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Social Support Mediates the Effects of Dual-Focus Mutual Aid Groups on Abstinence from Substance Use

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Abstract

Background—Specialized 12-step based groups have emerged to address the needs of persons recovering from both substance abuse and psychiatric illness.

Objective—This study investigates the role of social support in mediating the association between mutual aid participation and subsequent substance use for dually-diagnosed persons.

Method—A cohort of Double Trouble in Recovery (DTR) members in New York City were studied prospectively over a two-year period.

Findings—Longer DTR participation during the first year of the study was associated with lower substance use in the second year; that effect was partially explained by the maintenance of high level of social support.

Conclusion—These findings speak to the enduring influence of 12-step attendance on reducing substance use, and underline the importance of both 12-step attendance and supportive networks for dually-diagnosed persons.

Keywords

12-step; social support; recovery; dual-diagnosis; substance use

Introduction

Substance use is a relapse-prone disorder, and for many individuals, recovery from substance use requires ongoing support. Twelve-step groups such as Alcoholics and Narcotics Anonymous are the most well-known, widely available and utilized source of recovery support in the US (e.g., Weisner, Greenfield and Room, 1995). Participation in 12-step groups, both during and after formal addiction treatment, has been associated with greater likelihood of abstinence (Fiorentine & Hillhouse, 2000a; Humphreys, Huebsch, Finney and Moos, 1999; McCrady & Miller, 1993; Moos, Finney, Ouimette and Suchinsky, 1999; Project MATCH Research Group, 1997; Timko, Moos, Finney and Lesar, 2000).

The growing popularity of 12-step groups has led clinicians and researchers to seek elucidation of why 12-step participation is beneficial to its members. This large body of work spanning

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several decades has yielded valuable insights (e.g., Denzin, 1987; Kurtz, 1982; Rudy, 1986). In 1995, Finney noted the importance of examining and specifying mediational processes in studies of substance abuse to help understand how important health outcomes may be generated. A number of other researchers have noted the need for quantitative research using enhanced statistical techniques and prospective designs to investigate processes underlying the effects of 12-step group affiliation on substance use outcome (e.g. Allen, 2000; Fiorentine, 1999; Humphreys, Mankowski, Moos and Finney, 1999; Kaskutas, Bond and Humphreys, 2002; Kassel & Wagner, 1993; Morgenstern & McCrady, 1993; Snow et al., 1994). In the last few years, several such process studies have been conducted (e.g. Fiorentine & Hillhouse, 2000b; Humphreys et al., 1999; Kaskutas et al., 2002; Kelly, Myers and Brown, 2000; Morgenstern, Labouvie, McCray, Kahler and Frey, 1997; also see later discussion).

Providing support to recovering peers is one of the hallmarks of 12-step fellowships. Social support is a critical element of what Grandfield and Cloud (1999) term 'recovery capital' and has been identified as key to the recovery process. Recovering persons consistently report that being around non-using peers is important to their recovery (Margolis, Kilpatrick and Mooney, 2000; Nealon-Woods, Ferrari and Jason, 1995; Richter, brown and Mott, 1991; Trumbetta, Mueser, Quimby, Bebout and Teague, 1999). Friends' support for abstinence predicts abstinence (e.g., Humphreys and Noke, 1997; Humphreys, Mankowski, Moos, and Finney, 1999) and friends' support for substance use is a negative predictor of abstinence (e.g., Havassy, Hall and Wasserman, 1991; Longabaugh, Wirtz and Zweben, 1998; Project MATCH Research Group, 1997). Although the need for support is high for recovering persons, friendship networks may erode, especially early in recovery, as the person ceases drug use and has not yet established a drug-free network (e.g., Ribisl, 1997). Exposure to and affiliation with other abstinent 12-step members can teach new members the skills necessary to relate to drug-free and non-addicted persons, increasing the likelihood that newcomers will develop abstinence-supportive friendships both within and outside of 12-step groups (e.g., Humphreys & Noke, 1997). A number of process studies have examined the dynamic relationship between 12-step participation and social networks as it relates to abstinence outcomes. Humphreys and Noke (1997) reported that new group members frequently replaced substance-abusing friends with friends involved in 12-step groups and concluded that 12-step group affiliation may minimize or eliminate the erosion of friendship networks that often attends the cessation of substance use. Building on that study, Humphreys subsequently reported that friends' support for abstinence partially mediated the relationship between 12-step group affiliation and abstinence (Humphreys, Mankowski et al., 1999). Project MATCH reported that Twelve Step Facilitation (TSF) appeared to "inoculate" against social networks with high numbers of frequent drinkers; that relationship was partially explained by higher 12-step involvement among the TSF participants (Longabaugh et al., 1998). More recently, Kaskutas, Bond and Humphreys (2002) reported that the association between 12-step involvement and subsequent alcohol consumption was partially mediated by network size and support for abstinence from people met in AA.

A large percentage of substance abusers have a comorbid psychiatric diagnosis (e.g., Kessler, 1995). Such dually-diagnosed persons suffer from two disorders that are both relapse-prone but also highly stigmatized by society; therefore, the need for support is likely to be especially critical in this population. The support many substance users find in 12-step groups may not be available to some dually-diagnosed persons. Although some studies have reported rates of 12-step participation among dually-diagnosed persons comparable to those of single disorder populations (e.g., Bogenschutz & Akin, 2000; Kurtz, Garvin, Hill, Pollio, McPherson and Powell, 1995; Pristach & Smith, 1999), others suggest that 12-step recovery groups are underutilized by dually-diagnosed persons (Minkoff and Drake, 1991; Noordsy, Schwab, Fox and Drake, 1996; Zalav, 1993; for discussion, see Laudet, Magura, Vogel and Knight, 2003).

Recognizing the importance of 12-step participation to recovery and the difficulties some dually-diagnosed persons may experience in becoming engaged in such groups, the American Psychiatric Association (1995) has recommended that substance users who take psychoactive medications be referred to support groups where pharmacotherapy is recognized and encouraged as useful, rather than possibly questioned or criticized. Alcoholics Anonymous holds such specialized meetings, and two 12-step based fellowships have emerged specifically to address dual-diagnosis recovery needs, Dual Recovery Anonymous (DRA – Dual Recovery Anonymous, 1993) and Double Trouble in Recovery¹ (DTR – Vogel, Knight, Laudet and Magura, 1998; also see later discussion). These organizations are designed to provide members with an opportunity to discuss both substance use and mental health issues, including the use of medications, in an accepting and psychologically safe forum. Dual-focus mutual aid groups have developed in the 1990's and remain under-studied.

The authors have been conducting a prospective investigation among members of dual-focus mutual aid recovery groups to assess the effectiveness of these groups and to determine the processes underlying their effects on substance use outcomes. In a previous study, we reported cross-sectional findings indicating that dually-diagnosed persons with higher levels of support and greater levels of participation in dual-focus recovery groups reported lower rates of substance use. Moreover, participation in mutual aid was indirectly associated with recovery, including lower rates of substance use, through perceived levels of support (Laudet, Magura, Vogel and Knight, 2000). In a second study, we found that participation in dual-focus groups was prospectively associated with lower rates of substance use in the following year (Magura, Laudet, Mahmood, Rosenblum, Vogel and Knight, 2003).

The current study builds on that previous work as well as on studies conducted among single disorder substance users investigating the role of social support as a mediator of 12-step participation effects on substance use. The present study seeks to extend existing findings in time and in scope. The process studies on support conducted previously among single disorder substance users have used a design where 12-step participation (the independent variable) and substance use (the outcome) were assessed concurrently. For example, Humphreys and Noke's (1997) findings were obtained at one-year post treatment, but substance use and 12-step participation were both assessed concurrently for the past 3 months. Kaskutas and colleagues (2002) measured participation in 12-step groups and alcohol problem severity (the dependent variable) over the same 12-month follow-up period. If participation in 12-step groups results in changes in social networks that have a positive influence on substance use behavior, as demonstrated empirically by Humphreys and colleagues, it raises the question of whether these effects may endure over time independently of ongoing 12-step participation. This is an important issue because there is evidence that attrition among 12-step members is relatively high (e.g., Kissin and Ginexi, 2000; Timko, Finney, Moos, Moos and Steinbaum, 1993). Alcoholics Anonymous (1990) has noted that results from successive triennial membership surveys consistently show 'a slow attrition of newcomers during the first year' and acknowledged this phenomenon as 'a challenge to AA' (for discussion, see McIntire, 2000). The present study investigates this question by assessing the effects of 12-step participation and social support in the first year of the study, on substance use behavior in the following year.

In addition to extending the scope of investigation in time, the present study broadens the investigative scope in two other areas. First, existing investigations of social support as a mediator of 12-step effects have been conducted primarily with samples of persons who were alcohol-dependent; the sample used in this study consists of individuals who were dependent on a broad array of illicit drugs in addition to alcohol. Second, this study seeks to determine

¹<http://draonline.org> and <http://www.doubletroubleinrecovery.org/>

whether the mediational role of social support in 12-step participation extends to specialized, 12-step based, dual-focus groups for persons with co-occurring substance use and psychiatric disorders. This is particularly important because, as noted earlier, the need for support is likely to be particularly high among dually-diagnosed persons, some of whom may not feel comfortable at traditional 12-step meetings such as Narcotics Anonymous.

The key question addressed by the present study is whether the beneficial effects of 12-step based, dual-focus group participation on subsequent substance use are mediated (explained) by social support. Based on prior studies described earlier, we hypothesized that (1) longer participation in dual-focus recovery groups during the first year of the study would be associated with lower rates of substance use in the second year; (2) higher levels of social support at one-year follow-up would be associated with lower rates of substance use in the subsequent year; and (3) the association between dual-focus group participation and substance use would be mediated by social support.

Method

Setting

Study participants were recruited from persons attending Double Trouble in Recovery (DTR) meetings throughout New York City. DTR is a mutual aid fellowship adapted from the 12-step program of recovery, specifically addressing recovery from psychiatric illness and substance use (Vogel et al., 1998). DTR was started in New York State in 1989 and currently has approximately 200 groups meeting in the U.S., with the most groups currently in New York, Georgia, Colorado, New Mexico and Florida. New DTR groups continue to be started, some initiated by dually-diagnosed persons, others by professionals who believe that mutual help fellowships are a useful complement to formal treatment. DTR is not affiliated with AA or with any other 12-Step fellowship. Groups meet in community-based organizations, psychosocial clubs, outpatient treatment programs for mental health, substance abuse and dual-diagnosis and in inpatient psychiatric hospital units and follow a format similar to that of traditional 12-step groups. All meetings are led by recovering individuals and follow the traditional format of 12-step fellowship meetings. At this writing, this relatively new fellowship is in the process of formalizing its own 12-Step dual-diagnosis recovery program including efforts to encourage sponsorship and step work among its members. DTR adapts the original 12-steps to dual-diagnosis in Step One (“We admitted we were powerless *over our mental disorders and substance abuse* and that lives had become unmanageable.”) and Step Twelve (“Having had a spiritual awakening as a result of these steps, we tried to carry this message to other *dually-diagnosed* people and to practice these principles in all our affairs.”).

Procedures

Prospective study participants were recruited at 24 DTR meetings (10–20 members each) held in community-based organizations and day treatment programs throughout New York City. The study employed as interviewers several trusted members of the DTR fellowship who received training in interview skills and were closely supervised in their research activities. Recruitment was conducted from January to December 1998. The interviewers went to meetings, explained the study, and invited all members to participate in the study, with the only requirement that they had to be attending DTR for at least one month. The study used a prospective naturalistic design consisting of three in-person interviews conducted at yearly interval. Participation was voluntary based on informed consent; the Institutional Review Board of the author’s organization, National Development and Research Institutes, Inc. (NDRI) approved the study. The interviews required about 2 hours; participants received \$35 at baseline and \$40 for each of the follow-up interviews.

Sample

A total 360 attendees were counted at the 24 DTR meetings during the recruiting period, 16 were ineligible due to less than one month of attendance, and 34 declined participation, either immediately or when they were subsequently contacted for an interview. The main reasons for declining to participate were a concern about confidentiality (especially for meeting held in treatment facilities), interview length, and scheduling conflicts among persons attending intensive day treatment programs..

Three hundred and ten DTR members were recruited, representing about 6 out of 7 DTR attendees (310/360). As stated earlier, the present analyses aim to investigate how participation in DTR contributes to reducing substance use; therefore, the analyses are conducted on the subset of study participants who reported substance use in the year before the baseline interview in order to strengthen the basis of causal inference about the effects of participation in DTR on substance use – participants who did not report substance use in the year preceding the baseline interview were excluded from the analyses. Prior process investigations of 12-step participation (reviewed earlier) have been conducted among persons in the early stages of recovery process- e.g., Kaskutas and colleagues (2002) restricted their sample to participants with past year substance use and Humphreys et al. (1999) used a VA treatment sample interviewed at intake. Therefore, using a sample of participants who are in the same early recovery phase (when support is especially critical and may be eroding as discussed earlier) will allow findings from this study to be compared to that of prior investigations.

One-hundred and forty-five participants reported substance use in the year before baseline; 4 died during the first year of study, bringing the 'recontactable' base to 141 participants; 126 of these 141 participants were recontacted at one-year follow-up and 99 at two-year follow-up. This represents a two-year recontact rate of 70% (99/141). These 99 individuals on whom we obtained complete baseline and follow-up data constitute the sample for this study. Reasons for no recontact at one-year follow-up were: unable to locate or contact (9), refused (3), residential treatment out of state (2), incarcerated (1). Some of the specific information about reasons for no recontact at the two-year follow-up was lost in the authors' World Trade Center offices (i.e., why were some participants not interviewed at two-year follow-up). Available information indicates that reasons for not obtaining two-year follow-up data on 42 participants were similar to those at the one-year follow-up, namely, inability to locate participants accounted for approximately 60% of the missing data (25 participants), refusal (20%-8 participants) and out state (20%). Participants who were and were not reinterviewed at follow-ups did not differ significantly at baseline in gender, education, psychiatric diagnosis, time since last substance use, or in length of DTR attendance at baseline; participants who were not followed-up were somewhat younger (by 3.5 years) than those who provided complete data ($t(143) = 2.39, p < .05$).

Study Measures

The interview was a semi-structured instrument. In addition to collecting sociodemographics and background information as described below (Description of sample), the study used the following measures:

DTR Attendance during the first year of the study—The study collected information on number of meetings attended and on frequency of attendance. Most DTR attenders ($n = 84, 85\%$) attended meetings once a week or more while they were attending, and only 15% ($n = 15$) attended less than weekly. Because attendance at a frequency of less than one meeting per week was relatively rare in this sample, number of months of attendance between these baseline and one-year follow-up (range = 0 – 12) was selected as the measure used in the analyses.

Social Support at baseline and at one-year follow-up—We used a 14-item scale developed for this study to assess support during the recovery process; scale development and psychometric properties are reported elsewhere (author citation). Each of the 14 social support items was rated on a 4-point Likert type response scale ranging from one to four: For six of the fourteen items, 1 = “Not At All Supportive” to 4 = “Very Supportive” (sample item: “To what extent are your friends encouraging you or supporting you in your recovery efforts?”). For the other eight items, 1 = “Strongly Disagree” to 4 = “Strongly Agree.” Example of items: “my friends and relatives don't bother with me” and “The people in my life go out of their way to show me support.” The score is the mean of the 14 items with higher scores reflecting greater levels of support (Alphas = .68 at baseline and .87 at one-year follow-up).

Substance use during second year of the study—At each interview, participants were asked about their use of each of 11 substances in the previous year (e.g., “alcohol,” “marijuana/grass,” “crack/rock”) following the format of the Addiction Severity Index (McLellan et al., 1992). In this paper, we measured substance use, the dependent variable, as the proportion of months during which participants reported any substance use during the second year on the study on the 2-year follow-up interview. An arcsine transformation was applied to this variable to correct for skewness (Cohen, 1988).

Housing Status: Supported Living at baseline and at one-year follow-up—Participants' residence status was included in the analyses for two reasons: First, living in supported housing compared with persons living independently is associated with greater likelihood of attending 12-step meetings among single disorder substance users (Mankowski, Humphreys and Moos, 2001). Second, we have reported that living in supported housing was a significant predictor of DTR retention at one-year follow-up (Laudet, Magura, Cleland, Vogel and Knight, 2003) and preliminary analysis indicates that residing in supported housing is also associated with lower substance use. Participants' housing status was included in the analyses using a dichotomous variable: Yes (=1) if living in an apartment program or in a community residence/group home, otherwise no (= 0).

Time since last used drugs or alcohol at baseline—This was used as a covariate in the analyses as described in the analytic plan. Number of months since last used drugs and alcohol, obtained from the date each of the 11 substances assessed for the study was last used.

Analysis Plan

The first step in the analyses was to describe the zero-order associations among social support, DTR attendance in the first year of the study and substance use in the second year. Zero-order correlations describe the relation between a single predictor and dependent variable when that single predictor is not required to compete with other predictors. Unique relations indicate whether a single variable can add to the prediction of the dependent variable when all other predictors have been controlled. Thus, a predictor with a significant zero-order relation will not necessarily be uniquely related to the dependent variable, particularly if the information it provides is redundant with that provided by other predictors. As a second step, change in social support over time was examined using repeated measures analyses of variance (Girden, 1992). This repeated measures analysis is equivalent to a paired samples *t*-test.

A path model, adapted from work by Humphreys and colleagues (1999) and Kaskutas and colleagues (2002) was specified (Figure 1). Following Kenny, Kashy, & Bolger (1998), our goal was to specify a model that is theoretically relevant but not so complex that its analysis cannot be supported by the available sample. The proposed path model is identified in principle because it is recursive, a sufficient condition for identification (Bollen, 1989). An autoregressive effect was specified for social support, with a direct effect from the baseline

assessment to the assessment at the one-year follow-up interview. A direct effect from DTR attendance to the one-year follow-up assessment of social support was specified. These direct effects imply that changes in social support may be related to DTR attendance. We interpret effects of other variables on follow-up support (e.g., DTR attendance) as effects on change in support, since the baseline assessment of support is consistently controlled. When an earlier assessment of a variable is controlled for in a regression or path analysis where a later assessment of that same variable is the dependent variable, it is common to interpret effects of other predictor variables present in the model on the later assessment as effects on residualized change (e.g., Finkel, 1995). Finally, direct effects from DTR attendance and social support assessed at the one-year follow-up to substance use between the one- and two-year follow-up interviews were specified.

Because the proposed path model is recursive (one-way causation) and includes no latent variables, path coefficients can be estimated using standard linear regression. Three separate regression analyses were conducted, one for each of the three variables that receive direct effects from other variables. After examining the direct effects in Figure 1, steps for testing mediation described in detail by Baron & Kenny (1986), Kenny, Kashy, & Bolger (1998) and by Holmbeck (1997) were followed to assess the extent to which DTR attendance effects are mediated by social support.

Following Morgenstern and colleagues (1997) and Kelly and colleagues (2000), we examined four sets of variables to control for the relationship between other factors and outcome: (a) demographics (age, gender, education, marital status, and ethnicity), (b) Time since last used at baseline, (c) treatment experience (number of substance abuse treatment episodes before baseline), and (d) living arrangement (supported housing vs. no supported housing at baseline and one year follow-up). To limit the number of predictors entering the equation, we examined correlations between outcome and potential control variables first. None of the demographic variables were significantly correlated with outcome (all $ps > .20$). The four variables in the other three sets—supported housing at baseline, supported housing at follow-up one, clean time before baseline, and number of substance abuse treatment episodes—were significantly correlated ($ps < .10$) with outcome and were used as controls in subsequent regression analyses. [A less stringent alpha level of .10 was used to identify variables to control for; the .05 levels was used subsequently to test primary hypotheses.]

Results

Description of Sample

The sample was 72% male; 60% black, 24% white, 13% Hispanic, and 2% other ethnicity. Forty-five percent lived in supported housing at baseline, 25% in their own apartment or house, 13% with friends/relatives, 7% in Single Room Occupancy (SRO), and 9% in a homeless shelter. Their mean age was 40.2 years ($s.d. = 8.6$), ranging from 20 to 63 years. Sixty-three percent graduated from high school or received a GED. Primary psychiatric diagnoses reported were: schizophrenia (43%), bipolar disorder (19%), major depression (20%), and other 18%. Four out of ten reported alcohol as the major lifetime substance use problem, cocaine/crack (38%), heroin (8%), marijuana (12%), and other drugs (2%).

DTR Attendance between Baseline and One-year Follow-up

In the year during the baseline and follow-up interviews, participants attended DTR for an average of 9.3 months ($s.d. = 3.9$). Over one-half of participants ($n = 56$) attended continuously during this period.

Substance Use at Baseline, One- and Two-year Follow-ups

Participants included in these analyses were selected based on their report of substance use during the year preceding the baseline interview. Length of time since last substance use ranged 11 months to zero (o.e., current use). Mean (and median) number of months since last substance use at baseline was 5 (St. Dev. = 3.8). Three quarter of participants had less than 8 months of clean time at baseline. At the one-year follow-up interview, fifty-three percent of participants reported no substance use in the preceding year (i.e., since baseline). At the two-year follow-up, nearly two-thirds (61%) reported no substance use in the preceding year (i.e., since the one-year follow-up); 23% (23 of 99) reported some use for a period of one to six months and 15% reported substance use for more than 6 months out of the one year period between one- and two-year follow-ups.

Association between Length of DTR Attendance and Changes in Support between Baseline and One-year Follow-up

Participants reported high levels of support at both assessment points (Table 1). Overall, social support decreased slightly over time; this change was significant, $t(98) = 2.70, p < .01$. One way to describe the size of the change in social support is in terms of the baseline standard deviation of this variable – a mean difference of .11 between baseline and follow-up assessments of support corresponds to more than a quarter of a standard deviation. This change corresponds to an effect that is small to medium in size (Cohen, 1988). Also, we estimated the test-retest reliability of our social support index at $r_{xx} = .70$. Following the presentation of the reliable change index (RCI) in Jacobson and Truax (1991), we found that 11 subjects had a reliable decrease in support, 3 a reliable increase, and 85 did not change to a reliable degree. Zero-order correlations among the variables under study also are presented in Table 1. Social support at baseline was not significantly correlated with DTR attendance. A simultaneous multiple regression analysis was used to examine the unique effect of social support on DTR attendance in the subsequent year, after taking control variables into account (see Table 2). The standardized coefficient, $\beta = .04$, indicates the magnitude of baseline social support's direct effect on DTR attendance; this was not significant, $t(93) = 0.41, p > .10$.

As shown in Figure 1, DTR attendance was related to change in social support from baseline to the one-year follow-up interview. The association between length of DTR attendance and change in support was assessed using hierarchical multiple regression analysis. Baseline assessments of support and control variables were entered as the first block. Length of DTR attendance during the first study year was entered as the second block. DTR attendance was related to change in social support, $t(92) = 2.99, p < .05$. Level of support did not increase, but members with longer DTR attendance maintained high support levels, while those with less attendance reported lower (decreased) levels of support.

Association between DTR Attendance during the First year and Substance Use during the Second Year

As shown in Table 1, longer DTR attendance during the first study year was significantly associated with less substance use in the second year. Further, when DTR attendance and the control variables were entered in a multiple regression analysis, attendance continued to have a unique effect on the substance use measure ($t(93) = -2.52, p < .05$).

Association Between Social Support at 1-year Follow-up and Substance Use During the Second Study Year

Social support at one-year follow-up had a significant zero-order relation with subsequent substance use ($r = -.28, p < .05$ – Table 1). Results from multiple regression analysis including

social support as well as the control variables revealed that social support had a unique effect on substance use in the second year, $t(93) = -3.01, p < .01$.

Change in Social Support as Mediator of DTR Effect on Substance Use

Potential mediation of the DTR attendance effect on substance use was examined by testing for several conditions described by Baron and Kenny (1986) and Kenny, Kashy and Bolger (1998). One condition is that the independent variable -DTR attendance - predicts the mediator (social support). The results above show that this condition is met— DTR attendance was a unique predictor of change in social support. A second condition is that the independent variable predicts the outcome (substance use). The results above show this condition is met — DTR attendance had a unique effect on substance use after taking into consideration the four covariates (demographics, time since last used, treatment experience and living arrangements). A third condition is that the putative mediator (social support at one-year follow-up) predicts the outcome, after controlling for the initial variable. An additional regression analysis was conducted with all four control variables, DTR attendance, and social support at one-year follow-up as independent variables and substance use between one- and two-year follow-ups as the dependent variable. The unique effect of social support was significant, $t(92) = -2.42, p < .05$, suggesting that the third condition is satisfied. A fourth and final condition for mediation is that the relation between the initial independent variable and the outcome be attenuated when controlling for the mediator. The unstandardized coefficient for DTR attendance when only it and control variables were in the model was $b = -0.064 (p < .05)$, while in the model with social support added, it was $b = -0.047 (p = .07)$. This pattern is consistent with the fourth condition and suggests that the effect of DTR attendance on substance use is partially mediated by social support. The indirect effect from DTR attendance to substance use through social support was tested by multiplying the unstandardized coefficients for the two direct paths involved, $b = -0.016$. The standard error of this indirect path was calculated using Sobel's (1982, 1986) formula, $se = 0.0085$. This indirect path was significant at a trend level ($z = -1.88, p = .06$). The percentage of the total DTR attendance effect explained by the social support path is 27% $[(1 - (-0.047/-0.064)) * 100]$. As can be seen in Figure 1, DTR attendance has a nearly significant direct effect on (lower) substance use in addition to its indirect effect, $t(92) = -1.81, p = .07$. This too suggests that the mediation by social support is partial, not complete.²

Discussion

Study findings supported our overall hypothesis that the beneficial effects of dual-focus 12-step based group participation on substance use outcome are mediated by social support, although the mediation was only partial. Specifically, and consistent with our hypotheses, longer attendance at DTR during the first year of the study had a unique effect on substance use in the subsequent year. Social support at one-year follow-up had a unique effect on substance use during the subsequent year and partially mediated the effect of DTR attendance on subsequent substance use. Phrased differently, for this dually-diagnosed sample, longer attendance at 12-step based groups during the first year of the study predicted lower rates of substance use in the subsequent year; that effect was partially explained by the maintenance of high levels of social support.

During the early stages of recovery, there is typically ambivalence about quitting drug use and about disengaging from the associated life style and social life. Support for recovery is likely to be particularly critical at this stage. Support may decline during the early recovery stage as

²Structural equation model analysis of the model depicted in Figure 1 is a reasonably good fit ($\chi^2 = 0.88 (df=1), p = .349$; CFI = 1.00; RMSEA = 0; SRMR = .01 - df=1).

the person ceases drug use and has not yet established a drug-free network (e.g., Ribisl, 1997). Thus identifying strategies and recovery resources that may minimize the erosion of social support among persons in early recovery can enhance the likelihood of successful outcome. Twelve-step groups encourage members to form supportive relationships that most often begin in the context of meeting attendance but frequently develop beyond meetings; for example new members are encouraged to obtain other members' telephone numbers and to call them when they feel the urge to use drugs or are encountering personal difficulties as is often the case especially early on in the recovery process; the sponsorship relationship also encourages new members to spend time with other, more experienced recovering persons outside of meetings. The need for support is likely to be particularly high among dually-diagnosed persons in recovery who face multiple challenges, especially at the early stages of recovery (see e.g., author citation.).

Our findings about the effectiveness of 12-step participation in achieving abstinence, and about the role of social support as a mediator of this effect are consistent with prior reports; present results also extend these findings to dually-diagnosed persons. Methodological features of the present study, including controlling for possible confounds and use of a prospective design, help to strengthen inferences relating 12-step participation to outcome. Importantly, this appears to be the first study that uses a prospective design with a long follow-up period (2 years) to investigate the effectiveness of 12-step participation on subsequent substance use. As mentioned earlier, most prior studies have measured 12-step attendance and substance use concurrently; a few others (e.g., Kelly et al., 2000) have used a prospective design but follow-periods were short (e.g., 3 months between the assessment of 12-step attendance and substance use)

Finally, we note that as in previous process studies of 12-step participation, the hypothesized mediator explained only partially the effect of 12-step attendance on substance use, suggesting that other factors not examined here might be implicated in the behavioral change process. For example, 12-step organizations emphasize the need for spiritual change that promotes adult growth and development by helping the recovering addict develop a more accurate identity, an ability to be intimate in relationships, and a general willingness to help others. This occurs over time through meeting attendance as well as through working the 12-step program with a sponsor. While spiritual change may be unusually difficult to capture using a traditional social science measurement approach (Humphreys et al., 1999), changes in beliefs - about addiction and recovery, about self and about what is required to recover - that may result from working the 12-step program are quantifiable. This set of beliefs has been termed "12-step ideology" (Kingree, 1995). To date, only one study has investigated the association between 12-step ideology and substance use: acceptance of 12-step ideology predicted subsequent abstinence independent from 12-step participation and from other potentially relevant variables such as frequency of pretreatment 12-step meeting attendance and frequency of contact with a sponsor before treatment (Fiorentine & Hillhouse, 2000b). Clearly, there is a need for further research to identify the mechanisms underlying the therapeutic effects of 12-step participation on substance use outcomes.

The main limitation of the present study is the use of 12-step group participants who volunteered to be interviewed and may differ in background characteristics from group members who were not interviewed. However, findings were generally consistent with available reports obtained among single-disorder substance users, suggesting that the restricted sample may not significantly limit the generalizability of findings. Overall, present findings underline the importance of social support and of 12-step meeting attendance as a means of obtaining recovery support for dually-diagnosed persons. Where specialized 12-step groups are available, clinicians should encourage clients to participate; when such groups are not available, clinicians can play a critical role in supporting clients in their effort to initiate such

groups. Further, some dually-diagnosed persons attend traditional 12-step meetings (author citation) and appear to benefit from participation (e.g., Gonzalez & Rosenheck, 2002; Moos et al., 1999), suggesting that participation in traditional 12-step should be encouraged as well. Finally, institutions serving dually-diagnosed persons, such as treatment programs and supported living residences should provide clients with the opportunity to develop supportive networks both within the institution and in the community.

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References

- Alcoholic Anonymous. NY Alcoholics Anonymous World Services. 1990. AA 1989 membership survey.
- Allen JP. Measuring treatment process variables in Alcoholics Anonymous. *Journal of Substance Abuse Treatment* 2000;18:227–230. [PubMed: 10742635]
- American Psychiatric Association. Practice Guidelines for the Treatment of Patients with Substance Abuse Disorders: Alcohol, Cocaine, Opioids. *American Journal of Psychiatry* 1995 Nov;152(suppl): 1–59.
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173–1182. [PubMed: 3806354]
- Bogenschutz M, Akin S. 12-Step participation and attitudes towards 12-step meetings in dual diagnosis patients. *Alcoholism Treatment Quarterly* 2000;18(4):31–45.
- Bollen, KA. *Structural Equations With Latent Variables*. New York: Wiley; 1989.
- Cohen, J. *Statistical Power Analysis For The Behavioral Sciences*. 2. Hillsdale, NJ: Lawrence Erlbaum; 1988.
- Denzin, N. *Treating alcoholism: an Alcoholics Anonymous Approach*. Thousand Oaks, CA: Sage Publications; 1987.
- Dual Recovery Anonymous. *The Dual Diagnosis Recovery Book*. Center City, MN: Hazelden; 1993.
- Finkel, SE. *Causal analysis with panel data*. Thousand Oaks, CA: Sage; 1995.
- Finney JW. Enhancing substance abuse treatment evaluations: Examining mediators and moderator of treatment effects. *Journal of Substance Abuse* 1995;7:135–150. [PubMed: 7655309]
- Fiorentine R. After drug treatment: Are 12-step programs effective in maintaining abstinence? *American Journal of Drug and Alcohol Abuse* 1999;25:93–116. [PubMed: 10078980]
- Fiorentine R, Hillhouse M. Drug treatment and 12-step program participation: The additive effects of integrated recovery activities. *Journal of Substance Abuse Treatment* 2000a;18(1):65–74. [PubMed: 10636609]
- Fiorentine R, Hillhouse MP. Exploring the additive effects of drug misuse treatment and twelve-step involvement: Does 12-step ideology matter? *Substance Use and Misuse* 2000b;35(3):367–397. [PubMed: 10714452]
- Fiorentine R. After drug treatment: Are 12-step programs effective in maintaining abstinence? . *Am J Drug Alcohol Abuse* 1999;25(1):93–116. [PubMed: 10078980]
- Girden, ER. *Sage University Paper Series on Quantitative Applications in the Social Sciences* 07–084. Newbury Park, CA: Sage; 1992. ANOVA: Repeated Measures.
- Gonzalez G, Rosenheck R. Outcomes and service use among homeless persons with seriously mental illness and substance abuse. *Psychiatric Services* 2002;53(4):437–446. [PubMed: 11919357]
- Granfield, R.; Cloud, W. *Coming Clean: Overcoming Addiction Without Treatment*. New York: New York University Press; 1999.
- Havassy BE, Hall SM, Wasserman DA. Social support relapse: commonalities among alcoholics, opiate users, and cigarette smokers. *Addictive Behavior* 1991;16:235–246.

- Holmbeck GN. Toward terminological, conceptual and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Clinical and Consulting Psychology* 1997;65:599–610.
- Humphreys K, Noke JM. The influence of post-treatment mutual help group participation on the friendship networks of substance abuse patients. *American Journal of Community Psychology* 1997;25(1):1–16. [PubMed: 9231993]
- Humphreys K, Mankowski ES, Moos RJ, Finney JW. Do enhanced friendship networks and active coping mediate the effect of self-help groups on substance abuse. *The Society of Behavioral Medicine* 1999;21:54–60.
- Humphreys K, Huebsch PD, Finney JW, Moos RH. A comparative evaluation of substance abuse treatment: V. Substance abuse treatment can enhance the effectiveness of self-help groups. *Alcoholism Clinical & Experimental Research* 1999;23(3):558–563.
- Jacobson NS, Truax P. Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology* 1991;59:12–19. [PubMed: 2002127]
- Kaskutas LA, Bond J, Humphreys K. Social networks as mediators of the effect of Alcoholics Anonymous. *Addiction* 2002;97(7):891–900. [PubMed: 12133128]
- Kassel JD, Wagner EF. Processes of change in Alcoholics Anonymous: A review of possible mechanisms. *Psychotherapy* 1993;30(2):222–234.
- Kelly JF, Myers MG, Brown SA. Multivariate process model of adolescent 12-Step attendance and substance use outcome following inpatient treatment. *Psychology of Addictive Behaviors* 2000;14(4):376–389. [PubMed: 11130156]
- Kenny, DA.; Kashy, DA.; Bolger, N. Data analysis in social psychology. In: Gilbert, D.; Fiske, S.; Lindzey, G., editors. *The Handbook of Social Psychology*. Boston: McGraw-Hill; 1998. p. 233–265.
- Kessler RC. The national co-morbidity survey: preliminary results and future directions. *International Journal of Methods in Psychiatric Research* 1995;5:139–151.
- Kingree JB. Understanding gender differences in psychosocial functioning and treatment retention. *American Journal of Drug and Alcohol Abuse* 1995;1(1):77–92.
- Kissin, W.; Ginexi, EM. The Impact Of Self-Help Involvement On Recovery Course; Presented at the 62th Annual Scientific Meeting of the College on Problems of Drug Dependence; San Juan, PR. 2000.
- Kurtz E. Why A.A. works: the intellectual significance of Alcoholics Anonymous. *Journal of Studies on Alcohol* 1982;43(1):38–80. [PubMed: 7050538]
- Kurtz L, Garvin C, Hill E, Pollio D, McPherson S, Powell TJ. Involvement in Alcoholics Anonymous by persons with dual disorders. *Alcoholism Treatment Quarterly* 1995;12(4):1–18.
- Laudet A, Magura S, Vogel H, Knight E. Support, mutual aid and recovery from dual diagnosis. *Community Mental Health Journal* 2000;36(5):457–476. [PubMed: 10994680]
- Laudet A, Magura S, Vogel H, Knight E. Participation in 12-Step-based Fellowships among Dually-Diagnosed Persons. *Alcoholism Treatment Quarterly* 2003;21(2):19–39. [PubMed: 17361312]
- Laudet A, Magura S, Cleland C, Vogel H, Knight E. Predictors of Retention in Dual-Focus Self-Help Groups. *Community Mental Health Journal* 2003;39(4):281–297. [PubMed: 12908643]
- Longabaugh R, Wirtz PW, Zweben A, Stout RL. Network support for drinking: Alcoholics Anonymous and long-term matching effects. *Addiction* 1998;93:1311–1333.
- Magura S, Laudet A, Mahmood D, Rosenblum A, Vogel H, Knight E. The role of self-help processes on achieving abstinence in dual recovery. *Addictive Behaviors* 2003;28(3):399–413. [PubMed: 12628615]
- Mankowski E, Humphreys K, Moos R. Individual and contextual predictors of involvement in 12-step self-help groups after substance abuse treatment. *American Journal of Community Psychology* 2001;29(4):537–563. [PubMed: 11554152]
- Margolis R, Kilpatrick A, Mooney B. A retrospective look at long-term adolescent recover: Clinicians talk to researchers. *Journal of Psychoactive Drugs* 2000;32(1):117–125. [PubMed: 10801073]
- McCready, B.; Miller, W. *Research on Alcoholics Anonymous: Opportunities and Alternatives*. New Brunswick, NJ: Alcohol Research Documentation, Rutgers–The State University of New Jersey; 1993.

- McIntire D. How well does AA work? An analysis of published AA surveys (1968–1996) and related analyses/comments. *Alcoholism Treatment Quarterly* 2000;18(4):1–18.
- McLellan AT, Kushner H, Metzger D, et al. The fifth edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment* 1992;9:19–21.
- Minkoff, K.; Drake, RE., editors. *New Directions For Mental Health Services*. 50. San Francisco: Jossey-Bass, Inc; 1991. *Dual Diagnosis of Major Mental Illness and Substance Use Disorder*.
- Moos R, Finney J, Ouimette PC, Suchinsky R. A comparative evaluation of substance abuse treatment: I. Treatment orientation, amount of care, and 1-year outcomes. *Alcoholism Clinical and Experimental Research* 1999;23(3):529–536.
- Morgenstern, J.; McCrady, BS. Cognitive processes and change in disease-model treatment. In: McCrady, B.; Miller, WR., editors. *Research on Alcoholics Anonymous, Opportunities and Alternatives*. 1993. p. 153-166.
- Morgenstern J, Labouvie E, McCray BS, Kahler CW, Frey RM. Affiliation with Alcoholics Anonymous after treatment: A study of its therapeutic effects and mechanisms of action. *Journal of Consulting and Clinical Psychology* 1997;65(5):768–777. [PubMed: 9337496]
- Nealon-Woods Fer JR, Jason LA. Twelve-step program use among Oxford House residents: spirituality or social support in sobriety? *Journal of Substance Abuse* 1995;7(3):311–318. [PubMed: 8749790]
- Noordsy D, Schwab B, Fox L, Drake R. The role of self-help programs in the rehabilitation process of persons with severe mental illness and substance use disorders. *Community Mental Health Journal* 1996;32(1):71–81. [PubMed: 8635319]
- Pristach C, Smith C. Attitudes towards Alcoholics Anonymous by dually-diagnosed patients. *Journal of Addictive Diseases* 1999;18(3):69–76. [PubMed: 10507583]
- Project MATCH Research Group. Matching alcoholism treatment to client heterogeneity: Project MATCH post-treatment drinking outcomes. *Journal of Studies on Alcohol* 1997;58:7–29. [PubMed: 8979210]
- Ribisl, KM. Role Of Social Networks In Predicting Substance Abuse Treatment Outcome In A Dual Diagnosis Sample; Paper presented at the annual meeting of the Society for Behavioral Medicine; San Francisco. 1997.
- Richter SS, Brown SA, Mott M. The impact of social support and self-esteem on adolescent substance abuse treatment outcome. *Journal of Substance Abuse* 1991;3:317–85.
- Rudy, D. *Becoming Alcoholic: Alcoholics Anonymous and the Reality of Alcoholism*. Southern Illinois University Press; 1986.
- Snow MG, Prochaska JC, Rossi JS. Process of change in Alcoholics Anonymous: Maintenance factors in long-term sobriety. *J Stud Alcohol* 1994;55:362–371. [PubMed: 8022185]
- Sobel, ME. Asymptotic intervals for indirect effects in structural equations models. In: Leinhardt, S., editor. *Sociological Methodology*. San Francisco: Jossey-Bass; 1982. p. 290-312.
- Sobel, M. Some new results on indirect effects and their standard errors in covariance structure models. In: Tuma, N., editor. *Sociological Methodology*. San Francisco: Jossey-Bass; 1986. p. 159-186.
- Timko C, Finney JW, Moos RH, Moos BS, Steinbaum DP. The process of treatment selection among previously untreated help-seeking problem drinkers. *Journal of Substance Abuse* 1993;5(3):203–20. [PubMed: 8312728]
- Timko C, Moos RH, Finney JW, Lesar MD. Long-term outcomes of alcohol use disorders: Comparing untreated individuals with those in Alcoholics Anonymous and formal treatment. *J Stud Alcohol* 2000;61:529–540. [PubMed: 10928723]
- Trumbetta SL, Mueser KT, Quimby E, Bebout R, Teague GB. Social networks and clinical outcomes of dually diagnosed homeless persons. *Behavior Therapy* 1999;30(3):407–430.
- Vogel HS, Knight E, Laudet AB, Magura S. Double Trouble in Recovery: Self-help for the dually-diagnosed. *Psychiatric Rehabilitation Journal* 1998;21(4):356–364. [PubMed: 17710222]
- Weisner C, Greenfield T, Room R. Trends in the treatment of alcohol problem: in the U.S. general population. *American Journal of Public Health* 1995;85:55–60. [PubMed: 7832262]
- Zaslav, P. The role of self-help groups in the treatment of the dual diagnosis patient. In: Solomon, J.; Zimmer, S.; Sholler, E., editors. *Dual Diagnosis*. NY: Plenum Publishing Corporation; 1993. p. 105-126.

Figure 1.
Estimated Path Model with Standardized Coefficients.

Table 1
Means (Standard Deviations) and correlation matrix for covariance structure model (n = 99)*

	M	(SD)	1	2	3	4
1. Social Support - baseline	3.23	(0.41)				
2. Social Support - 1 yr follow-up	3.12	(0.42)	-.54*			
3. DTR Attendance - first study year	9.32	(3.90)	.04	.24*		
4. Substance Use - second study year	0.63	(1.01)	-.23*	-.28*	-.26*	

*
p < .05.

Table 2

Longitudinal Association between DTR attendance, Social Support, and Substance Use

DEPENDENT VARIABLES

EFFECTS	DTR Attendance between Baseline and One-Year Follow-Up			Social Support at One-Year Follow-Up			Substance Use between One- and Two-Year Follow-Up		
	<i>b</i>	<i>se_b</i>	$\bar{B}$	<i>b</i>	<i>se_b</i>	β	<i>b</i>	<i>se_b</i>	β
Supported Housing (1-year follow-up)	-0.71	0.965	-.09	0.03	0.086	.04	0.08	0.226	.04
Supported Housing (2-yr follow-up)	2.08	0.927	.27*	-0.14	0.085	-.16	-0.42	0.225	-.21 [†]
Clean Time (baseline)	-0.01	0.104	-.01	-0.01	0.009	-.01	-0.04	0.025	-.16 [†]
Substance Abuse Tx Episodes ^A	-1.09	0.902	-.12	0.08	0.081	.08	-0.44	0.218	-.19*
Social Support (at baseline)	0.40	0.998	.04	0.54	0.089	.52*	--	--	--
Social Support (at 1-year follow-up)	--	--	--	--	--	--	-0.57	0.236	-.24*
DTR Attendance (Baseline to 1-yr)	--	--	--	0.03	0.009	.26*	-0.05	0.026	-.18 [†]

^A at baseline *b* = unstandardized regression coefficient; *se_b* = standard error; β = standardized regression coefficient;

* $p < .05$,

[†] $p < .10$.