonresidential and residential programs made efforts to engage all subjects assigned to treatment, 40% of those assigned to either program never attended, with no difference in nonattendance rates between the nonresidential and residential programs. Among those who attended, retention was higher in the residential than the nonresidential program. In the residential program, 49% of those assigned stayed in the program for at least two weeks, and 24% successfully completed Phase 1. In the nonresidential program, only 36% of those assigned attended as much as 2 weeks of the program over the study period (10 program days), and only 8% successfully completed Phase 1.

Results of analyses examining changes in outcomes between baseline and follow-up as a function of log days of residential and nonresidential program exposure, controlling for treatment group assignment and relevant baseline covariates, are shown in Table 4. Significant treatment exposure effects were found for residential treatment across substance use and housing outcomes at the 3-month follow-up, indicating that longer retention in residential treatment was associated with better outcomes. However, these positive effects of residential treatment exposure found at 3 months were not maintained at the 6- and 9-month follow-ups, with the exception of
<table>
<thead>
<tr>
<th>Group Assignment</th>
<th>Mean at Baseline</th>
<th>Mean differences from Baseline to Follow-up Assessment</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Treatment (N = 211)</td>
<td>Control (N = 65)</td>
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<tr>
<td>Substance Use in Past 30 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days used alcohol</td>
<td>11.4</td>
<td>12.3</td>
</tr>
<tr>
<td>Level alcohol use</td>
<td>1.5</td>
<td>1.6</td>
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<tr>
<td>Days used drugs</td>
<td>9.3</td>
<td>4.5</td>
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<tr>
<td>Severity drug use</td>
<td>4.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Current Mental Health Symptoms</td>
<td></td>
<td></td>
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<tr>
<td>Depression and anxiety</td>
<td>53</td>
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<td>Psychotic symptoms</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Anger and hostility</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Mania</td>
<td>34</td>
<td>32</td>
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<tr>
<td>Self esteem</td>
<td>49</td>
<td>47</td>
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<tr>
<td>Housing Status in Past 60 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% time on streets</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>% time in independent housing</td>
<td>17</td>
<td>14</td>
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1 Range for "days used alcohol" and "days used drugs" was 0 to 30 days. "Level alcohol use" ranged from 0 (none) to heavy (3) while "severity drug use" was scored from 0 to 75. Measures of mental health symptoms and housing status all ranged from 0 to 100.

2 Underlined differences are significantly different from zero (no change from baseline) at p < .05. Positive numbers indicate improvement in outcome from baseline to follow-up (less substance use, better mental health, less time homeless on streets, more time independently housed); while negative numbers indicate poorer outcome from baseline to follow-up.

*Difference between treatment and control group is significant at p < .05.
**Difference between treatment and control group is significant at p < .01.
TABLE 4. Relationship of treatment exposure to changes in substance use, mental health, and housing patterns.

<table>
<thead>
<tr>
<th></th>
<th>3-month Follow-up</th>
<th>6-month Follow-up</th>
<th>9-month Follow-up</th>
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<tr>
<td></td>
<td>Non-res. days</td>
<td>Res. days</td>
<td>Non-res. days</td>
</tr>
<tr>
<td>Substance Use in Past 30 Days</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Days used alcohol</td>
<td>1.73</td>
<td>1.49</td>
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<tr>
<td>Level alcohol use</td>
<td>0.16</td>
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<tr>
<td>Days used drugs</td>
<td>1.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity drug use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Mental Health Symptoms</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Depression and anxiety</td>
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<tr>
<td>Psychotic symptoms</td>
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<tr>
<td>Anger and hostility</td>
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<td></td>
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<td>Mania</td>
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<td></td>
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<tr>
<td>Self-esteem</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Housing Status in Past 60 days</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% time on streets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% time in independent housing</td>
<td></td>
<td></td>
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</tr>
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</table>

1 Regression coefficients are shown for treatment exposure effects that were significant predictors of outcomes, controlling for treatment assignment and baseline covariates. All other treatment exposure coefficients were nonsignificant.

improvements in independent housing at 6 months. Days of nonresidential treatment participation had less discernible effect on outcomes, showing only one significant association with days of alcohol use at 6 months, and no significant association with outcomes at 3 or 9 months.

When indicators of out-of-program treatment were added to these regression models to control for possible contamination of the experimental treatment effect through use of other substance abuse and mental health related services (see Table 5), further significant effects of exposure to nonresidential and residential treatment emerged. Exposure to nonresidential treatment, in addition to predicting improved substance use outcomes at 6 months, was also associated with improvements in depression/anxiety...
TABLE 5. Relationship of Treatment Exposure and Out-of-Program Treatment to Changes in Substance Use, Mental Health, and Housing Patterns.

<table>
<thead>
<tr>
<th>Study Intervention</th>
<th>Out-of-Program Treatment*</th>
<th>3-month Follow-Up</th>
<th>6-month Follow-Up</th>
<th>9-month Follow-Up</th>
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</thead>
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<td></td>
<td>Non-res. Res.</td>
<td>AA days</td>
<td>Meds</td>
<td>MH</td>
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<td>Days used alcohol</td>
<td>1.97</td>
<td>1.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days using drugs</td>
<td>1.96</td>
<td>1.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity drug use</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Depression and anxiety</td>
<td>3.33</td>
<td>4.09</td>
<td>3.52</td>
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<td>Psychotic symptoms</td>
<td></td>
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<tr>
<td>Anger and hostility</td>
<td>4.01</td>
<td>5.20</td>
<td></td>
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<tr>
<td>--------------------</td>
<td>------</td>
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<td></td>
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<tr>
<td>Mania</td>
<td></td>
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<tr>
<td>Cell size(mm)</td>
<td>3.77</td>
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<td></td>
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</tr>
<tr>
<td>Housing Status in Past 60 days</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>% time on streets</td>
<td>0.06</td>
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<td></td>
<td></td>
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<tr>
<td>% time in independent housing</td>
<td></td>
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</tr>
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</table>

Regression coefficients are shown for treatment exposure effects that were predictors of outcomes, controlling for treatment assignment and baseline covariates. All other treatment exposure coefficients were nonsignificant.

"AA" is log of days attended 12-step meetings in past 30. "Meds" is any use of prescribed psychotropic medications in past 30 days. "MH TX" is any inpatient or outpatient mental health treatment in the past 30 days. "SA TX" is any formal treatment (residential or non-residential) for a substance problem in the past 30 days.
at 3 months. Exposure to residential treatment, in addition to having positive effects on substance use and housing outcomes at 3 months, was also associated with improvements in two measures of mental health status at 3 months (depression/anxiety, anger/hostility). The effect of nonresidential treatment on housing status at 6 months, however, was reduced to nonsignificance.

These analyses also showed that indicators of out-of-program treatment were sometimes significantly associated with outcomes. Of particular interest is the association of attendance at AA meetings with improvements in substance use outcomes at all three follow-up periods, and also with improvements in mental health symptoms (depression/anxiety, anger/hostility, and self-esteem) at the 3-month follow-up. Use of psychotherapeutic medications was generally not associated with outcomes, except for a negative association with psychotic symptoms at 3 months, perhaps reflecting a reverse causal association (that is, those with increasing levels of psychotic symptoms being more likely to get and use medications). Out-of-program mental health treatment was associated with some positive outcomes (improvements in psychotic symptoms at 3 months and substance use at 9 months), but was also related to lower self-esteem at 3 and 9 months. Out-of-program substance abuse treatment had no discernible association with outcomes, except for an association with increased psychotic symptoms at 3 months that is not readily interpretable.

**DISCUSSION**

The most rigorous test of the effectiveness of a treatment intervention is the experimental design, in which subjects are randomly assigned to treatment and control groups, and the outcomes of all persons assigned are compared between groups. Using this evaluation standard, we found little discernible effect of intensive integrated treatment on substance use, mental health, or housing outcomes among dually diagnosed and homeless adults. On only one measure, frequency of alcohol use, did the treatment groups show more improvement than the control group. And this positive effect, while significant at the end of the 3-month intensive phase of treatment, was not detectable at the 6- or 9-month follow-ups. Because our sample sizes were adequate for detecting medium-sized effects (0.5), the absence of detectable treatment effects cannot be attributed to insufficient statistical power.

Previous studies of integrated treatment interventions for dually diagnosed individuals have reported positive outcomes with much smaller sample sizes, but have not employed experimental designs, and often excluded
from analysis persons who dropped out of treatment early. Both of these design weaknesses are likely to have biased results towards finding positive effects of treatment. In the case of nonexperimental pre- and post-treatment comparisons, simple regression to the mean could explain improvements from before to after treatment, particularly if subjects are selected into treatment during a period of acute problems with substance abuse and/or mental illness. Such regression to the mean could explain why, in the present study, the control as well as the treatment groups showed improvements in many outcomes from baseline to follow-up assessments. Another possible explanation for improvements in the control as well as the treatment groups is that the control group was "contaminated" by its exposure to other types of mental health, substance abuse, and homeless services. This explanation suggests that the improvements in the treatment groups from baseline to follow-up assessments are truly positive outcomes of treatment rather than regressions to a mean level of functioning, but that the control group also improved as a result of the variety of services that it received and therefore masked the differences between the treatment and control conditions. Perhaps those assigned to the control conditions were nonetheless stimulated by the research protocol to seek help for their substance abuse and mental health problems. In analyses designed to partial out the contaminating effects of use of services received outside of the experimental treatment interventions, significant treatment exposure effects were found, but these were largely restricted to a positive impact of residential treatment on substance use and mental health at the 3-month follow-up (occurring at the end of the intensive treatment period). These results suggest that residential treatment effects were real, but short-lived, and that regression to the mean may explain apparent pre-post improvements in outcomes over the longer period of evaluation.

While it is common in treatment evaluation studies to exclude from analysis subjects who drop out of treatment early, this practice can seriously bias results if, as many clinicians believe, those clients who are more likely to have poor outcomes anyway are also most likely to drop out of treatment and those who have a good prognosis most likely to stay in. For this reason, we included in our analyses all persons who agreed to be assigned to either a treatment or control group. Conceptually, one can think of this as a test of the effectiveness of the programs' "intention" to provide treatment to a targeted group of individuals. This is the most rigorous and appropriate test of treatment because it avoids biases introduced by selective treatment retention. At the same time, it raises concerns that high rates of early drop-out from both treatment programs may have diluted real treatment effects among those who had more exposure to the interventions.
When we analyzed the relationship of days of treatment exposure to outcomes, a consistent effect of residential treatment on improved outcomes at 3 months did, in fact, emerge. Because we had comprehensively assessed variables that might be expected to predict outcomes at baseline, and included these as covariates in our models, we can cautiously assert that exposure to a 3-month intensive social model residential treatment intervention improved outcomes over what would have been expected in this dually diagnosed and homeless population, but only for a short period of time.

One issue that merits special attention with this population is the limited extent to which newly emerging programs specifically designed for the dually diagnosed appear to have been successful in engaging them in sustained treatment efforts. Among studies reporting any information about treatment drop-outs, most report high rates of early program attrition: 66% dropped out of a once-a-week VA outpatient group within 2 months in Kofod and colleagues' pilot study;16 five out of ten clients dropped out of another weekly outpatient group within 1 year as reported by Hellerstein and Meehan;17 Blankertz and Cnaan21 give drop-out rates of 43% and 106% among homeless dually diagnosed clients within the first 2 months of a structured residence program and modified therapeutic community, respectively. Drop-out rates in the present demonstration were also high. Among those who attended at least once, drop-out rates in the first two weeks were 18% and 40% in the residential and nonresidential groups, respectively. If those who agreed to participate in the demonstration but never entered treatment are included, these early drop-out rates increase to 51% and 64%. While some treatment attrition is to be expected, particularly for programs demanding sobriety of substance abusers, the dually diagnosed seem particularly difficult to engage in treatment even when it is specially targeted to their comorbid disorders.

In hindsight, we speculate that engagement and retention of this population could have been improved by restructuring the intervention in two ways. First, an extended and low-demand first phase of entry into the program may have boosted participation. It is our impression that some individuals who were not quite "ready" to commit themselves to treatment at the time they entered the demonstration would over time have become involved given a more flexible and low-demand option for engaging. This idea has been articulated by others10,36 as a model in which clients progress, or regress if necessary, through different phases of treatment, with engagement and persuasion as the first phases (for example, through mental health treatment settings where abstinence is a goal but not a requirement), followed by more active treatment and relapse prevention.
(with higher expectations for abstinence and a focus on skills to maintain abstinence).

Second, we think that our treatment approach underestimated the primacy of housing and income needs in this population, and the difficulties involved in assisting clients with such needs even with intensive case management. This was particularly a problem for clients in the nonresidential program, who usually required immediate efforts to secure temporary shelter and apply for disability and/or welfare income assistance. Because housing of any type was difficult to access in this community (including emergency or transitional housing as well as permanent housing), program staff were often frustrated in their efforts. We believe that low-demand but highly supervised transitional housing linked to the nonresidential program would have increased its effectiveness in engaging and retaining clients. Expanded affordable permanent housing options for both residential and nonresidential clients upon completion of the initial intensive phase of treatment might have facilitated continued treatment involvement and gains in sobriety. Although a project-sponsored sober-living house and apartments were available, the financial feasibility of this option was dependent upon all residents contributing their share to the monthly rent, and upon fully occupied dwellings (2 residents per bedroom). The sober living homes failed to attract and maintain many treatment graduates because of their expense (only those who had qualified for and received SSI could afford the rent), the inability of some clients to live cooperatively and in close quarters with others, and the requirement that residents remain abstinent. In addition to the universal need, in our target population, for very low- or no-cost housing options, a range of housing environments in addition to sober-living homes such as single apartments, supervised community support residences or half-way houses, and moderately “wet” transitional housing would have better served the range of residential needs that existed.

Our experience has also led us to question the appropriateness of applying relatively short-term treatment models to the joint problems of serious mental illness and substance dependence. Serious mental illness is by definition the presence of a persistent and often lifelong disorder characterized by acute exacerbations and serious functional impairment. The natural course of substance addiction is also typically prolonged or chronic, characterized by multiple episodes of remittance and relapse among treated populations. Given this reality, it is perhaps not surprising that a relatively short-term intervention would have little detectable and lasting impact. What may be needed to stabilize and maximize the functioning of dually diagnosed individuals is a model of care that is very long-term and contin-
uous, such as that described by Drake, McHugo, and Noordsy who report high rates of abstinence among 18 individuals who were treated continuously in an integrated dual diagnosis program over a period of four years. In this regard, an interesting finding from our study is that those subjects who attended AA meetings, beyond participation in the experimental treatment interventions, had better substance use outcomes over the course of the 9-month evaluation. This finding must be interpreted cautiously because it is possible to explain as an individual selection effect (that is, individuals who have better outcomes are more likely to attend AA meetings) and cannot conclusively be attributed to the efficacy of AA involvement. Nonetheless AA groups do have the advantage of providing a continuously available—even lifelong—source of support for this population, unlike formal treatment programs. While long-term support for sobriety may increase positive outcomes among the homeless dually diagnosed, we think it unlikely that any program, formal or self-help, is likely to produce long-lasting benefits unless issues of housing and income support are also resolved for this population.

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<td>RP-493</td>
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<td>RP-499</td>
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