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Efficacy of Dual Focus Mutual Aid for Persons with Mental Illness and Substance Misuse

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Abstract

Background—Previous studies have indicated that persons with co-occurring mental health and substance use problems can benefit by attending dual-focus mutual aid groups. However, to date, a trial to test the efficacy of these groups has not been published.

Method—This study randomly assigned 203 substance misusing clients attending a mental health or dual-diagnosis facility to either a dual-focus 12-step group (Double Trouble in Recovery; DTR) or a waiting list control group. Participants were followed for 3–6 months. The primary outcome was substance use (days used in the past 30 with saliva testing to detect under-reporting); secondary outcomes included psychiatric medication adherence, attendance at traditional (single-focus) 12-step meetings (e.g., AA/NA); and improvement in mental health and substance use problems (quality of life). Multilevel model (MLM) regression was used to analyze the nested effect of participants within 8 facilities (7 in New York City and 1 in Michigan). Regression imputation was used to adjust for drug use under-reporting.

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Contributors

Drs. Magura and Rosenblum designed the study. Dr. Matusow served as project director during most of the study period and wrote the initial draft. Mr. Fong and Drs. Magura, Matusow and Rosenblum contributed to the data analysis. All authors contributed to the interpretation of the data and contributed to the manuscript.

Conflicts of interest

Mr. Vogel is the founder and executive director of Double Trouble in Recovery, Inc; a non-profit organization that has disseminated the DTR model throughout the United States. He also receives royalties from Hazelden Foundation for the sale of DTR documents and CDs. The other authors have no conflicts of interest to disclose.

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Results—At follow-up 79% of the subjects were interviewed. In intent to treat analysis, DTR subjects compared with control subjects used alcohol ($p=.03$) and any substances ($p=.02$) on fewer days. DTR compared with control subjects were also more likely to rate themselves as experiencing better mental health and fewer substance use problems ($p=.001$). There were no effects for DTR on drug use only, medication adherence or NA/AA attendance.

Conclusion—Findings reported in previous studies on the association between exposure to DTR and reductions in substance use were partially supported in this efficacy trial.

Keywords

Mutual Aid; 12-Step groups; Recovery; Dual diagnosis; Co-occurring disorders

1. INTRODUCTION

Large epidemiological studies, such as the National Epidemiological Survey of Alcohol and Related Conditions (NESARC), the National Survey of Drug Use and Health (NSDUH), and the Replication of the National Comorbidity Survey (NCS-R), using DSM criteria have documented high comorbidity prevalence rates of substance use disorders and mental illness (Regier et al., 1990; Kessler, 1995; Sacks et al., 2008). For example, the NSDUH estimated that 25.7% of adults with a current (12 month) serious mental illness also have a substance use disorder; and that among adults with a substance use disorder, 42.8% meet criteria for any mental illness (Office of Applied Studies, 2010). Co-occurring disorders are generally more severe and chronic than single disorders (Murphy, 1990; Drake and Burnett, 1998). One method that has been used to independently address substance use or mental health disorders is mutual aid (Center for Substance Abuse Treatment, 2005). Mutual aid groups, such as 12-step fellowships, offer non-clinical, non-professional, peer-to-peer support for the purpose of overcoming a shared problem.

In the recovery community, Alcoholics Anonymous (AA), Narcotics Anonymous (NA) and other 12-step groups share core precepts of anonymity, spirituality, and “singleness of purpose,” based on the principle that misuse of alcohol and other drugs must remain “relentlessly in the foreground” in order to sustain attention on the goal of recovery and avoid denial (Vaillant, 2003).

Despite the documented benefits associated with participation in single-focus 12-step groups (Krentzman, et al., 2010; Galanter et al., 2013), there is a growing body of research and narrative accounts suggesting that persons with mental health and substance use problems may feel stigmatized when attending single-focus groups. Such stigmatization may become especially apparent when 12-step participants discuss the severity of their psychiatric symptoms and use of prescribed medications to manage these symptoms (Bogenschutz, 2007; Jordan et al., 2002; Matusow et al., 2013; Magura et al., 2008a; Vogel et al., 1998; Vogel, 2010a).

The recognition of the limitations of traditional single focus mutual aid groups spurred the development of dual focus fellowships designed to address the needs of persons with both mental health and substance use problems. One of these dual focus mutual aid groups is

Double Trouble in Recovery (DTR). Founded in 1989, DTR is a program adapted from the 12 Steps of AA, specifically designed to embrace the specialized needs of persons with substance use and mental health problems (Vogel, 2010b).

Our research team has previously conducted studies that found that DTR participation had direct and indirect effects on substance use and several other important outcomes (Magura et al., 2002, 2003, 2008b). However, these studies were not experimental designs. The purpose of this current study is to examine the efficacy of a dual focus mutual aid fellowship for persons with co-occurring mental illness and substance misuse by conducting a randomized clinical trial (RCT) of DTR at multiple program sites. The primary outcome is substance use; secondary outcomes are psychiatric medication adherence, attendance at traditional 12-step meetings; and quality of life.

2. METHODS

2.1 Settings

The study sites included seven programs in New York City (NYC) and one in Michigan. (Initially we had proposed to recruit from NYC only, but due to a number of secular changes in NYC that became evident during the early part of the study, e.g., closure of some dual-diagnosis programs and more programs that had started to include dual-focus self-help groups as a regular part of their intervention, we had to look elsewhere for another recruitment site.) The settings in NYC were comprised of both residential and outpatient psychiatric facilities. All programs provide mental health services for persons with single psychiatric diagnoses as well as for those with co-occurring mental illness and substance use disorders. Four of the NYC sites were residential, two were modified day treatment (1/2 day schedule, 3–5 days per week), and one provided both day and residential services. The Michigan site was a large, comprehensive mental health and substance abuse treatment agency in Grand Rapids, where patients typically receive 3–8 weeks of outpatient counseling depending on their individualized treatment plans.

2.2 Participants and procedures

All counselors at the NYC programs were asked to refer current and newly-admitted patients with a DSM-IV diagnosis of mental illness and a history of substance misuse, who were interested in DTR participation, to study staff. In Michigan, counselors were asked to refer patients with the same characteristics who had completed outpatient treatment and were interested in DTR as an aftercare program. Patients were excluded from study participation if they were younger than 18 years of age, did not comprehend or speak English, appeared intoxicated, had a diagnosis of mental retardation, showed overt psychotic symptoms, or were unable to give informed consent. Some patients reported to research staff directly (without receiving a referral from their counselor). For these patients, a lifetime history of substance misuse was determined by administering the Modified Simple Screening Instrument for Substance Abuse (Center for Substance Abuse Treatment, 1994). Patients who met eligibility criteria and who expressed interest in the study were administered an informed consent, completed a baseline interview and donated a saliva sample for drug testing.

Random assignment of study subjects was accomplished by means of a random numbers table using block randomization (Efrid, 2011). Assignment was not known to the interviewer until the end of the interview when a sealed envelope was opened to reveal the study condition, both to the interviewer and the subject. Those assigned to the control group were asked to refrain from attending DTR meetings until they had completed their follow-up interview, after which they were invited to participate. In both conditions, subjects were encouraged to continue to participate in their usual treatment and recovery activities. Subjects were compensated \$30 for the baseline interview. Subjects were recruited between January, 2009 (NYC) and January, 2012; recruitment in Michigan commenced in January, 2010.

Figure 1 presents the CONSORT (Consolidated Standards of Reporting Trials) diagram for the study. A total of 424 patients were referred to the study, of whom 75 were determined to be ineligible for the reasons shown. The remaining 349 were randomized to either immediate participation in DTR or to the wait list control condition. For most of the trial equal allocation was used to randomly assign subjects to the two study conditions (50% assigned to each condition), but during the first month of the study more subjects were randomly allocated to the experimental condition (e.g., 70% to DTR; 30% to the control group) to establish the DTR groups and intermittently during the study to sustain the size of these groups; this accounts for the somewhat larger number of DTR subjects.

The primary purpose of the study described in this paper was to determine whether DTR participation was efficacious in reducing substance use among psychiatric patients with recent substance misuse. For this reason the analyses described in this paper only include DTR subjects with evidence of recent substance misuse (N=203).

The baseline interview and saliva testing (see below) enabled the study to identify the target sample for the intervention, which was a self-report of at least one day of substance misuse in the past 90 days (illicit drug use or 4 drinks/day) or a positive saliva test for a psychoactive drug that had not been prescribed to the patient. As shown in figure 1, this resulted in 113 DTR and 90 control subjects being included in the analysis for this paper. The follow-up rate for the DTR condition was 80.5% and for the control condition was 77.8% of those included in the analysis, a non-significant ($p > .05$) difference.

2.2.1 Avoidance of conflict of interest—Subjects were paid by a NDRI research interviewer who was not an employee at the treatment program site. Moreover, as with most IRB-approved consent forms, subjects were told that refusal to participate in the study would have no impact on their standing at the treatment program, and that they could withdraw from the study at any time without penalty. These design features eliminated or minimized any possible conflict of interest vis-a-vis the treatment program.

2.3 Study Intervention

2.3.1 NYC DTR groups—Four dually-diagnosed persons with a history of long term (>5 years) DTR participation shared responsibility for facilitating the DTR groups in NYC. DTR groups were scheduled for times patients would be most likely to attend, which meant evenings in residential facilities and during the day at the outpatient facilities. Subjects were

scheduled to attend one DTR group a week. Subjects received public transportation cards (NYC MetroCards) if they needed to take a subway or bus to attend the group. Facilitators were compensated \$30 per group. DTR facilitators were typically assigned to the same DTR group for the duration of the study.

2.3.2 Michigan DTR groups—Two weekday DTR groups were conducted each week during most of the study intervention period, each meeting in a group room at the facility (at 4:30 PM and 6:00 PM). DTR-assigned study subjects were scheduled to attend one DTR group a week. Each DTR meeting was chaired (facilitated) by a peer member (DTR-assigned study subject) who was selected to do so by the other DTR group members at the start of each meeting. Each subject attending received \$5 for transportation expenses (most subjects needed to drive to the site). DTR groups in both NYC and MI ran for 45 minutes.

2.4 IRB approvals

The study protocol was approved by the Institutional Review Boards (IRBs) of National Development and Research Institutes (NDRI), Western Michigan University (WMU), New York State Psychiatric Institute (which served as the IRB for the Staten Island site), Maimonides Medical Center (which served as the IRB for Coney Island Hospital), and the Michigan Department of Community Health (which served as an IRB for the Michigan site).

The study was registered with clinicaltrials.gov: Identifier NCT01333280.

2.5. Follow-up interviews

In NYC follow-ups began 6 months after study induction and in Michigan 3 months after study induction, based on negotiations with the programs regarding the length of the wait time. Average time between baseline and follow up interviews was 6.6 (SD 1.4) months in NYC and 4.6 (SD 1.5) months in Michigan.

At baseline, research interviewers gave study participants a card with their contact information and the date of their scheduled follow-up interview. Study subjects also completed a locator sheet which contained contact information (addresses/phone numbers/email of self, friends, and relatives, etc.). Extensive efforts were made to schedule follow-up interviews for all subjects regardless of whether or not they were still receiving services at the index clinic, including periodic reminders about their upcoming interview, contacting relatives, counselors, and when necessary, visiting addresses previously provided in person. Subjects in NYC were compensated \$50 and subjects in Michigan \$50–\$100 for the follow-up interview. In Michigan compensation was increased half-way through the study to increase the response rate, which was successful in doing so.

2.6 Study measures

At study intake subjects were administered a battery of selected items and validated instruments that obtained data on referral source, sources of income, living arrangements, support for treatment, criminal justice involvement, recent and lifetime 12-step involvement (both single and dual focus), physical health, psychiatric diagnoses, substance use, psychiatric medication history, and severity of mental health symptoms. Most of the items

were used in our previous DTR studies (Laudet et al., 2004; Magura et al., 2008). Our main outcome measures, substance use (for alcohol and several types of drugs) in the past 30 days, was adapted from the Addiction Severity Index (McClellan, et al., 1992). Saliva specimens were collected at baseline and follow-up.

2.6.1 Saliva drug test—Saliva immunoassay drug test results were used as part of the participant selection criteria and as a validity check on self-reported drug use. Saliva samples were collected with the Intercept® Oral Fluid Drug Test manufactured by OraSure Technologies (Bethlehem, PA); the testing was performed by Bendiner and Schlesinger (Brooklyn, NY). Drugs tested were: opiates, methadone, oxycodone, cocaine, benzodiazepines, marijuana and tramadol. Since saliva tests were used to assess illicit drug use, test results were considered negative for prescribed drugs, e.g., a positive result for methadone was coded as negative for a subject attending a methadone maintenance program, marijuana was coded as negative for individuals enrolled in medical marijuana in Michigan, and benzodiazepines and other medications were coded as negative if the subject reported having relevant prescriptions.

2.6.2 Outcome measures

2.6.2.1 Current Substance Use (Past 30 days): This was measured at baseline and follow-up. Subjects were asked separately about individual substances subject to misuse (marijuana, powder or crack cocaine, heroin, methadone, prescription opioids, hallucinogens, sedatives, stimulants, ecstasy, alcohol, and heavy alcohol use [≥ 4 drinks per day]): “On how many days out of the last 30 did you use...?” The maximum number of days used for any substance reported was selected as the value for the composite variable representing substance use. For subjects with positive salivas who reported neither drug use nor having a prescription for the drug, number of days used was calculated by using a regression imputation methodology (described in *Analysis Techniques*, below).

2.6.2.2 Retrospective Quality of Life Scale (RQOL): *Quality of life was assessed at follow-up with a 7 item scale constructed by the investigators to represent subjects’ perceived change in their mental health functioning and substance misuse since entering the study. The first item was worded as, “Since we first interviewed you on [subject’s baseline interview date] are you better or worse at taking your meds as prescribed?” Responses were recorded on a 0 (a lot worse at taking my meds) to 10 (a lot better at taking my meds) scale. The remaining six items were presented in the same format, and were worded as: “drinking less or more”, “doing drugs less or more”, “have your cravings and urges to pick up changed”, “dealing better or worse with your mental health issues”, “getting along better or worse with other people,” and “able to stand up for yourself”. We chose to assess subjective change in quality of life using a retrospective rather than a pre-post technique due to concerns of “response shift,” which refers to how individuals may change the basis on which they make judgments about themselves over time (Ring et al., 2005; Sprangers and Schwartz, 1999). The internal consistency of the RQOL was $\alpha = .84$. This scale also demonstrated factorial validity. Using principal components analysis with varimax rotation, two factors were generated with the four mental health items loading ($>.60$) on Factor 1*

(representing 55% of the variance) and the three substance misuse items loading ($>.70$) on Factor 2 (16% of the variance).

Adherence to taking psychiatric medications was assessed with the Medication Adherence Rating Scale (MARS) (Thompson, et al., 2000), and was administered at baseline and follow-up. Sample items include, “were you careless about taking your medication?” and “when you felt better did you stop taking your medication?” Dichotomous response categories of the MARS (Yes/No) were modified to a 4-point frequency scale (ranging from 1 “Never” to 4 “Always”) in order to better represent the range of non-adherence behaviors. A lower score represents better medication adherence.

2.7. Intervention fidelity

Although the researchers kept “hands off” the interactions in the DTR groups once they were up and running, we felt that it was important to determine whether the DTR groups adhered to the DTR 12-step format (which is similar to the format of other 12-step groups). Thus, study staff periodically observed the groups and completed a DTR fidelity checklist. The checklist included 19 statements representing behaviors indicating adherence to the DTR group format and guidelines such as “new members are recognized and welcomed,” “serenity prayer procedure completed,” and “no feedback during sharing.” Responses were either “Yes” and “No”; or “Totally”, “Partly”, and “Not at all”. A total fidelity score was computed for each checklist completed.

2.8. Analysis techniques

Multilevel model (MLM) regression (Raudenbush and Bryk, 2002) was conducted to analyze the nested effect of subjects within programs, using intent to treat (ITT) analysis. With this design, “program” was a random level 2 effect. Fixed effects (level 1 variables) were the outcome measures at follow-up, study condition (DTR vs. Control), and the baseline equivalent of the outcome measures (used as covariates in the MLM regression model). Outcome variables that were not normally distributed were log transformed. Since self-reported alcohol and drug use (number of days used in past 30 days) were highly skewed, we log-transformed the substance use outcome variables. Statistical significance was set at $p < .05$. Baseline variables that were correlated with study condition and a study outcome were added as covariates to the regression analysis. The data were analyzed using SPSS version 6.14 (SPSS, 1999), except that MLM was performed using the Mixed command in SPSS version 20 (IBM, 2011).

A regression imputation methodology (Little and Rubin, 2002) was used to adjust for drug use under-reporting, defined as a positive saliva test result vs. a report of no days used in the past 30 days. With this analysis we replaced zero reports of drug use for subjects with a positive saliva with a predicted value based on characteristics that were associated with drug(s) that tested positive, e.g., if a history of 12-step attendance was associated with number of days cocaine was used, then that variable was used in the regression model to predict days used cocaine among under-reporters. Because we used a statistical rather than a theoretical approach for the regression imputation procedure, we included all available data, representing substantially more data than are reported in this paper, such as a detailed

treatment history; these data will be reported in subsequent papers. Variables that were retained in the regression model were marital status, number of different psychiatric medications, anxiety disorder, financial situation, and items from a self efficacy measure (Brief Situational Confidence Questionnaire, Breslin et al., 2000), a measure of 12-step attitudes and beliefs (Kingree, 1995), the Mental Health Confidence Scale (Carpinello et al., 2000), and the MARS.

3. RESULTS

3.1. Characteristics of sample

There were significant differences between the NYC and Michigan subjects for most characteristics (Table 1). NYC subjects were more likely to have never married, to be black or Hispanic, to be receiving public assistance, and to have a psychotic disorder. Michigan subjects were more likely to be characterized by: current legal involvement, more education, independent living, substance abuse treatment history, more substance use, an affective disorder, more severe psychological distress, and lower medication adherence.

3.1.1. Baseline characteristic associated with study condition, attrition and substance use outcomes—Since study characteristics differed between NYC and MI subjects, homogeneity of the DTR and the control group was determined by comparing them on intake characteristics for the two regions separately (Table 2). For the NYC cohort, DTR subjects compared with control subjects were less likely to have a PTSD diagnosis; for the MI cohort, DTR subjects were less likely to have a bipolar diagnosis. Among MI subjects, the baseline variables that were significantly associated with attrition were age, legal involvement, and a bipolar or depression disorder. Among NYC subjects only bipolar was significantly associated with attrition. Baseline characteristics significantly associated with substance use outcomes among NYC subjects were public assistance (less use for all four substance use variables), living independently (more heavy drinking), PTSD (more drinking, heavy drinking and any substance use), and other substance use. Baseline characteristics significantly associated with substance use outcomes among MI subjects were male gender and lower medication adherence.

3.2. DTR attendance

Attendance at DTR meetings was measured both by self-report at follow-up and by attendance sheets that were signed by attendees at each meeting. Of the 91 subjects assigned to DTR, 74% reported having attended at least one DTR meeting, and the mean number of meetings attended was 7.8 (SD=7.9, range 0–25). Based on the attendance sheets, however, 66% attended at least one meeting, and the mean number of meetings attended was 5.2 (SD=6.2, range 0–23).

Based on the sign-in sheets, 70% of Michigan subjects attended at least one DTR meeting compared with 56% of New York subjects. The mean number of meetings attended was higher in Michigan (5.5 meetings, SD=5.8) than in New York (4.5 meetings, SD=6.9), but this difference did not reach statistical significance.

The primary reasons that the 22 DTR-assigned subjects who did not report attending a single meeting gave for not attending were: believing they were assigned to the control group or that they could not attend DTR groups (27%); transportation problems (18%); and scheduling conflicts (18%). Thirty-seven percent mentioned other reasons for not attending, such as: didn't want to, forgot, and "I only go to NA and church."

3.3. Intervention (DTR) fidelity

A total of 100 DTR groups were observed during the course of the study (26 in NYC and 74 in Michigan). Since relatively few items were endorsed as "partial," only "totally" ratings (representing full adherence) were coded as representing adherence. The mean level of adherence was 85% with 14 of 19 observed behaviors endorsed >90% of the time. There was no difference ($p = .05$) in DTR fidelity adherence rates between Michigan and NYC DTR groups.

3.4. Validity of self-reported drug use

At baseline, 98% (200/203) of subjects provided a valid saliva specimen, and at follow-up 94% (151/161) provided a valid specimen. All but one of the saliva samples tested were valid. The 200 subjects at baseline who provided a valid saliva sample were composed of 82% who self-reported substance use in the last 30 days and 18% who tested positive for illicit drug use but did not self-report. The 151 subjects at follow-up who provided a valid saliva sample were composed of 90% who self-reported substance use and 10% who tested positive but did not self-report. There was no significance difference between DTR and control subjects in the percentage of drug use under-reporters, either at baseline or follow-up. The percentage under-reporters in this study is lower than in many other studies examining the validity of illicit drug use self-reports in high-risk populations (Magura and Kang, 1996). As indicated in the description of the substance use measures, regression imputation was used to generate a positive value for drug misuse at baseline and follow-up if the saliva was positive and self-report was negative.

3.5. Different follow-up time between NYC and MI subjects

All subjects received only one follow-up interview. NYC subjects were scheduled for 6 months after baseline and Michigan subjects for 3 months after baseline. To rule out a possible artifact that the different follow-up schedules between NYC and MI could account for differences in outcome, we examined the association between time to follow-up and outcome. When we looked at MI subjects exclusively, we did find that length of time between baseline and follow-up was associated with fewer drinking days at follow-up. However, once we partialled out the influence of baseline drinking days, the correlation between time to follow-up and days used alcohol (in the past month) at follow-up was reduced from $r = -.23$, $p = .03$ to $r = -.13$, $p = .20$. There was no association between time to follow-up and outcomes among NYC subjects.

3.6. Effect of DTR on outcomes

The outcome variables for substance use and the variables for AA/NA and DTR attendance were log transformed since they were not normally distributed. This adjustment reduced

skew and kurtosis. Results for the MLM analysis are shown in Table 3. With the exception of RQOL – which was only administered at follow-up - all analyses include the baseline measure of the outcome variable as a covariate. At follow-up, DTR subjects had used alcohol and any substances on fewer days than control subjects. DTR subjects also rated themselves as more improved than control subjects on the RQOL ($p=.02$), including each of the two RQOL sub-scales: substance misuse ($p = .008$) and mental health ($p=.015$). There were no effects for DTR on medication adherence or NA/AA attendance. When the Michigan and NYC cohorts were analyzed separately, significant differences were only found for the Michigan cohort: DTR compared with control subjects reported fewer days drinking alcohol and rated themselves as more improved on the RQOL including each RQOL subscale.

Regression analysis also was used to determine whether there was an association between number of DTR sessions attended and any of the substance use outcomes, with the baseline measure of the outcome as a covariate. This analysis showed a significant association between more frequent DTR attendance and fewer days heavy drinking at follow-up among Michigan subjects ($\beta=.31$, $df = 53$, $p = .01$).

3.5.1 Exploratory analysis of New York City subjects—The comparatively low levels of substance use at baseline among New York City subjects may have reduced the likelihood of detecting reductions in substance use at follow-up. To adjust for a possible floor effect, we conducted an exploratory analysis by modifying inclusion criteria to 1 day of substance use in the past 30 days (rather than the past 90 days). At follow-up using MLM regression, NYC DTR subjects compared with NYC control subjects reported significantly fewer days using any substances ($N = 59$, $p=.027$). The means and standard deviations for days used at baseline were: 5.66 (6.33) for DTR and 10.53 (10.82) for controls. Days used at follow-up were 4.28 (7.56) for DTR and 10.87 (10.83) for control subjects. (The difference at baseline between the DTR and control cohorts was not significant, $p = .089$.) However once we added the covariate PTSD -because this baseline variable was correlated with both study condition and substance use at follow-up- the association was no longer significant ($p = .064$). There were no significant effects for DTR on the other substance use outcome variables.

4. DISCUSSION

In this multisite study, we found a relationship between dual focus group assignment and improved substance use outcomes. Specifically, study participants assigned to the experimental DTR condition had fewer days using alcohol and fewer days using any substance (drugs and/or alcohol) compared with those assigned to a waiting list control group. We also found that DTR predicted a higher quality of life at follow-up. When these substance use and quality of life outcomes were analyzed separately for Michigan and NYC subjects, significance was only found for Michigan subjects. The study was unable to show a relationship between the dual focus group condition and two other hypothesized outcomes (increased medication adherence and attendance at traditional 12-step groups).

The absence of evidence for an improvement in medication adherence may be attributed to a floor effect. The baseline distribution of medication adherence (MARS) scores was highly skewed. With a possible range of 1 (never) to 4 (always), where lower scores represent higher adherence, the median was 1.44 (mean = 1.55; SD=.48) and only 17% scored 2 or higher. In our previous study, where we did identify a DTR effect, there was a considerably lower level of medication adherence at baseline (Magura et al., 2008). In that study, where we used a dichotomized version of the MARS scale with a possible range of 0–10, the mean was 4.1 (SD=2.3). The lack of evidence indicating an hypothesized increase in traditional 12-step attendance at follow-up among DTR assigned subjects may be partially attributable to a relatively high rate of 12-step attendance at baseline (38% of subjects).

Evidence of a dose-effect of attendance on substance use outcomes was limited to Michigan DTR subjects where more frequent attendance was significantly associated with fewer days of heavy drinking. Although not statistically significant, New York DTR-assigned subjects attended fewer meetings than their Michigan counterparts; this restricted range may have accounted for an absence of an association between DTR attendance and substance use outcomes. While Michigan and New York subjects differed on several sociodemographic measures at baseline, none of those differences predicted attendance at DTR meetings. Among MI subjects, baseline variables that predicted attrition were age, legal involvement, and a bipolar or depression disorder. Among NYC subjects only bipolar was associated with attrition.

4.1 Strengths and Limitations

To our knowledge, this is the first RCT to examine the efficacy of a dual focus mutual aid intervention for persons with substance use and mental health problems. The study included multiple sites and participants with diverse characteristics (e.g., differences between Michigan and NYC participants). The study adds to and extends previous findings of dual focus mutual aid (for reviews see: Kelly and Yeterian, 2008; Magura, 2008; Rosenblum et al., 2011). The validity of self-reported drug use was supported by saliva test results; only 10% of the subjects had evidence of under-reporting at follow-up and there was no difference in under-reporting between DTR and control subjects. The fidelity of the DTR group process was supported by observations with a checklist representing principles of a dual focus 12-step group. Moreover we did try to assure the external validity of the DTR groups by permitting persons with distant histories of substance misuse to participate in these groups. (More about this fundamental principal of 12-step fellowships is described below.)

Despite these strengths this study has several limitations. Although saliva specimens were tested for recent drug use, the presence of alcohol was not assessed due to the short window for detecting ethanol with an immunoassay test. Also the non-significant outcome results among NYC subjects may be partially explained by a floor effect since there was relatively low substance use among NYC subjects at baseline. Evidence for a floor effect is supported by supplementary analysis that included only NYC subjects with substance use in the past 30 days at baseline rather than in the past 90 days. Among these more recent users DTR compared with control assignment was associated with fewer days of substance use at

follow-up, although this association became non-significant when we added the confounding covariate PTSD.

An additional concern could be the inclusion in DTR groups of individuals who were not currently misusing substances. Such individuals could have been subjects in the larger study -but not included in the analysis for this paper – who had not used substances in the past 90 days - or control subjects who had become abstinent by the time they were eligible to attend DTR (i.e., after they had completed their follow-up interview). There may be concern that individuals with distant substance misuse histories could have subverted the sense of common purpose in the DTR groups, thus diminishing perceived peer similarity and group cohesiveness. However, the threat to group cohesiveness is unlikely since it is common for persons in long term recovery to participate in 12-step groups, including dual-focus groups (Laudet, et al., 2004). In fact, 12-step philosophy is based on the principle that all group members benefit when persons at different stages of recovery participate in mutual aid, e.g., the 12th step encourages persons in long term recovery to help others who are currently misusing drugs or alcohol (Alcoholics Anonymous, 2013; Vogel, 2010a). In a previous study of DTR we found that members at various levels of recovery serve as role models for each other through two 12-step process factors, *reciprocal learning* and *helper-therapy* (Magura et al., 2003).

A related concern is that a DSM diagnosis of substance use was not a requirement to enroll in the study. We felt this was justified because, as described above, it is not uncommon to find persons with a history of substance use problems – but who do not necessarily meet DSM substance use disorder criteria – to participate in 12-step groups. A similar phenomenon has also been observed among patients in formal treatment, e.g., more than 20% of patients in mental health or addiction treatment do not meet current DSM criteria, but have histories of emotional or substance use problems (Druss et al. 2007).

The heterogeneity of the sample population, especially the difference between the MI and NYC cohorts, represents both a strength and limitation of the study. A weakness is that the differences among the study subjects could make it difficult to determine which types of individuals would be likely to benefit from DTR. Study subjects from the two regions differed along several factors such as type of treatment (aftercare vs. residential/intensive outpatient), race/ethnicity, psychiatric illness (affect vs. psychotic disorders) and substance use frequency. We have partially addressed this concern by conducting MLM to control for site differences, separate analyses for the two regions, and as described above by a supplementary analysis of NYC subjects who used substances in the past month.

4.2 Future Research

On balance, the study supports the concept of DTR as aftercare, as used by the MI subjects, but not as a supplementary intervention during relatively intensive mental health and substance abuse treatment. Use of DTR as aftercare for dually-diagnosed patients should be further investigated for a wider range of programs. A challenge in implementing this intervention was ensuring that subjects assigned to DTR attended the meetings. Although the mean number of meetings attended is consistent with previous studies examining 12-step outcomes (Magura et al., 2008b), it has been shown that intensive referral (Timko et al.,

2006, 2011; Timko and DeBenedetti, 2007) and motivational enhancements (Rosenblum et al., 2005) result in significantly better attendance at 12-step meetings, both for singly-diagnosed and dually-diagnosed patients. Consistent with these findings, better substance use outcomes for subjects in Michigan were associated with greater attendance at meetings. To ensure 12-step participants receive the greatest possible “dose” of mutual aid, thereby improving their chances not only for participation but true affiliation, future research in this area should include an intensive referral component.

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Fig. 1.
Flowchart of participants' progress through the study.

Table 1**Baseline Characteristics**

	All Subjects (N=203)	New York (N=90)	Michigan (N=113)
	N or Mean (% or SD)	N or Mean (% or SD)	N or Mean (% or SD)
Demographics			
Male	138 (68)	67 (74)	71 (63)
Age	43 (11.0)	43 (11.4)	42 (10.9)
Never married	117 (58)	70 (78)	47 (42)*
Hispanic	26 (13)	21 (23)	5 (4)*
Black	65 (32)	43 (48)	22 (20)*
White	102(50)	21 (23)	81 (72)
Arrested as an adult	178 (88)	77 (86)	101 (89)
Current legal involvement	42 (21)	6 (7)	36 (32)*
High School or equivalency	144 (71)	47 (52)	97 (86)*
Receiving public assistance	154 (76)	84 (93)	70 (62)*
Live independently	142 (70)	31 (34)	111 (98)*
Ever attended AA or NA	172 (85)	73 (81)	99 (88)
AA/NA Meetings past 6 months	19.0 (37.5)	16 (39.4)	21(35.5)
Ever attended Dual Focus Meeting	82 (40)	40 (44)	42 (37)
Ever in Substance Use Tx	130 (64)	50 (57)	80 (71)**
Mental Illness Diagnosis			
Major Depressive Disorder	105 (54)	26 (30)	79 (74)*
Bipolar	97 (51)	42 (50)	55 (51)
Anxiety Disorder	46 (24)	6 (7)	40 (37)*
Schizophrenia	39 (20)	34 (40)	5 (5)*
PTSD	24 (12)	5 (6)	19 (18)**
Schizo-affective Disorder	20 (10)	18 (21)	2 (2)*
Other (i.e. OCD, personality disorders)	35 (18)	16 (19)	20 (18)
Substance Use, past 30 days			
Days any alcohol	4.9 (8.4)	2.4 (5.3)	6.9 (9.8)*
Days heavy alcohol	2.1 (5.2)	.6 (1.4)	3.4 (6.6)*
Days any drugs	6.6 (9.2)	5.3 (8.1)	7.7 (10.0)
Days any drugs or alcohol	9.6 (10.2)	6.5 (8.5)	12.0 (10.9)*
Measures			
Psychological distress ²	1.49 (1.16)	.85 (1.00)	2.01 (1.02)**
(Low) Medication Adherence ³	1.55 (0.48)	1.44 (0.39)	1.65 (0.53)*

* p<.05;

** p<.01

¹Magura et al., 2003.

²6-item Symptom Checklist (Rosen et al., 2000). Severity of psychiatric symptoms measured on a 5 point scale from 0 (not at all) to 4 (extremely).

³Measured with a modified versions of the Medication Adherence Rating Scale (MARS) (Thompson, et al., 2000).

Table 2

Baseline Characteristics and Study Assignment for each State

	New York (N=90)		Michigan (N=113)	
	DTR (N=50)	Control (N=40)	DTR (N=63)	Control (N=50)
	N or Mean (% or SD)		N or Mean (% or SD)	
Demographics				
Male	40 (80)	27 (68)	36 (57)	35 (70)
Age	42 (10.4)	45 (12.5)	42 (9.2)	43 (12.8)
Never married	42 (84)	28 (70)	26 (41)	21 (42)
Hispanic	10 (20)	11 (28)	3 (5)	2 (4)
Black	27 (54)	16 (40)	10 (16)	12 (24)
White	10 (20)	11 (28)	46 (73)	35 (71)
Arrested as an adult	41 (82)	36 (90)	55 (87)	46 (92)
Current legal involvement	3 (6)	3 (8)	16 (25)	20 (40)
High School or equivalency	27 (54)	20 (50)	52 (82)	45 (90)
Receiving public assistance	48 (96)	36 (90)	38 (60)	32 (64)
Live independently	16 (32)	15 (38)	2 (3)	0 (0)
Ever attended AA or NA	41 (82)	32 (80)	54 (86)	45 (90)
AA/NA Meetings past 6 months	19 (44)	12 (33)	22 (36)	20 (35)
Any AA Meetings past 6 months	17 (42)	15 (48)	32 (59)	29 (64)
Ever attended Dual Focus Meeting	25 (50)	15 (38)	25 (40)	17 (34)
Ever in Substance Use Tx	28 (57)	22 (56)	44 (70)	36 (72)
Mental Illness Diagnosis				
Major Depressive Disorder	15 (32)	11 (28)	47 (81)	32 (65)
Bipolar	22 (48)	20 (53)	35 (60)	20 (41) *
Anxiety Disorder	3 (6)	3 (8)	21 (36)	19 (39)
Schizophrenia	19 (40)	15 (38)	4 (7)	1 (2)
PTSD	0 (0)	5 (13) *	11 (19)	8 (16)
Schizo-affective Disorder	11 (23)	7 (18)	1 (2)	1 (2)
Other (i.e. OCD, personality disorders)	7 (15)	9 (23)	12 (21)	7 (14)
Substance Use, past 30 days				
Days any alcohol	1.9 (4.0)	3.2 (6.6)	6.5 (9.8)	7.4 (10.0)
Days heavy alcohol	.5 (1.3)	.7 ((1.6)	3.8 (7.1)	2.8 (5.8)
Days any drugs	4.4 (6.8)	6.4 (9.4)	7.9 (10.2)	7.5 (9.9)
Days any drugs or alcohol	4.8 (6.6)	8.7 (10.1)	12.0 (11.0)	12.0 (10.8)
Measures				
Psychological distress ²	.68 (.83)	1.07 (1.16)	1.89 (1.11)	2.17 (.89)
(Low) Medication Adherence ³	1.50 (.06)	1.34 (.35)	1.66 (.58)	1.65 (.47)

* p<.05

¹ Magura et al., 2003.² 6-item Symptom Checklist (Rosen et al., 2000). Severity of psychiatric symptoms measured on a 5 point scale from 0 (not at all) to 4 (extremely).

³ Measured with a modified versions of the Medication Adherence Rating Scale (MARS) (Thompson, et al., 2000).

DTR: Double Trouble in Recovery

Table 3

Effect of DTR on Outcome

Substance Use	All Subjects (N=161)		p	New York (N=67)		p	Michigan (N=94)		p
	DTR (N=91) Mean(SD)	Control (N=70) Mean(SD)		DTR (N=35) Mean(SD)	Control (N=32) Mean(SD)		DTR (N=56) Mean(SD)	Control (N=38) Mean(SD)	
Substance Use									
Days any alcohol past 30			0.03			0.84 ^a			0.01
Baseline	4.5 (8.2)	6.5 (9.6)		1.9 (4.7)	3.9 (7.2)		6.1 (9.5)	8.6 (11.0)	
Follow Up	3.1 (6.4)	6.1 (8.8)		1.6 (4.4)	3.2 (7.2)		4.0 (7.3)	8.4 (9.5)	
Days heavy alcohol past 30			0.11			0.47 ^a			0.10
Baseline	2.6 (6.1)	2.1 (5.1)		0.3 (1.0)	0.8 (1.8)		4.0 (7.4)	3.1 (6.5)	
Follow Up	1.1 (2.8)	2.1 (6.0)		0.3 (1.3)	1.0 (4.5)		1.5 (3.4)	3.0 (7.0)	
Days any drugs past 30			0.07			0.07			0.31
Baseline	6.9 (9.3)	7.7 (10.4)		4.2 (6.3)	7.1 (10.2)		8.6 (10.5)	8.2 (10.6)	
Follow Up	5.5 (9.2)	8.0 (10.6)		3.4 (7.1)	8.0 (10.2)		6.8 (10.2)	8.0 (11.1)	
Days any drugs or alcohol past 30			0.02			0.17 ^a			0.06
Baseline	9.3 (10.1)	11.9 (11.2)		4.7 (6.1)	9.9 (10.8)		12.2 (11.0)	13.6 (11.5)	
Follow Up	6.8 (9.8)	11.3 (11.1)		4.5 (7.8)	10.2 (10.8)		8.3 (10.6)	12.2 (11.4)	
(Low) Medication Adherence^b			0.45			0.73			0.15
Baseline	1.5 (0.5)	1.5 (0.5)		1.4 (0.4)	1.4 (0.4)		1.6 (0.5)	1.6 (0.5)	
Follow Up	1.4 (0.4)	1.4 (0.4)		1.4 (0.3)	1.3 (0.3)		1.5 (0.5)	1.6 (0.4)	
Attendance in Single-focus 12-step Groups			0.50			0.44			0.77
Meetings attended past 6 months									
Baseline	21.5 (38.0)	14.1 (31.0)		17.8 (38.0)	13.6 (36.9)		23.7 (38.3)	14.5 (26.6)	
Follow up	17.5 (30.8)	13.6 (21.5)		13.2 (31.8)	12.3 (23.5)		20.2 (30.1)	14.8 (19.9)	
RQOL (Quality of Life)^c (total scale)			<0.01			0.23			<0.01
RQOL (Substance misuse sub-scale)	2.7 (1.8)	2.0 (1.8)		3.5 (1.5)	3.2 (1.7)		2.1 (1.8)	1.0 (1.3)	
RQOL (Mental health sub-scale)	2.4 (2.3)	1.5 (2.3)	0.01	3.1 (2.0)	2.4 (2.4)	0.24	1.8 (2.3)	0.7 (1.9)	0.02
	2.9 (2.0)	2.5 (2.0)	0.02	4.0 (1.4)	3.9 (1.5)	0.54	2.2 (2.0)	1.2 (1.4)	0.01

Multilevel model (MLM) regression was used to analyze the nested effect of participants within clinics. The baseline equivalent of the dependent variable was used as a covariate.

^aThe baseline variable PTSD diagnosis was added as a covariate to these analyses because it was correlated with study condition and the outcome variable.

^b A modified versions of the Medication Adherence Rating Scale (MARS) (Thompson, et al., 2000).

^c The RQOL (Retrospective Quality of Life) scale was administered at follow-up only.