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## Comparing Treatments for Dual Diagnosis: Twelve-Step and Self-Management and Recovery Training

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### ABSTRACT

The purpose of this study was to compare the effectiveness of 12-step and cognitive-behavioral (Self-Management and Recovery Training [SMART]) approaches for persons with a dual diagnosis of serious mental illness and substance use disorder in an intensive outpatient/partial hospitalization setting. Participants ( $n = 112$ ) were alternately assigned to the two treatment conditions, with 50 participants completing the 6-month treatment program. Assessments occurred at baseline, 3 months, and 6 months during treatment, and at 3- and 12-month follow-ups. Analyses were conducted on participants who had completed 3 months of treatment ( $n = 70$ ). The 12-step intervention was more effective in decreasing alcohol use and increasing social interactions. However, a worsening of medical problems, health status, employment status, and

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psychiatric hospitalization were associated with the 12-step intervention. SMART was more effective in improving health and employment status, but marijuana use was greater for SMART participants. Improvements in alcohol use and life satisfaction occurred in both approaches. Covariates associated with treatment outcome were identified, with greater attendance being positively related to outcome. Involvement with the criminal justice system was positively related to treatment completion but negatively associated with medical problems. Less alcohol use, fewer medical problems, and better financial well-being at baseline were associated with better attendance.

*Key Words:* Drug rehabilitation; Dual diagnosis; Co-occurring Disorders; Treatment outcomes; Mental health services.

## INTRODUCTION

The current consensus is that persons with dual diagnosis, that is, co-occurring persistent mental illness and substance use disorders, require unified, integrated treatment in which both disorders are addressed simultaneously in programs specifically tailored to their needs (1–9). Despite this consensus, there is little evidence about what types of integrated treatment are most effective (10–13). Recent attempts to integrate substance use and mental health treatment for the dually diagnosed have been applied to all levels of treatment including inpatient (14–18), outpatient (19–21), and case management (11,22,23), with case management approaches showing the best outcomes to date. However, many of these studies had small samples, high dropout rates, and no comparison groups. In the one study that employed a control group, no differences were found (17). Thus there is still no clear indication of which modality works best with this population.

Although no definitive answers have emerged yet in terms of which treatment level is most effective with this population, the primary models of substance abuse treatment, cognitive behavioral (CB) and 12-step, have only recently been investigated in both the substance abuse and dually diagnosed populations. Three recent studies (24–26) found little difference in effectiveness between 12-step and CB. Both approaches were equally effective in producing positive outcomes. However, 12-step was found to be more effective in reducing substance use at the 1-year follow-up in the sample in the Ouimette et al. study (24,27), although the authors attribute this finding to participation in 12-step groups during the follow-up period. Only the Ouimette et al. (24) sample included persons with dual diagnosis. Outcomes



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for dually diagnosed persons mirrored those found in the whole sample. The only difference was reduced substance use in the 12-step group at the 1-year follow-up (28). In contrast, Maud-Griffin et al. (29) found CB to be superior to 12-step in a study of cocaine abusers with high rates of concomitant psychopathology.

These studies were tailored primarily to substance abuse treatment, not dual diagnosis. Two studies compared 12-step and CB for the dually diagnosed and found limited support for the efficacy of the CB treatment approach. Fisher and Bentley (30) reported some support for CB treatment in a study comparing a disease-recovery model, CB, and “treatment as usual” in persons with a co-occurring personality disorder diagnosis. CB was more effective in an outpatient setting in reducing alcohol use and improving psychological functioning and social and family relations. In the inpatient setting, CB and disease-recovery participants fared better than the “treatment as usual” group only in the area of social and family relations. Drug use did not change in either setting or treatment condition. Similarly, Jerrell and Ridgely (31) found behavioral skills training and case management approaches superior to 12-step in improving psychosocial functioning and psychiatric symptomatology, but the differences were less than anticipated.

Thus the two studies that specifically targeted dually diagnosed individuals found limited support for CB treatment. The other studies included persons with dual diagnosis but did not tailor treatment to the specific needs of dually diagnosed (e.g., integrating mental health interventions with the substance abuse treatment). The goal of the present study was to compare the two most commonly used substance abuse treatment philosophies as applied in an integrated treatment program for the dually diagnosed. The two treatment methods were 12-step and Self-Management and Recovery Training (SMART), a cognitive-behavioral intervention based on Rational Emotive Behavioral Therapy. The interventions were applied at an intensive outpatient/partial hospitalization (IOP/PHP) level.

## METHODS

### Sample

The program served adults who met the criteria of having a current dual history of serious mental illness and substance dependence. Individuals were considered to be dually diagnosed if they were diagnosed with a primary Axis I thought disorder or affective disorder, and a substance abuse or dependency disorder based on the criteria set forth in the Diagnostic and Statistical Manual

III—Revised [DSMIII-R; (32)]. This included individuals with diagnoses such as schizophrenia, bipolar disorder, schizoaffective disorder, and major depression. Individuals with an Axis II personality disorder diagnosis as determined by a psychiatrist, who did not also have an Axis I diagnosis, were excluded from the sample. Current diagnosis was determined using the diagnostic evaluation from the referring treatment team psychiatrist and the results of the Psychiatric Diagnostic Inventory-R (33), the Mini Mental Status Exam (34,35), and clinical interview administered by the trained research staff at an initial screening. All participants provided informed consent. The procedures and materials complied with the ethical standards of the American Psychological Association and were approved by La Frontera Center's Institutional Review Board.

Overall, the project received 194 referrals and screened 190 individuals. Of those screened, 170 were eligible, and 112 received a subsequent intake (66%). The discrepancy between the number eligible and the number receiving an intake was primarily because a number of clients decided they weren't interested in the program (40%) or they didn't show up for the intake (28%). The remaining clients entered other treatment programs or could not attend because of circumstances beyond their control such as job conflict, transportation difficulties, or childcare.

Analyses were conducted comparing persons completing treatment, dropouts, and those who received an initial screening only. No differences were found between the groups for gender, ethnicity, or mental health diagnosis. Persons with a polysubstance dependence diagnosis were more likely to have been screened only ( $X^2 = 7.86$ ,  $df = 2$ ,  $p < .02$ ; 59% screened vs. 22% dropouts vs. 19% completers). In addition, differences in independent living situations, substance use, probation/parole status, and a chronic medical problem were found between completers and dropouts. Completers were less likely to be in independent living situations ( $X^2 = 4.44$ ,  $df = 1$ ,  $p < .02$ ; 38% vs. 62%) and had less substance use at 2 months ( $X^2 = 6.360$ ,  $df = 1$ ,  $p < .01$ ; 22% vs. 52%). There was also a trend for completers to be on probation or parole ( $X^2 = 3.77$ ,  $df = 1$ ,  $p < .052$ ; 63% vs. 41%) and not have a chronic medical condition ( $X^2 = 2.93$ ,  $df = 1$ ,  $p < .087$ ; 52% vs. 35%).

Participants were alternately assigned to either the 12-step or SMART conditions. Although attempts were made to ensure comparability of the two treatment groups, analyses indicate there was a difference in subject characteristics between the two treatment conditions. More males (60%) were assigned to the SMART condition and more females (60%) were assigned to the 12-step condition. However, subsequent comparisons between males and females found no differences on the outcome variables at baseline.



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### Assessments

Participants were assessed at five time points. The baseline interview was conducted after the client attended approximately 1 week of treatment. Originally, clients were administered the baseline measures before starting treatment. However, many clients did not understand the nature of the treatment program or confused the baseline interview with the treatment content and did not show up for services. Therefore, clients were allowed to attend services for a week so they had some idea of what treatment entailed. The remaining assessments were conducted at 3 months during treatment, upon completion of treatment (6 months), 3 months after treatment completion (9 months), and 12 months after treatment completion (18 months). The same data technician conducted almost all of the data collection interviews throughout the duration of the project. Of the 112 clients who began treatment, 70 had data for at least the first two time points (63%). Hospitalization data were available for all 50 clients who completed treatment.

### Measures

#### Psychiatric Diagnostic Inventory-R (PDI-R)

The PDI-R is a structured, diagnostic interview based on diagnostic criteria set forth in the DSM-III-R. It is designed to determine whether an individual is suffering or has ever suffered from a major psychiatric disorder. The questions are simple and easy to understand, and are primarily in a yes-no format. Questions are organized into 17 basic syndromes and 4 derived syndromes (33). For analysis purposes, the client's psychiatric diagnosis was categorized as mood disorder, thought disorder, mixed mood/thought disorder, personality disorder, and other. Most clients had several other psychiatric diagnoses, however.

#### Addiction Severity Index (ASI)

The ASI is a structured interview that assesses a person's current status and previous history in the following areas: demographics, medical problems, employment, substance use, legal status, family relations, and psychiatric status (36). Composite scores for medical problems, employment, drug use, alcohol use, legal status, and psychiatric status were used in the present study. Higher scores indicate greater impairment.



### Quality of Life

The subjective measure of overall quality of life was assessed with the short form of the Lehman Quality of Life Interview (37). Quality of life was measured by 21 items rating satisfaction across six of the domains: living arrangements, family, leisure activities, finances, legal and safety issues, and health. Two items rated overall life satisfaction. A mean of the items was obtained. Higher scores indicate greater life satisfaction.

### Functioning and Well-Being

The objective measures of the quality of life from the short form of the Lehman Quality of Life Interview (37) were used to assess functioning and well-being in five domains: perceived overall functioning, social interaction, leisure activities, financial well-being, and perceived health status. Perceived overall functioning is a single item rating overall functioning in home, work, school, and social settings. Health status is a single item rating overall health. Both items are rated on a scale of 1 “excellent” to 5 “poor.” Social interaction is the frequency of contact with family members and friends rated on a scale of 1 “not at all” to 5 “at least once a day.” Leisure activities is mean number of activities engaged in the past week. Financial well-being is the average of four items addressing whether the participant had enough money to cover daily living expenses such as food and clothing.

### Substance Use

Urinalyses were performed to detect the presence of alcohol, marijuana, and other drugs, such as cocaine, heroin, amphetamines, and barbiturates. Results were categorized into alcohol, marijuana, and other drug use. Urinalyses were collected at intake, 2 months, 4 months, 9 months, and 12 months.

### Hospitalization

This was defined as the number of days and number of times the person was hospitalized. Data were collected for the following time periods: (1) 3 months before starting treatment (baseline); (2) the last 3 months of treatment (during treatment); and (3) 3 months after treatment completion



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(follow-up). The last 3 months of treatment was chosen because of the fluid nature of client participation in the program. Participants would often leave and re-enter treatment. Thus the time to complete treatment varied (see the following section). The last 3 months of treatment was chosen as the during treatment time frame so that a consistent time frame was obtained for all persons and because attendance was usually more stable with more time in the program.

### Intervention

Participants were assigned to either the SMART or 12-step treatment group. The two groups were conducted at separate sites to avoid contamination between the two approaches. The interventions were conducted in an intensive outpatient day treatment/partial hospitalization program (IOP/PHP, ASAM Level II, American Society for Addiction Medicine Patient Placement Criteria). The SMART group followed the guidelines and techniques of the national organization. SMART began in 1994 as a self-help organization providing an alternative to 12-step based community meetings (e.g., [www.smartrecovery.org](http://www.smartrecovery.org)). SMART uses the principles and practices of psychologist Albert Ellis's Rational Emotive Behavior Therapy, a cognitive therapy system based on the theory that how we think and perceive life largely determines how we feel and how we act. The 12-step program followed the widely recognizable format adapted for dual diagnosis, incorporating the disease model, the 12 steps, and the 12 traditions. Counselors in both groups were trained in their respective approaches using treatment manuals developed for the study by consultants and other related materials (see (38), for a detailed description of the treatment and manuals). Staff were trained and continuously supervised by the consultants, the project manager, and the principal investigator.

A client-centered approach that was welcoming and nonjudgmental was stressed in both groups. Participants were not terminated for relapses. These approaches have been considered essential for the dually diagnosed (39). Both treatment conditions sought to be nonconfrontational, which is not how the 12-step approach is often applied. However, the key concepts of denial, the need to accept powerlessness, and a higher power were still stressed in the 12-step treatment group.

The treatment groups met 5 hours a day, 5 days a week, generally from 10:00 a.m. until 3:00 p.m. Lunch was provided each day. Clients were encouraged to attend all of the time but were allowed to continue even if they did not. Transportation was not provided to the program, but after group



outings or trips to community support groups clients were frequently given rides home.

Group activities followed a structured format that provided equal emphasis on mental health and substance abuse issues. Although both treatment group counselors followed the same weekly format, the material was presented according to the group's philosophy and methods, SMART or 12-step. Group topics covered every week where the two different methods were used included mental illness management, relapse prevention, goal setting, survival skills, written assignments, weekend preparation, recreation, 12-step or SMART groups (in-house), and 12-step or SMART groups (in community). Other activities in both groups included grocery shopping, menu preparation, adult daily living skills, and mental health and substance education. One day per week was devoted to recreation to promote healthy and enjoyable alternatives to substance use. After "graduation" clients were allowed to attend their treatment groups 2 days a week for aftercare if they felt the need. Formal and informal individual sessions with the group counselors were also available, and clients took advantage of this service in varying degrees. In addition, participants in both groups received non-intensive case management, medication, and hospitalization or crisis services as needed.

The length of the treatment program was defined as 6 months. This length was chosen to allow enough time for treatment to have an impact on this population with persistent disorders, and also to allow for an adequate sample size to accrue during the grant period. However, because of the chronic and erratic nature of both serious mental illness and addiction, it was necessary to allow participants to leave and reenter treatment as they needed. Therefore, completion of treatment was defined as 6 months of treatment exposure rather than 6 consecutive calendar months. In general, qualification for completion was defined as approximately 26 weeks of treatment and mastery of at least the basic concepts and skills. For example, the SMART clients would be observed using the ABCs, a core component of SMART, and the 12-step clients would have completed some of the steps. In both cases the clients were observed applying the core concepts of each approach to their lives. Participants typically needed to attend at least 3 days in a week for it to qualify as a week of treatment.

### Therapists

Staff turnover during the study was low. Both 12-step counselors typified traditional substance abuse counselors. Both identified themselves as in 12-step recovery for many years, did not hold degrees in a human service field,





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and had several years of paraprofessional experience. The SMART group had three counselors, but one of them only worked for a very short time at the start of the project. The two primary counselors did not identify themselves as being in recovery and held bachelor's or master's degrees in human services, and had a few years of related experience. Staff training is described in depth elsewhere (38).

## RESULTS

Descriptive statistics of the whole sample are presented first. Treatment retention and treatment exposure analyses are presented next, followed by the results of hierarchical linear modeling (HLM) to examine mean-level changes in the ASI and Lehman outcome variables over time. HLM analyses of differences in outcome between the two treatment groups are presented next. Last, analyses examining substance use and hospitalization are presented.

### Sample Pretreatment Characteristics

The intake sample was 42% percent female, 70% percent Anglo, and 13% Hispanic. The average age was 34 years, ranging from 19 to 59 years. Years of education ranged from 3 to 18 years, with an average of 11.5 years. More than half were single, about one-third were divorced, and only 5% were married. Most clients were not employed (61%) or irregularly employed (22%). Half the sample had been incarcerated in the past, and almost a quarter of the sample was currently on probation or parole.

Half of the sample was diagnosed with a mood disorder, followed by thought disorder and personality disorder diagnoses. However, most clients had multiple substance and psychiatric diagnoses. Participants had multiple hospitalizations for psychological problems. The most frequent substance diagnosis was alcohol dependence, followed by polysubstance dependence and cocaine dependence. Alcohol, polysubstances, marijuana, and cocaine had the longest average lifetime use. Participants reported being treated an average of 3.9 times for alcohol abuse and 3 times for drug use. The longest period of voluntary abstinence averaged 6.5 months. Almost half the sample felt alcohol was currently their biggest substance use problem.

The 12-step and SMART samples were comparable on most dimensions. However, in addition to the gender difference described previously, SMART participants were less likely to be on probation or parole (Table 1).

**Table 1.** Sample characteristics at baseline.

Variable	Total $n = 112$	12-step $n = 54$	SMART $n = 58$
<b>Demographic</b>			
Age (Mean $\pm$ SD)	34.2 $\pm$ 8.8	34.3 $\pm$ 9.3	34.2 $\pm$ 8.4
Years education	11.6 $\pm$ 2.3	11.5 $\pm$ 2.3	11.6 $\pm$ 2.4
% Female	42.0	51.9	32.8 <sup>a</sup>
% White	69.6	66.7	72.4
% Married	5.4	9.3	1.7
% Worked full/part-time past 3 years	17.1	13.7	20.4
<b>Psychiatric</b>			
% Mood disorder	50.5	56.6	44.8
% Thought disorder	19.8	18.9	20.7
% Personality disorder	15.3	15.1	15.5
% Mixed mood/thought disorder	14.4	9.4	19.0
Number of times hospitalized	8.2 $\pm$ 11.4	8.3 $\pm$ 12.5	8.2 $\pm$ 10.5
<b>Substance</b>			
% Alcohol dependence	45.0	44.4	45.6
% Polysubstance dependence	18.0	27.8	8.8
% Cocaine dependence	12.6	11.1	14.0
% Amphetamine dependence	8.1	5.6	10.5
% Marijuana dependence	7.2	5.6	8.8
% Other substance diagnosis	9.0	5.6	12.3
Years alcohol use	11.8 $\pm$ 9.7	13.3 $\pm$ 9.6	10.5 $\pm$ 9.6
Years polysubstance use	9.9 $\pm$ 9.3	10.7 $\pm$ 10.1	9.1 $\pm$ 8.4
Years marijuana use	8.0 $\pm$ 8.3	7.4 $\pm$ 7.9	8.6 $\pm$ 8.6
Years cocaine use	5.4 $\pm$ 7.1	6.5 $\pm$ 8.3	4.4 $\pm$ 5.7
Number of times alcohol treatment	3.9 $\pm$ 5.4	4.4 $\pm$ 4.6	3.4 $\pm$ 6.0
Number of times drug treatment	3.1 $\pm$ 4.7	3.0 $\pm$ 3.6	3.2 $\pm$ 5.5
<b>Criminal activity</b>			
% On probation/parole	23.2	35.2	12.1 <sup>b</sup>
% Incarcerated during lifetime	50.0	49.0	51.0

SMART = self-management and recovery training; SD = standard deviation.

<sup>a</sup>  $X^2 = 4.19$ ,  $df = 1$ ,  $p < .041$ .<sup>b</sup>  $X^2 = 8.38$ ,  $df = 1$ ,  $p < .004$ .

### Treatment Retention

Overall, 50 clients (44%) completed treatment. Twenty-one clients (39%) completed the 12-step program, whereas 29 clients (50%) completed the SMART program (difference not statistically significant). The primary reasons for dropping out were circumstances beyond the individual's control (32%), uninterested (21%), and continuous substance use (19%). The remaining clients left for other reasons, such as acute symptom exacerbation, entering other treatment programs, or counselor conflict.

### Treatment Exposure

A significant difference in attendance was observed between the two groups. SMART participants attended fewer days ( $t(48) = 2.26, p < .028$ ) and had fewer weeks of attendance ( $t(48) = 2.46, p < .018$ ). SMART participants attended an average of 81 days (range = 43–109, standard deviation [ $SD$ ] = 18.3) and 26 weeks (range = 20–35,  $SD = 3.2$ ), whereas 12-Step participants attended an average of 94 days (range = 52–106,  $SD = 21.6$ ) and 28 weeks (range = 19–38,  $SD = 4.7$ ). To determine treatment exposure, the mean number of days attended was divided by the total number of days of possible attendance. As such, 12-step participants received an average of 73% of the total treatment dosage, whereas SMART participants received 63% of the total treatment dosage. SMART clients completed the treatment program in less time, but, this difference was not significant ( $t(48) = 1.762, p < .09$ ). SMART participants took an average of 32 weeks to complete treatment (range = 21–67,  $SD = 11$ ), whereas 12-step participants took an average of 44 weeks (range = 23–126,  $SD = 27$ ).

### Analyses

HLM was used to analyze change over time in the whole sample and to test for treatment condition differences on the outcome variables. HLM is an analytic method of multilevel growth curve analysis conceptualizing individual change in a two-level hierarchical model. The first level represents an individual's growth trajectory (intraindividual change) expressed as a set of parameters: intercept, slope (rate of change), and error. At the second level the individual parameters become the outcome variables with stable characteristics (e.g., personality characteristics, treatment condition) as predictors modeling interindividual differences. HLM also allows for the inclusion of

cases with incomplete data, weighting cases with more complete data and reliable trajectories of change more heavily (40). In the present study, HLM was used to model growth trajectories for the ASI and Lehman outcome variables.

### Average Growth Models

Mean-level changes in the ASI and Lehman variables across the whole sample were examined initially to determine the general effect of participating in treatment. In these models the linear effect of time on the outcome variables was examined. Time was coded as the number of months since the baseline interview, with baseline coded as 0. All participants with at least two data points were included in the analyses ( $n = 70$ ). Using alcohol use as an example, the linear model is as follows:

$$\text{Level 1 : Alcohol}_{it} = \pi_{0i} + \pi_{1i} * (\text{Time}) + R_{it}$$

$$\text{Level 2 : } \pi_{0i} = \beta_{00} + U_0$$

$$\pi_{1i} = \beta_{10} + U_1$$

In the Level 1 equation,  $\text{Alcohol}_{it}$  represents the level of alcohol use for participant  $i$  at time  $t$ .  $\pi_{0i}$  represents alcohol use for participant  $i$  at baseline (time = 0), and  $\pi_{1i}$  is the rate of change in alcohol use for participant  $i$ . There are no Level 2 predictors, thus in the Level 2 equation  $\beta_{00}$  is the grand mean level of alcohol use,  $\beta_{10}$  is the grand mean rate of change in alcohol use, plus a random component ( $U_0, U_1$ ) that allows for individual differences in intercept and slope.

Models were computed separately for each of the outcome variables across the five time points. The means for the ASI and Lehman variables over time are presented in Table 2. Statistically significant improvements over time were found for all of the ASI composites with the exception of medical status. Financial well-being and life satisfaction also improved. Health status, overall functioning, leisure activities, and social interaction showed no significant mean change.

### Effect of Treatment Condition

The primary model to be tested with HLM was the effect of treatment condition (12-step vs. SMART) on the ASI and Lehman outcome variables.

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**Table 2.** Mean level changes in ASI composites and Lehman Functioning and well-being.

Variables	Baseline	3-Month	6-Month	9-Month	18-Month
ASI					
Alcohol	0.2825	0.2567	0.2309	0.2051	0.1277**
Drug	0.1095	0.1003	0.0915	0.0827	0.0564**
Psychiatric	0.5445	0.5277	0.5108	0.4939	0.4433*
Medical	0.3241	0.3371	0.3500	0.3630	0.4019
Legal	0.1321	0.1191	0.1061	0.0932	0.0542*
Employment	0.8376	0.8194	0.8011	0.7829	0.7281*
Lehman					
Health	3.1163	3.1125	3.1087	3.1049	3.0935
Financial	0.6105	0.6370	0.6635	0.6900	0.7694**
Functioning	2.4101	2.4019	2.3938	2.3856	2.3610
Leisure	0.5695	0.5753	0.5812	0.5871	0.6046
Social	3.2326	3.2471	3.2616	3.2761	3.3195
Life satisfaction	4.1293	4.2267	4.3241	4.4215	4.7138**

\* $p < .005$ ; \*\* $p < .001$ .

The Level 1 model remains the same, an estimate of the linear trajectory of the outcome variables. Treatment condition is added to the Level 2 model to determine the effect of treatment condition on the intercept and linear time slope. Gender, probation status, and attendance were also included in the Level 2 model as predictors of both the intercept and slope to determine their effect on the linear time slope and to control for their influence given the baseline differences between the treatment groups on these variables. Gender, probation status, and treatment condition were dichotomously coded with male, not on probation, and SMART coded as 0. Using alcohol use as an example the Level 1 and Level 2 equations used for the ASI and Lehman analyses are as follows:

$$\text{Level 1 : Alcohol}_{it} = \pi_{0i} + \pi_{1i} * (\text{Time}) + R_{it}$$

$$\begin{aligned} \text{Level 2 : } \pi_{0i} = & \beta_{00} + \beta_{01} * (\text{Gender}) + \beta_{02} * (\text{Program}) \\ & + \beta_{03} * (\text{Probation}) + \beta_{04} * (\text{Attendance}) + R_{0i} \end{aligned}$$

$$\begin{aligned} \pi_{1i} = & \beta_{10} + \beta_{11} * (\text{Gender}) + \beta_{12} * (\text{Program}) \\ & + \beta_{13} * (\text{Probation}) + \beta_{14} * (\text{Attendance}) + R_{1i} \end{aligned}$$

The Level 1 equation models the linear effect of time on alcohol use (described previously). In the Level 2 model the effect of treatment condition on alcohol use is examined controlling for gender, probation, and attendance. In interpreting the HLM findings, a positive slope for treatment condition ( $\beta_{12}$ ) would indicate an increase in scores over time, while a negative slope indicates a decrease in scores. For the ASI composites, health status, and overall functioning a negative slope indicates an improvement on that measure. For life satisfaction, social interaction, leisure activities, and financial well-being a positive slope indicates improvement.

### Changes in the ASI Composites

In the model examining change in alcohol use, a significant difference in intercept was found for treatment condition, probation status, and attendance. Participants in the 12-step program and persons not on probation had higher baseline alcohol use. Participants with higher attendance had lower alcohol use at baseline. The model confirmed a decrease in alcohol use over time. Two predictors were significantly related to the rate of change in alcohol use, treatment condition, and attendance. The decrease in slope for 12-step participants was steeper indicating a greater decrease in alcohol use in the 12-step condition. Greater attendance increased the slope indicating that alcohol use decreased less with greater attendance.

No predictors were related to baseline employment status. However, treatment condition was related to the rate of change in employment. The slope for 12-step participants was positive indicating a decline in the employment composite, whereas the slope for SMART participants was negative indicating an improvement in the employment composite. The effect of time on the rate of change was not confirmed in this model.

For the medical composite, only attendance was a significant predictor of intercept. Attendance was higher for participants with fewer medical problems at baseline. Treatment condition and probation status were significant predictors of the rate of change in medical status. Both predictors increased the slope of medical status, indicating that 12-step and probation were related to a worsening of medical status over time. (Results are presented in Table 3.)

No significant differences for treatment condition were found for psychiatric symptoms, drug use, and legal status. However, probation status was a significant predictor of intercept for legal status and drug use. Probation status was associated with greater drug use and worse legal status at baseline.

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**Table 3.** HLM estimates of treatment condition on ASI alcohol, employment, and medical composites.

Variables	Alcohol			Employment		
	Coefficient	SE	<i>t</i>	Coefficient	SE	<i>t</i>
<b>Intercept</b>						
Intercept $\beta_{00}$	0.3636	0.0537	6.77***	0.8561	0.0482	17.73***
Gender	-0.0304	0.0447	-0.68	-0.0722	0.0400	-1.82
SMART vs. 12-step	0.0914	0.0447	2.04*	-0.0007	0.0423	-0.02
Probation	-0.1096	0.0452	-2.42*	0.0618	0.0410	1.51
Attendance	-0.0014	0.0007	-2.11	-0.0001	0.0006	-0.09
<b>Time linear slope</b>						
Average rate of linear change	-0.0160	0.0051	-3.17**	-0.0003	0.0085	-0.03
Gender	-0.0033	0.0031	-1.06	-0.0039	0.0039	-1.01
SMART vs. 12-step	-0.0076	0.0033	-2.28*	0.0118	0.0038	3.14**
Probation	0.0054	0.0034	1.61	-0.0065	0.0040	1.65
Attendance	0.0001	0.0001	2.51*	0.0001	0.0001	-0.94
<b>Medical</b>						
<b>Intercept</b>						
Intercept $\beta_{00}$	0.4995	0.0776	6.44***			
Gender	0.0863	0.0586	1.47			
SMART vs. 12-step	-0.0059	0.0608	-0.10			
Probation	-0.1087	0.0689	-1.58			
Attendance	-0.0029	0.0009	-3.14**			
<b>Time linear slope</b>						
Average rate of linear change	-0.0077	0.0127	-0.61			
Gender	0.0061	0.0055	1.11			
SMART vs. 12-step	0.0166	0.0065	2.56*			
Probation	0.0188	0.0057	3.33***			
Attendance	-0.0000	0.0001	-0.01			

HLM = hierarchical linear models; SE = standard error; SMART = self-management and recovery training.

 \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



The effect of time on rate of change was not confirmed for any of these variables.

### Changes in Functioning

In the model examining change in social interaction, a significant difference in the intercept was found for gender, with females having more social interactions. Treatment condition significantly increased the rate of change of social interaction, indicating a greater increase in social interactions over time for 12-step participants.

None of the predictors were related to baseline health status. Comparable to the findings for the ASI medical composite, treatment condition and probation status were related to rate of change. Both variables increased the slope of health status, indicating that 12-step and probation were related to poorer health over time. The slope for SMART participants decreased over time, indicating an improvement in health status. (Results are presented in Table 4.)

There were no significant predictors of baseline life satisfaction. HLM confirmed the increase over time in life satisfaction when controlling for the covariates ( $t(105) = , p < .008$ ). Increased attendance was associated with a marginal decrease in life satisfaction over time ( $t(105) = -1.83, p < .067$ ).

Increased attendance was associated with marginally greater financial well-being at baseline ( $t(105) = 1.94, p < .052$ ). None of the predictors were related to rate of change in financial well-being. The change over time in financial well-being was not confirmed with the covariates in the model.

Probation status was marginally associated with baseline and rate of change of overall functioning. At baseline, being on probation was marginally related to better overall functioning ( $t(105) = 1.91, p < .086$ ). However, over time those on probation showed a marginal decrease in functioning ( $t(105) = 1.91, p < .056$ ).

### Changes in Substance Use

Logistic regression analyses were conducted on the urinalysis results at each time point. In addition to examining the influence of treatment condition on substance use, the regression included the same covariates used in the HLM model (gender, probation, and attendance). Statistically significant models were found for marijuana use at 2 ( $X^2 = 24.18, p < .001$ ), 4 ( $X^2 = 10.07, p < .04$ ), and 9 months ( $X^2 = 10.63, p < .03$ ), and any substance use at



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**Table 4.** HLM estimates of treatment condition effects on Lehman social interaction and health status.

Variables	Social interaction			Health status		
	Coefficient	SE	<i>t</i>	Coefficient	SE	<i>t</i>
<b>Intercept</b>						
Intercept $\beta_{00}$	3.2724	0.1645	19.89***	3.2188	0.2390	13.47***
Gender	0.3478	0.1372	2.53*	0.1680	0.2240	0.75
SMART versus 12-step	-0.1041	0.1396	-0.75	-0.2405	0.2211	-1.09
Probation	0.0552	0.1587	0.35	-0.2182	0.2600	-0.84
Attendance	-0.0026	0.0020	-1.32	-0.0001	0.0030	-0.05
<b>Time linear slope</b>						
Average rate of linear change	0.0235	0.0181	1.30	-0.0484	0.0375	-1.29
Gender	0.0061	0.0102	0.59	-0.0064	0.0181	-0.35
SMART versus 12-step	0.0352	0.0116	3.05**	0.0498	0.0193	2.59**
Probation	-0.0242	0.0134	-1.81	0.0381	0.0175	2.17*
Attendance	-0.0003	0.0002	-1.71	-0.0002	0.0004	0.49

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

HLM = hierarchical linear models; SE = standard error; SMART = self-management and recovery training.

2 months ( $X^2 = 11.83$ ,  $p < .02$ ). None of the remaining models were significant. For marijuana use at 2 months, gender, attendance, and treatment condition were all significant. Females, 12-step participants, and participants with better attendance were less likely to use (odds ratio[OR]: 0.06, 0.05, 0.96, respectively). None of the predictors were significant in explaining marijuana at 4 months. Gender was a marginally significant (OR: 0.08,  $p < .06$ ) predictor of marijuana use at 9 months. Similar to the 2-month results, females were less likely to use. Better attendance predicted a lower likelihood of any substance use at 2 months (OR: 0.98,  $p < .03$ ). Females were marginally less likely to use any substance (OR: 0.32,  $p < .07$ ).

**Changes in Hospitalization**

A 2(group)  $\times$  3(time) repeat measures analysis of variance for repeated measures was conducted on days hospitalized. A significant time  $\times$  treatment



interaction was found [ $F(2, 78.6) = 4.239, p < .024$ ]. The number of days hospitalized was greater for 12-step clients than SMART clients during treatment (mean = 5.52, SD = 13.7 vs. 0).

## DISCUSSION

The purpose of this study was to compare the effectiveness of the two predominant substance use treatment modalities used as the basis of integrated treatment in a sample of persons with dual diagnosis. The primary differences noted between the two groups were in the alcohol composite, marijuana use, medical problems, health status, employment, social interaction, psychiatric hospitalization, and treatment attendance. There was no difference between the two treatment approaches in retention, drug use, psychiatric symptoms, and legal status as measured by the ASI, substance use as measured by urinalysis, and life functioning and well-being as measured by the Lehman. Life satisfaction and alcohol use improved over time irrespective of treatment approach. Most of the outcome variables improved over time; however, these differences did not remain when the covariates were added to the HLM model. Probation status, treatment attendance, and gender were significant covariates related to baseline status and rate of change for several outcome variables.

### Retention

The completion rate (44%), although somewhat low, is in keeping with completion rates found with this population [15–75%; (41,42)] and somewhat higher than the outpatient public sector completion rates in the local county at the time the study was conducted [36%; (43)]. With a completion rate less than 50%, one could question the extent to which the present findings are generalizable. However, using HLM analyses increased the sample size to 70 (63%), expanding the sample to include persons who had completed at least 3 months of treatment, thereby broadening generalizability. At the same time, variance resulting from decreased attendance was controlled by including treatment attendance in the model. In addition, several factors related to attrition were identified in the present study. Thus the present findings are valid in demonstrating how either of the treatments can benefit some participants and, at the same time, identify characteristics of participants for whom the treatments were not effective. Treatment completers were less likely to have a polysubstance diagnosis, live independently, and have a chronic medical problem, and more likely to be on probation or parole.



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Although being involved with the legal system may increase the likelihood of completing treatment, ancillary efforts may be needed for engagement and retention of other subgroups of dually diagnosed individuals.

#### Treatment Condition

The 12-step intervention was more effective than SMART in decreasing alcohol use and increasing social interactions. Marijuana use was also less for 12-step participants during treatment. However, a worsening of medical problems, health status, and employment, and more days in psychiatric hospitalization were associated with the 12-step intervention. On the other hand, positive changes in health and employment were associated with the SMART intervention. Alcohol use also decreased in SMART, although not as sharply as in the 12-step condition, and marijuana use was greater during treatment in this group. This pattern of results may be due in part to the difference in emphasis in the two interventions. The 12-step approach uses the disease model with the primary emphasis on confronting addictions and, of course, has its roots in alcohol addiction. Building a support system and reaching out to others are encouraged as strategies for avoiding use. This would be consistent with the findings of less use and greater social interaction in the 12-step approach.

On the other hand, one of the basic tenets of SMART is that irrational beliefs support substance dependency, and that refuting and replacing these irrational beliefs can improve these problems. The focus is on current beliefs, attitudes, self-statements, and personal responsibility. Changes in cognition with less emphasis on directly confronting substance use may explain the slightly greater substance use in SMART, the positive changes in health and employment, and less psychiatric hospitalization. An emphasis on personal responsibility may have taught the clients to take charge of their lives and their problems in general. In addition, the clients may have applied the principles to what they perceived as their immediate problems, not necessarily their substance use issues. The cognitive focus of SMART may have had a greater impact on psychiatric symptoms, resulting in less psychiatric hospitalizations. However, a comparable difference between groups was not found on the ASI psychiatric scale, so these findings should be interpreted with caution. In general, revised cognitions increase a sense of empowerment and decrease a sense of victimization, so people feel more empowered in general, which can lead to specific as well as more generalized behavior change. It is possible that after a person has resolved his or her immediate problems, cognitive principles such as those used in SMART can be applied to substance use behavior.



### Covariates

Identifying significant covariates of outcome for this population provides important information for designing more effective treatment programs for this difficult to treat population. The covariates in the model proved to be significant predictors of baseline status for several outcome variables. Length of treatment attendance has consistently been found to be related to better treatment outcomes in the literature. The present study found several variables related to attendance. Less alcohol use, fewer medical problems, and better financial well-being at baseline were associated with better attendance. In addition, those attending more had less substance use. However, better attendance was also associated with a smaller decrease in alcohol use. This could be a floor effect—participants who attended more had less alcohol use to at baseline. These variables are easily identified at intake, which would allow treatment programs to design targeted services for persons with problems in these areas to improve their attendance. Examples of such services might be facilitating medical links for persons with chronic medical conditions and focusing on obtaining entitlements for those with poor financial status.

Probation/parole status was also related to several outcome variables. Participants on probation/parole had less alcohol use and greater drug use, in addition to worse legal status at baseline. It was also the only covariate related to rate of change in some of the outcome variables associated with an increase in medical problems over time. Participants on probation/parole also tended to decrease in overall health status and overall functioning. Persons on probation/parole tend to be more likely to complete treatment, probably due to the threat of incarceration. While it may be a motivator to remain in treatment, it may also be a source of additional stress influencing the participant's health and well-being.

Consistent with other studies (44), gender did not prove to be a key covariate predicting outcome. However, females were less likely to use substances and had more social interactions at baseline.

### Change over Time

Most of the outcome variables improved over time; however, many of these differences did not remain when the covariates were added to the model. The time effect remained for alcohol use and life satisfaction but was not confirmed for employment, drug use, psychiatric symptoms, legal status, and financial well-being. One possible explanation may be that unidentified factor(s) may be associated with the rate of change. Greater statistical power



or a more parsimonious model may be needed to detect change over time. The covariates in the present model were included to control for differences between the two treatment conditions, not necessarily to test a specific hypothesis.

### CONCLUSIONS

Both of the approaches examined in the present study had positive effects on dually diagnosed individuals, with neither proving to be superior across multiple outcome dimensions. The failure to find a clear pattern of significant differences between the two treatments is comparable to the studies cited earlier comparing 12-step and CB approaches, suggesting that the specific treatment philosophy may not be a large determining factor in producing successful outcomes, at least for well-developed modalities or in certain populations. In fact, the present findings suggest that each approach has different benefits and a blending of the strengths of each approach may be necessary in treating dually diagnosed individuals.

Another consideration is the chronic, cyclical course of substance use in this population (45–48). Dually diagnosed individuals suffer impairments across multiple life areas, thus requiring long-term treatment. In studies with positive outcomes treatment lasted longer than 6 months (22,23,42). Moggi et al. (14) found no change in substance use 1 year later, although positive changes in housing, employment, and psychiatric symptoms were present. Jerrell and Ridgely (23) found that although the dually diagnosed showed improvement in several functioning areas and service utilization over 18 months of treatment, substance use and substance-related problems did not show a statistically significant change, although they did decrease. The authors attributed the lack of reduction to the cyclical nature of the disorder. Further, the authors stressed the importance of measuring both consumption and related problems in this population. Accordingly, future studies would want to use multiple measures of substance use incorporating frequency, quantity, and patterns of use, self-report and objective measures, and indicators of the impact of substance use on the individual's life to determine where and when changes are occurring. Additionally, other service utilization measures, such as case management encounters and medication management, should be tracked to determine how a treatment program impacts overall service utilization over time (23). Also, these findings point to the need not only for ongoing, integrated, comprehensive treatment but for long-term follow-up with this population.



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