

Major depression in patients with substance use disorders: relationship to 12-Step self-help involvement and substance use outcomes

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ABSTRACT

Aims Many patients treated for substance use disorders (SUDs) who become involved in 12-Step self-help groups have improved treatment outcomes. However, due to high rates of psychiatric comorbidity and major depressive disorder (MDD), among SUD patients in particular, concerns have been raised over whether these benefits extend to dual diagnosis patients. This study examined the influence of comorbid MDD among patients with SUDs on 12-Step self-help group involvement and its relation to treatment outcome.

Design A quasi-experimental, prospective, intact group design was used with assessments completed during treatment, and 1 and 2 years postdischarge.

Participants A total of 2161 male patients recruited during in-patient SUD treatment, of whom 110 had a comorbid MDD diagnosis (SUD-MDD) and 2051 were without psychiatric comorbidity (SUD-only).

Findings SUD-MDD patients were initially less socially involved in and derived progressively less benefit from 12-Step groups over time compared to the SUD-only group. However, substance use outcomes did not differ by diagnostic cohort. In contrast, despite using substantially more professional outpatient services, the SUD-MDD cohort continued to suffer significant levels of depression.

Conclusions Treatment providers should allocate more resources to targeting depressive symptoms in SUD-MDD patients. Furthermore, SUD-MDD patients may not assimilate as readily into, nor benefit as much from, traditional 12-Step self-help groups such as Alcoholics Anonymous, as psychiatrically non-comorbid patients. Newer, dual-diagnosis-specific, self-help groups may be a better fit for these patients, but await further study.

KEYWORDS Alcohol treatment, Alcoholics Anonymous, Cocaine Anonymous, comorbidity, drug treatment, major depression, mutual help, Narcotics Anonymous, psychiatric self-help, substance abuse, 12-Step, substance abuse treatment.

INTRODUCTION

Research evidence accumulated during the past 15 years indicates that individuals suffering from substance use disorders (SUDs) who become involved in recovery-focused self-help groups, such as Alcoholics Anonymous (AA), Cocaine Anonymous (CA) and Narcotics Anonymous (NA),

have better outcomes in multiple domains of functioning (e.g. Emrick *et al.* 1993; Timko *et al.* 1994; Tonigan, Toscova & Miller 1996; Morgenstern *et al.* 1997; Project MATCH 1997, 1998; Ouimette *et al.* 1998; Humphreys *et al.* 1999; Longabaugh 1999; Ouimette *et al.* 2001). Practice guidelines from the American Psychiatric Association (APA 1995) therefore recommend

self-help group involvement as an important adjunct to treatment for patients with SUDs. In spite of this many patients, for whom 12-Step attendance is recommended, do not attend and many initial attendees drop out or do not become as involved as clinicians would like. Little is currently known about what types of patients do or do not become involved in such fellowships, or the extent to which patient subgroups differ with regard to derived benefits. Greater knowledge of factors that influence 12-Step involvement and that moderate its effects on substance use could enhance the specificity of clinical recommendations to attend such groups.

Psychiatric comorbidity is one such patient factor to consider. Comorbid psychiatric illnesses are prevalent among people with SUDs (Regier *et al.* 1990; Kessler *et al.* 1996) and are often associated with increased social and cognitive-affective distress and behavioral symptoms. These dual-diagnosis patients tend to have poorer SUD treatment outcomes (e.g. Greenfield *et al.* 1998). The main text of AA (Alcoholics Anonymous 2001) states of its own membership that, 'there are those with grave emotional and mental disorders' of whom many recover. However, despite high rates of comorbidity and almost universal treatment recommendations to attend such fellowships, few studies have examined empirically how comorbid psychiatric illness influences involvement in, and the impact of, substance-focused 12-Step organizations.

Clinicians and researchers working in the SUD field have raised concerns that additional burdens carried by 'dual diagnosis' patients may negatively impact involvement in, and any derived benefit from, traditional 12-Step groups (Noordsy *et al.* 1996; Bogenschutz & Akin 2000). For example, the focus of organizations such as AA/NA/CA is kept purely on recovery from alcohol/drug addiction (Alcoholics Anonymous 1952). Consequently, experiences shared by the non-comorbid majority may not be perceived as sufficiently specific to meet the needs of individuals for whom the management of other psychiatric symptoms may be linked integrally to their substance abuse recovery. In addition, any deviation from the main purpose of 12-Step groups (i.e. sobriety/abstinence from alcohol/drugs) may be viewed as threatening to the unity and cohesion of the group and lead to less acceptance by other members, thus creating further barriers to assimilation. Other barriers faced by dually diagnosed patients include potential group resistance to the use of psychotropic medication (see Rychtarik *et al.* 2000), as well as related confusion and misunderstanding among group members about whether specific psychiatric symptoms may respond to the application of practices inherent in the 12-Steps or require specific professional treatment.

Although surveys assessing attitudes of existing 12-Step members have found generally positive sentiments

towards issues associated with psychiatric comorbidity among fellow members (e.g. Meissen *et al.* 1999), surveys of comorbid individuals themselves, in relation to traditional 12-Step groups, have evinced mainly negative attitudes and experiences (Noordsy *et al.* 1996; Bogenschutz & Akin 2000; but see Pristach & Smith 1999). Although further study is needed, these surveys suggest comorbid 12-Step meeting participants may perceive additional barriers and be more sensitive to certain issues, of which the non-comorbid majority is unaware.

Although it may be conceptually useful to categorize all individuals with a comorbid psychiatric illness in the same class, the impact of psychiatric comorbidity on self-help involvement and substance use outcomes may depend on the particular comorbid diagnosis. For example, Ouimette *et al.* (2001) assessed the impact of comorbid post-traumatic stress disorder (PTSD) among SUD patients on 12-Step self-help participation and found that comorbid SUD-PTSD patients participated in, and benefited from, 12-Step participation as much as SUD-only patients. In contrast, a study by Noordsy *et al.* (1996) on out-patients suffering from psychotic spectrum disorders and substance dependence did not find evidence for beneficial effects of 12-Step group involvement at 4 years' follow-up, although the sample size was small ($n = 18$). A larger prospective Icelandic study ($n = 351$) found similar rates of attendance at AA for all comorbid diagnoses except schizophrenia (Tomasson & Vaglum 1998). A further study by Bogenschutz *et al.* (2000) found that severely mentally ill patients with comorbid SUDs attended self-help groups at rates comparable to the general addiction treatment population, but reported difficulties at meetings regarding their comorbid status.

In spite of some of the highest rates of any psychiatric SUD comorbidity, major depressive disorder (MDD) has not received any focused attention with regard to self-help involvement and its effects. Data from the National Comorbidity Study (NCS; Kessler *et al.* 1996) revealed that, among those diagnosed with a (DSM-III-R) substance use disorder, there was a 12-month prevalence rate of almost 23% for major depression, whereas for those diagnosed with current major depression, just over 18% were also diagnosed with a current substance use disorder. Furthermore, certain features associated with major depression (e.g. poor eye contact, flat unresponsive affect, slowed speech) may make it more difficult for such patients to engage socially with other fellowship members, and for other fellowship members to engage socially with them. For clinicians working with patients who have SUDs, knowledge of any differential effects for self-help involvement, based on diagnostic subgroupings, could help them provide more precise and efficiently targeted interventions intended to facilitate 12-Step, or other self-help group, utilization.

To this end, the primary aim of the current study was to assess whether substance abuse patients with a comorbid diagnosis of major depression differed from substance abuse patients without a comorbid diagnosis in regard to 12-Step involvement and substance use outcome during the 2 years following in-patient treatment. Further, the study tested whether relations between 12-Step self-help involvement and substance use outcomes differed between the two cohorts. It was predicted that, compared to the non-comorbid group, the comorbid cohort would have poorer substance-related and psychiatric outcomes and be less involved in and derive less benefit from 12-Step self-help involvement.

METHOD

Participants

The present sample is derived from an original cohort of 3698 substance-dependent male veterans who were seeking SUD treatment at one of 15 VA in-patient units (Ouimette, Finney & Moos 1997; Moos *et al.* 1999). The in-patient treatment was designed to last between 21 and 28 days, used individual and group therapy to assist patients in meeting their treatment goals and was multi-disciplinary in staffing. Continuing aftercare and self-help involvement was encouraged. Rates of psychiatric comorbidity were assessed using the discharge diagnoses to help ensure that diagnoses were not confounded by acute symptoms related to substance use (Brown *et al.* 1995). It was found that of the 3698 patients, 142 had a comorbid MDD diagnosis (SUD-MDD), 511 had a different psychiatric disorder and 3045 had no documented comorbid diagnosis (SUD-only), leaving an eligible cohort of 3187 patients for this study. Of these, 79 patients died during the first-year follow-up phase and 94 patients died during the second-year follow-up phase. Of the remainder ($n = 3014$), 2161 (72%) completed follow-up questionnaires at both points (SUD-MDD = 110; SUD-only = 2051). No statistically significant baseline differences were found between participants who did ($n = 2161$) or did not ($n = 853$) provide follow-up data in terms of age, education, marital status, substance abuse problems, psychiatric symptoms or 12-Step group involvement.

For the current sample, summary baseline clinical and demographic information for the two groups was examined; χ^2 tests revealed no differences between the two cohorts with regard to education or employment. However, the SUD-MDD cohort was significantly older and contained significantly more Caucasians (67%) and fewer African Americans. Comparative analyses of clinical variables revealed that the SUD-MDD cohort was less

likely to be dependent on drugs other than alcohol and, as expected, reported significantly more psychiatric symptoms at baseline than their non-comorbid counterparts (all P s < 0.01). Of the SUD patients diagnosed with MDD, seven (6.4%) had PTSD, four (3.6%) had another anxiety disorder (e.g. obsessive-compulsive, social/simple phobia, agoraphobia) and three (2.7%) had a psychotic disorder. The average length of in-patient stay for both diagnostic subgroups was 23 days.

Procedure

Patients in 15 VA residential treatment programs were asked to participate in this VA-approved evaluation after they had completed medical detoxification and were admitted to the treatment program. After obtaining informed consent research staff, independent of the treatment program, asked participants to complete an inventory at baseline, and again at 1 year and 2 years after discharge. Most patients completed the follow-up forms as a self-administered survey that was returned through the mail (92%), with the remainder completing either by telephone or in person. More detailed descriptions of procedures can be found elsewhere (Ouimette *et al.* 1997).

Measures

Diagnoses and symptoms

Diagnoses All diagnoses were based on the International Classification of Diseases–9th revision (ICD-9-CM). Diagnoses used were discharge diagnoses, made by doctoral-level staff approximately 4 weeks following detoxification. Discharge diagnoses were used in order to ensure that diagnoses were not confounded by acute symptoms related to substance use; an abstinence period of at least 3 weeks has been shown to be necessary in order to differentiate patients with primary vs. residual, substance-use-related depression (Brown *et al.* 1995). Participants were coded '1' if they had a diagnosis of major depressive disorder and '0' if they had no comorbid psychiatric diagnosis.

Symptoms Depression symptoms were measured using a six-item depression scale taken from the Brief Symptom Inventory (BSI; Derogatis & Melisaratos 1983). Each item was rated on a five-point Likert scale (0 = not at all to 4 = extremely). Clinically significant depression was determined by a standardized t score of 70 or more (i.e. greater than or equal to 2 standard deviations above the mean) based on general population norms. Participants were coded as '1' if they were significantly depressed at the time of follow-up and '0' if they were not significantly depressed at the time of follow-up.

Substance use

Substance use Frequency of alcohol and other drug use in the past 3 months was reported by participants for each substance using five response options (0 = never, 1 = less than once a week, 2 = 1–3 days a week, 3 = 4–6 days a week, 4 = every day). Frequency of alcohol consumption over the past 3 months was assessed using items from the Health and Daily Living Form (HDL; Moos, Cronkite & Finney 1990). The drug use items were taken from the Drug Abuse Treatment Outcome Study (DATOS) inventory (Hubbard *et al.* 1989). Separate scores for each substance (e.g. cocaine, methamphetamines, amphetamine, heroin, other opiates, tranquilizers, inhalants) and each method of administration (e.g. smoked, injected, ingested) were summed to derive a composite score.

Abstinence Participants who reported no alcohol or other drug use in the last 3 months were considered abstinent. Participants were coded as '1' if they were abstinent at the time of follow-up and '0' if they were not abstinent at the time of follow-up. A subset of participants received an alcohol and/or drug test (e.g. urine, blood or breath sample) during non-random patient visits to VA facilities in the first year of treatment (e.g. medical appointments). Self-reports of abstinence were found to be highly concordant with urinalysis results. Specifically, 230 men were identified who had received an alcohol/drug test in the same 3-month period as their self-report follow-up data (we included drug test data collected 1 week after the date of the self-report). Patient reports of abstinence from alcohol and other drugs were significantly associated with a negative alcohol or drug test ($P < 0.001$). In the 78 men tested for alcohol use, 95% of those reporting abstinence (35 of 37) had a negative test for alcohol. In the 230 men with drug test data (including opiates, cocaine, amphetamines, sedative-tranquilizers and marijuana), 86% (144 of 167) reporting abstinence from drug use had a negative test. Agreement rates for respondents reporting no use of individual drugs ranged from 93% for tranquilizers to 100% for amphetamines.

Consequences from use Participants also completed the Problems From Substance Use scale (Ouimette *et al.* 1999a). This scale was developed to assess the negative consequences of alcohol and drug use, including such domains as health, legal, monetary, occupational, intra- and interpersonal and residential problems. The 18 items were coded on a five-point scale ranging from 0 (never) to 4 (often). The internal consistency (Cronbach's alpha) for the current sample at intake was very high ($\alpha = 0.88$). For the current analysis, participants' scores were dichotomized into groups ('0' = no consequences and '1' = 1 or more consequences).

Remission Consistent with previous research (Ouimette *et al.* 1999b), 'remission' reflects abstinence from illicit drug use and either abstinence from, or non-problem use of, alcohol. In order to be categorized as remitted (coded '1') a patient must have (a) abstained from all 13 drugs investigated, (b) had no problems related to drug or alcohol abuse and (c) consumed 3 ounces or less of alcohol per day on maximum drinking days in the past 3 months. Freedom from problems related to substance use was reflected by a response of 'never' to all items from the Problems From Substance Use scale (Ouimette *et al.* 1999b). Participants were coded '0' if they were not remitted at the time of follow-up. Our rationale for including non-problem drinkers in the remitted category was twofold. First, some patient did not have alcohol use disorders before treatment and may have continued to drink moderately without problems after treatment. Secondly, some patients with alcohol use disorders may have resumed drinking at a moderate level without problems or negative consequences (Miller 1983).

12-Step group involvement

Twelve-step group participation can be conceptualized as a multi-dimensional construct (Mankowski *et al.* 2001). Thus, our measure of participation included assessment of five separate indices. The first item asked about the frequency of 12-Step meetings attended in the previous 3 months (on a 0–4 scale, ranging from 'none' to '30 or more meetings'). The second item assessed whether the participant had tried to incorporate each step into his daily life in the past year. Additional items measured how often a participant reads books and/or pamphlets distributed by 12-Step organizations (on a 0–4 scale ranging from 'never' to 'several times a week') and how often participants talked with a sponsor (on a 0–4 scale ranging from 'never' to 'several times a week'). Finally, we asked about the number of friends from 12-Step groups (on a 0–4 scale ranging from 'none' to 'four or more') a participant had. These items were used singularly and as a composite score derived by summing the total of all five items (total scores could range from 0 to 20). Cronbach's alpha was 0.82 and 0.85 for this sample's 1- and 2-year follow-up data, respectively.

RESULTS

Relation between diagnostic group and 12-Step involvement

The relation between diagnostic classification and 12-Step self-help group attendance and involvement during the 2-year follow-up period can be seen in Table 1. χ^2 and

Table 1 Diagnostic group by 12-Step variables.

Time-point	12-Step variable	Diagnosis: M (SD) or %		P
		SUD-only (n = 2051)	SUD-MDD (n = 110)	
12 months	Frequency of 12-Step attendance	1.33 (1.50)	1.12 (1.46)	0.15
	Steps worked (1–12)	6.28 (4.37)	5.80 (4.37)	0.26
	Reads 12-Step literature	1.47 (1.56)	1.17 (1.52)	0.05
	Has sponsor	28%	20%	0.04
	Contacts sponsor	0.84 (1.47)	0.60 (1.32)	0.09
	Number of 12-Step friends	1.61 (1.69)	1.22 (1.55)	0.01
	Contacts 12-Step friends	1.62 (1.69)	1.29 (1.65)	0.04
24 months	12-Step composite (standardized)	0.04 (3.82)	−0.81 (3.68)	0.02
	Frequency of 12-Step attendance	1.19 (1.46)	1.14 (1.52)	0.70
	Steps worked (1–12)	6.23 (4.56)	5.94 (4.66)	0.52
	Reads 12-Step literature	1.34 (1.53)	1.24 (1.59)	0.44
	Has sponsor	27%	25%	0.52
	Sponsor contact	0.82 (1.46)	0.73 (1.35)	0.49
	Number 12-Step friends	1.57 (1.69)	1.34 (1.61)	0.15
	Contacts 12-Step friends	1.56 (1.68)	1.37 (1.65)	0.26
	12-Step composite (standardized)	0.02 (3.93)	−0.35 (3.95)	0.35

Number of AA meetings attended ranges from 0 to 4 with 0 = never, 1 = 1–9, 2 = 10–19, 3 = 20–29, 4 = 30 or more. Frequency of reading AA materials and talking with sponsor ranges from 0 = 'never' to 4 = 'several times a week'. The number of AA friends ranges from 0 = 'none' to 4 = '4 or more'.

one-way analysis of variance (ANOVA) tests revealed no significant differences between the non-comorbid (SUD-only) and major depression groups (SUD-MDD) at treatment intake ($P_s > 0.11$). However, as shown in Table 1., at 1 year following treatment, the SUD-MDD group was significantly less likely than the SUD-only group to have a 12-Step sponsor (20.0% vs. 28.4%, $P = 0.04$) and reported a smaller number of friends in 12-Step fellowships ($M = 1.22$ vs. $M = 1.61$, $P = 0.01$). A further significant trend was observed with the SUD-MDD group reporting less frequent reading of 12-Step literature ($M = 1.17$ vs. $M = 1.47$, $P = 0.05$, respectively). There were no significant group differences observed at 2 years following treatment ($P_s > 0.15$).

In a subsidiary analysis we found that, compared to SUD-MDD patients (66.4%), slightly more SUD-only patients (75.0%) were referred by their clinician to self-help groups ($\chi^2 = 4.12$, $P < 0.04$). Furthermore, there was a small but significant relationship detected for referral status; those who were referred reported more 12-Step friends at 1 year (Spearman's $r = 0.12$, $P < 0.001$). However, there was no relationship detected between referral status and sponsorship ($\chi^2 = 3.64$, $P = 0.06$). We wondered whether clinician referral might account for the differences observed at 1 year in 12-Step friends. Mediation analyses (Baron & Kenny 1986), using a hierarchical linear regression model, did not support this

hypothesis; the effect of diagnosis remained significant despite the entry of clinician referral on the second step.

Relation between diagnostic group and substance use outcomes

In order to examine whether diagnostic group classification was associated with post-treatment outcomes a separate logistic regression model was tested for each response variable. A set of covariates was selected based upon their relationship with substance use outcomes (see Ouimette *et al.* 1997; Ritsher & Finney 2002). This set consisted of age, education, ethnicity, marital status, inpatient treatment in the 2 years prior to intake, motivational readiness to change substance use behavior and the respective intake level of each response variable. In addition, because previous research had found that the theoretical orientation of the treatment program from which patients originally came (i.e. 12-Step, mixed/eclectic, cognitive-behavioral) influenced 12-Step involvement and substance use outcomes (Ouimette *et al.* 1997; Humphreys *et al.* 1999), program type was held constant in order to examine unique effects attributable to the presence of MDD. The outcomes were dichotomized for two reasons: (1) non-normality in outcome score distributions, which did not respond adequately to recommended transformation procedures (Tabachnick & Fidell

	SUD-only (n = 2051)	SUD-MDD (n = 110)	χ^2 (for step)	P
Abstinent (1 year)	40.8	47.3	1.16	0.28
Abstinent (2 years)	43.8	41.5	0.20	0.65
Remitted (1 year)	25.5	24.9	0.01	0.92
Remitted (2 years)	29.4	28.2	0.02	0.90
No consequences (1 year)	28.3	29.1	0.50	0.48
No consequences (2 years)	31.7	33.3	1.10	0.29
Significant depression (1 year)	46.7	71.8	9.96	0.002
Significant depression (2 years)	44.7	67.3	8.07	0.004

*Adjusted for eight covariates: age, education, marital status, ethnicity, prior SUD treatment; motivation; treatment program type, intake level of dependent variable.

1996); and (2) clinical utility and ease of interpretation of odds ratios resulting from a maximum likelihood estimation approach. A Bonferroni adjustment was made for tests on the four outcome variables and, thus, the permissible type I error rate was set to $\alpha = 0.0125$ (0.05/4) per model.

For each logistic regression model, the entire set of eight covariates was entered first, followed by the diagnostic grouping variable. No significant group differences were observed at either time-point with regard to abstinence ($P_s > 0.29$), SUD remission status ($P > 0.92$) or substance-related consequences ($P_s > 0.29$). However, regarding significant depression symptoms, the addition of the diagnostic variable contributed significantly to the model fit at 1 year ($\chi^2 = 9.96$, $p = 0.002$); for the SUD-MDD cohort, the odds of having significant depression were almost twice that of the SUD-only cohort (OR = 1.98, $P = 0.002$, 95% CI = 1.27–3.08) controlling for the other variables in the model. A similar finding was observed at 2 years post-treatment ($\chi^2 = 8.07$, $P = 0.004$; OR = 1.82, $P = 0.005$, 95% CI = 1.19–2.76). Treatment outcomes by diagnostic group and covariate-adjusted significance tests are presented in Table 2.

Thus, despite less self-help involvement and significantly greater depression, the SUD-MDD cohort fared as well as their SUD-only counterparts on substance use outcomes. In a subsidiary analysis, to investigate whether these unexpectedly similar outcomes might be explained by more professional out-patient SUD and mental health treatment visits for the SUD-MDD group, the two groups were compared on these indices obtained from the nation-wide VA Patient Treatment File. Regarding SUD visits, the SUD-MDD group were not found to differ significantly from the SUD-only group during the first or second follow-up year ($P_s > 0.06$). However, the SUD-MDD group had almost two-and-a-half times as many mental health visits during both the first ($M = 1.27$, $SD = 1.37$ vs. $M = 0.56$, $SD = 0.98$, $P < 0.0001$) and second year ($M = 1.02$, $SD = 1.29$ vs. $M = 0.42$, $SD = 0.93$,

Table 2 Percentages and covariate-adjusted significance tests* of dependent variables at 1 and 2 years follow-up by diagnostic cohort

respectively, $P < 0.0001$) of follow-up, compared to the SUD-only group. In turn, these indices contributed significantly to logistic regression models of abstinence and remission outcomes at both time-points controlling for the set of covariates listed above ($P_s < 0.02$). Thus, greater professional treatment involvement might have helped offset potentially worse outcomes for the SUD-MDD group.

Does the presence of MDD influence the relationship between 12-Step involvement and substance use and depression outcomes?

To examine the relation between 12-Step involvement and substance use outcomes by diagnostic cohort, the 12-Step variables were standardized and summed to produce a 12-Step composite score for each participant. To test whether the relationship of 12-Step involvement with substance use outcomes differed by diagnostic group, logistic regression models with interaction terms were examined for each of the four outcome variables. As above, the set of eight covariates was entered first, followed by the 12-Step involvement variable, diagnostic group and, in the final step, the 12-Step involvement \times diagnostic group interaction term. Once again, a Bonferroni adjustment was made such that the family-wise type I error rate remained = 0.05, creating a type I error rate of 0.0125 (i.e. 05/4) for each model tested.

The relationship between 12-Step involvement and abstinence was not found to differ significantly across diagnostic groups at 1 year using the Bonferroni-protected level ($\chi^2 = 4.54$, $P = 0.03$, OR = 0.87, $P = 0.03$, 95% CI = 0.78–0.98), but was found to differ significantly at the 2 years' follow-up ($\chi^2 = 19.93$, $P < 0.0001$; OR = 0.78, $P < 0.0001$, 95% CI = 0.71–0.87). The observed disordinal interaction effect, illustrated in Fig. 1, shows that the probability of abstinence for the SUD-MDD cohort remained almost constant, at around

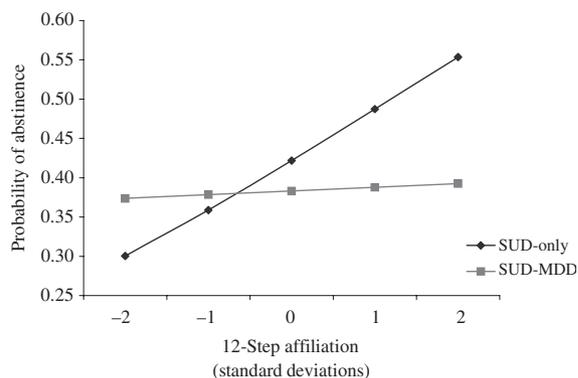


Figure 1 Diagnostic group \times 12-Step involvement in relation to abstinence at 2 years post-treatment

0.38, regardless of the level of 12-Step involvement. In contrast, the likelihood of abstinence for the SUD-only cohort increased substantially as the level of 12-Step involvement increased, rising to 0.49 and 0.55 for an individual who is one and two standard deviations above the mean on 12-Step involvement, respectively.

Similarly, the 12-step involvement–diagnosis interaction was not found to contribute significantly to the remission model fit at 1 year ($\chi^2 = 0.33$, $P = 0.57$), but did make a significant contribution at 2 years' post-treatment ($\chi^2 = 6.43$, $P = 0.01$; OR = 0.87, $P = 0.01$, 95% CI = 0.78–0.97). As shown in Fig. 2, the probability of remission for the SUD-MDD cohort remained almost constant, at around 0.36, regardless of the level of 12-Step involvement, while the likelihood of remission for the SUD-only cohort increased as the level of 12-Step involvement increased, rising to 0.39 and 0.42 for individuals one and two standard deviations above the mean on 12-Step involvement, respectively. There were no significant interactions detected at either the 1- or 2-year follow-up time-point on substance-related consequences ($P > 0.05$) or significant depression symptoms ($P > 0.63$).

Given that the relationship of 12-Step involvement to abstinence and remission status were found to differ between the diagnostic groups at the 2-year follow-up, a set of further tests were conducted to determine which of the 12-Step involvement components might account for the interactions. The same covariates were used, as was a Bonferroni adjustment for the interaction tests of the five 12-Step variables [$\alpha = 0.01$ (0.05/5)].

At the 2-year follow-up, the groups did not differ significantly in the effect of 12-Step meeting attendance on abstinence at the Bonferroni-protected level ($\chi^2 = 5.42$, $P = 0.02$; OR = 0.62, $P = 0.02$, 95% CI = 0.41–0.92). However, although more frequent 12-Step attendance was associated with a higher likelihood of being abstinent for both groups, the relationship was weaker for the comorbid SUD-MDD group. Furthermore, the relation-

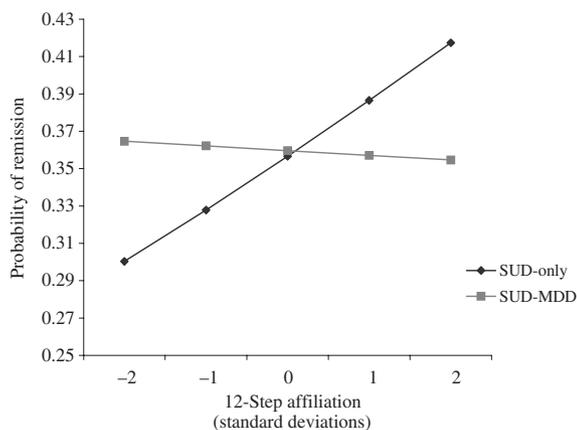


Figure 2 Diagnostic group \times 12-Step involvement in relation to remission status at 2 years post-treatment

ship between abstinence and sponsor contact ($\chi^2 = 9.18$, $P = 0.002$; OR = 0.51, $P = 0.002$, 95% CI = 0.33–0.78), number of 12-Step friends ($\chi^2 = 10.48$, $P = 0.001$; OR = 0.49, $P = 0.001$, 95% CI = 0.32–0.75), reading program literature ($\chi^2 = 15.54$, $P < 0.0001$; OR = 0.44, $P < 0.0001$, 95% CI = 0.30–0.66) and working the 12-Steps ($\chi^2 = 16.99$, $P < 0.0001$; OR = 0.42, $P < 0.0001$, 95% CI = 0.28–0.64) were all stronger for the SUD-only group than for the SUD-MDD cohort, such that linear increases in each of these 12-Step behaviors significantly increased the odds of abstinence for the SUD-only group but not for the SUD-MDD group. Thus, although the SUD participants with MDD appear to benefit modestly from going to 12-Step meetings, they do not appear to benefit as much from engaging in other 12-Step behaviors.

With regard to participants' remission status at the 2-year follow-up, the only significant interaction that emerged from the analyses at the Bonferroni-protected significance level was for the degree to which participants had worked the 12-Step steps in their daily lives ($\chi^2 = 6.82$, $P = 0.009$; OR = 0.56, $P = 0.009$, 95% CI = 0.36–0.87); for the SUD-only group, working the steps significantly increased the odds of remission, but this was less true of the SUD-MDD group.

DISCUSSION

This study examined whether the presence of MDD, among patients treated for a SUD, influenced 12-Step self-help involvement and its relation to substance use and depression at 1 and 2 years following discharge from in-patient care. Although the presence of MDD was not associated with worse substance use outcomes, it was associated with continued high levels of depression. Furthermore, the presence of MDD was associated with

differences in certain aspects of 12-Step involvement and significantly influenced the effect of 12-Step involvement on substance-related outcomes.

As predicted, patients with comorbid MDD were found to affiliate significantly less with 12-Step organizations, but only in certain social aspects and only at the 1-year follow-up. It may be that the depressed cohort needs more time to adjust to and become involved in 12-Step groups. At 1 year, compared to the SUD-only group, those in the SUD-MDD group were less likely to have a sponsor, had fewer 12-Step friends and reported less frequent contact with the 12-Step friends they did have. Whereas clinicians were less likely to refer SUD-MDD patients to self-help groups, the lower referral rates for SUD-MDD patients did not explain the observed differences in social involvement. It is possible that the SUD-MDD member's comorbid status may increase feelings of being different from the majority of 12-Step members, making it more difficult to make friends with them. Furthermore, communication difficulties and anxiety related to their depression may make it more difficult for some SUD-MDD patients to acquire and interact with a sponsor. Additionally, other (non-depressed) members may misinterpret objective manifestations of MDD (e.g. poor eye contact, flat affect, psychomotor retardation) as signifying a reluctance to engage socially, leading to avoidance of such individuals.

A study by Humphreys *et al.* (1999) found evidence that the effect of 12-Step involvement on outcome was mediated partially by the members' 12-Step friendship network. Consequently, potentially important benefits, derived from social engagement in these fellowships, may be diminished by the absence of such relationships. Noordsy *et al.* (1996) found that, independent of diagnosis, better social ability was associated with more frequent use of self-help programs. Combined, these findings suggest that verbal and non-verbal social abilities may mediate the relationship between diagnosis and social involvement in 12-Step groups. If further study shows this is the case, interventions designed to increase 12-Step participation may want to focus more intently on social skills training with SUD-MDD patients.

Contrary to predictions, and in spite of less 12-Step involvement, SUD-MDD patients did not differ significantly from SUD-only patients in terms of their substance use outcomes. This may reflect the fact that SUD-MDD patients rely more heavily on professional services designed to target symptoms of each disorder. This finding is consistent with a study by Tomasson & Vaglum (1998), which found higher rates of professional help-seeking among psychiatrically comorbid SUD patients compared to non-comorbid patients. Thus, SUD-MDD patients may need more professional services to achieve comparable substance use outcomes while SUD-only

patients benefit just as much from non-professional 12-Step self-help involvement. Despite more professional therapeutic involvement, however, SUD-MDD patients continued to suffer from significant levels of depression. These findings suggest the need for greater allocation of professional services to target depression specifically in SUD-MDD patients.

As predicted, SUD patients with MDD derived less benefit from 12-Step self-help groups than did SUD-only patients, despite similar levels of involvement at 2 years postdischarge. A similar trend was observed at 1 year postdischarge in relation to abstinence, although it was not significant at the Bonferroni protected level (observed $P=0.03$). The disordinal interaction detected at 2 years revealed that at very low levels of involvement, SUD-MDD patients may actually have superior substance use outcomes compared to SUD-only patients. However, this advantage diminishes as 12-Step involvement increases with the SUD-only patients catching up and surpassing SUD-MDD patients in derived benefits from 12-Step involvement as they relate to substance use outcomes. This finding also highlights the importance of attendance at self-help groups for SUD-only patients. Further interaction tests, examining separate components of 12-Step involvement, revealed that SUD-MDD patients did not appear to benefit as much from any aspects of 12-Step organizations measured herein, with the exception of meeting attendance. However, although more frequent 12-Step attendance was associated with a higher likelihood of being abstinent for both groups, the relationship was again weak for the comorbid SUD-MDD group.

A number of factors limit the generalizability of the current findings. First, clinician diagnoses were obtained from medical charts and not based on structured/semi-structured interviews. Previous research has shown that this method of obtaining diagnoses may result in underestimation of true diagnoses (Helzer *et al.* 1978; Clark *et al.* 1995). Compared to some other estimates of MDD among SUD patients, those reported in this study may seem lower. However, differences in prevalence of comorbidity can vary widely depending on many factors. One such factor relates to when MDD diagnoses are rendered with regard to last substance use. Certain psychiatric symptoms, for example, may appear only as a consequence of such use and subsequently fade with abstinence. Mood disorders, especially depressive symptoms, are particularly susceptible to this biobehavioral phenomenon. Thus, depending on when, and how accurately, such diagnoses are made, prevalence estimates will vary (e.g. Brown *et al.* 1995). In this study, discharge diagnoses were used. These were rendered by doctoral-level clinical staff at 15 separate SUD treatment program sites around the United States, following several weeks of close patient observation in residential treatment environments dur-

ing which time patients were abstinent. Given that the average length of stay was 23 days, they are unlikely to be confounded by residual effects of recent use (Brown *et al.* 1995). Furthermore, these clinical diagnoses are representative of diagnoses given in real-world residential SUD treatment settings and, thus, have high ecological validity and generalizability to settings where diagnoses are so derived. Alternatively, the lower rates observed here could also have been due, in part, to some depressed patients with a comorbid SUD being triaged to another type of health-care service such as a mental health or dual-diagnosis clinic and, thus, would not have presented at these programs. Rates of psychiatric comorbidity among patients with SUDs can also vary greatly depending on the time frame used to classify such prevalence (e.g. current, past year, life-time), severity/chronicity (e.g. major depressive episode vs. major depressive disorder), assessment method (self-report, structured/semistructured interview), type of instrument [e.g. Structured Clinical Interview for DSM-IV Axis I Disorders (SCID), Diagnostic Interview Schedule (DIS), Composite International Diagnostic Interview (CIDI), Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA)], level of expertise (e.g. BA-level research assistant vs. psychologist) and population studied (e.g. general, criminal, clinical). Thus, the lower rates of MDD among this SUD could also be due to such methodological variations.

A further limitation of this study is the use of an all-male, VA sample. Thus, caution should be exercised in extrapolating findings to women and individuals treated in other public and private settings. In addition, although self-report has largely been found to be a valid method of assessment in SUD treatment outcome research, the self-reported quantity/frequency of substance use may be underestimated (Babor *et al.* 2000). Also, substance use outcomes measured herein represent 3-month point-prevalence of use at 12 and 24 months postdischarge; we do not know the status of these indices in the intervening time-periods.

In summary, the results indicate that SUD patients also diagnosed with MDD at the time of substance use disorder treatment discharge do not become as socially involved in, and do not derive as much benefit from, 12-Step self-help involvement as do patients without a comorbid psychiatric diagnosis. However, perhaps through greater utilization of professional treatment resources, substance use outcomes for these patients are comparable to those for patients without psychiatric comorbidity. Nevertheless, these patients continue to suffer from significant levels of depression, indicating that more resources are needed to treat their depression.

Although not assessed here, previous research findings that dual-diagnosis patients report negative experiences and attitudes toward traditional self-help groups

(Noordsy *et al.* 1996; Bogenschutz *et al.* 2000) imply that SUD-MDD patients may not assimilate as readily into traditional self-help groups such as AA/NA/CA as non-comorbid patients. To the degree that it is these subjective experiential factors, and not social avoidance, that accounts for the observed lower social involvement, newer, dual-diagnosis-specific, self-help groups (e.g. Double Trouble in Recovery: <http://www.doubletroubleinrecovery.com> and Dual Recovery Anonymous: <http://www.draonline.org>) may be a better fit for these patients (e.g. Vogel *et al.* 1998). However, more research is needed.

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