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The Relationship between Substance Abuse Performance Measures and Mutual Help Group Participation after Treatment

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Abstract

We examined the relationship between treatment quality, using during-treatment process measures, and mutual help group (e.g., Alcoholics Anonymous) attendance after outpatient substance use disorder (SUD) treatment for 739 clients in the Alcohol and Drug Services Study. Logistic regression models estimated any and regular mutual help attendance after treatment. Clients referred to mutual help groups were significantly more likely to attend any mutual help after treatment. Results were mixed for facility offered mutual help groups; treatment engagement and retention were not significant. These findings offer treatment providers further evidence of the importance of referring clients to post-treatment mutual help groups, an effective, low-cost option.

Keywords

Self-help; mutual help; performance measures; substance abuse; treatment

Introduction

Addiction-related mutual help groups are an important and popular source of support for many individuals with substance use disorders (SUDs). Kessler, Mickelson and Zhao (1997) estimated that 6.4% of Americans between 25 and 74 years of age had ever attended a mutual help group for substance use problems and 2.6% had attended in the past year, for an average of 76 meetings per year among attendees. Despite their popularity, we know relatively little about who gets involved in these groups after SUD treatment and thus many questions remain about how individual characteristics and treatment-related factors, including substance abuse performance measures, affect participation. This study addresses several gaps in this research literature.

Mutual help group participation after treatment

Individuals with substance use disorders are often encouraged to participate in continuing care following professional SUD treatment in order to prevent relapse and extend the effects

of professional care (Institute of Medicine, 1990). One widely used and low-cost form of continuing care for individuals with SUDs is self-help or mutual help groups, including 12-step groups, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA), and other support groups that provide an alternative to the 12-step approach (e.g., Rational Recovery or S.M.A.R.T Recovery groups). Participation and membership in 12-step groups, particularly AA, is far greater than that in the alternative groups (Humphreys, 2004). Addiction-related mutual help groups are distinct from professional forms of continuing care treatment in their emphasis on anonymous, voluntary, peer-directed fellowship groups; in addition, individuals can readily participate in mutual help groups for many years at very little cost, whereas professionally-run continuing care programs are usually limited in duration and considerably more expensive (Humphreys, 2004). Studies of mutual help group participation are especially important given the affordability and accessibility of mutual help groups, the chronic, relapsing nature of SUDs, and federal, state and local fiscal constraints, with limited substance abuse treatment funding and long waiting lists for treatment slots a common challenge.

Addiction-related mutual help groups can provide a portal into an association with people who are abstinent or trying to remain abstinent, becoming an important, mutually reinforcing component of recovery for individuals with substance use disorders (Humphreys, 2004). Indeed, the research literature on mutual help group participation and its effectiveness show encouraging results, particularly for substance use outcomes after treatment. For example, a meta-analysis by Tonigan, Toscova, and Miller (1996) found a link between greater participation in AA and better drinking and psychosocial outcomes, although results varied by treatment setting and many of the studies were judged to be methodologically weak. Subsequent research has shown consistent benefits associated with mutual help group participation (e.g., Connors, Tonigan, & Miller, 2001; McKellar, Stewart, & Humphreys, 2003; Moos & Timko, 2008; Tonigan, 2001, 2008; Ye & Kaskutas, 2009). In addition, participation in addiction-related mutual help groups may produce health care cost savings (Humphreys & Moos, 1996; 2001).

Substance abuse performance measures

A key component of quality improvement is having mechanisms and methods for measuring treatment quality, and the focus on measurement of quality in SUD treatment has been growing in recent years (Institute of Medicine, 2006). In measuring quality of health services, including SUD treatment, the emphasis is usually on treatment processes or outcomes. Process measures assess the extent to which clinical practices conform to recommended standards of care; for SUD treatment, outcomes of interest include abstinence or reduced substance use, improved health, reduced criminal justice system involvement, increased employment or legal income, and improved housing conditions (Garnick, Horgan & Chalk, 2006; McLellan, Chalk, & Bartlett, 2007). In this paper, we focus on process measures related to SUD treatment, examining if there is a relationship with mutual help group attendance after treatment.

Process measures are often used as quality indicators because they may be easier to measure, are actionable by providers, and can be acted upon sooner for quality improvement than outcomes that are not seen until much later. For SUD treatment services, process measures that are indicators of quality often revolve around the number and timing of treatment visits. This is because research on SUD treatment outcomes has consistently shown that clients who remain in treatment longer have better treatment outcomes (Arria & TOPPS-II Interstate Cooperative Study Group, 2003; Hubbard, Craddock, & Anderson, 2003; McLellan et al., 2007).

The Washington Circle (WC) has developed several substance abuse performance measures. Two of these measures, treatment initiation and engagement, focus on the early stages of treatment and provide an assessment of the minimum services that should be provided. These process measures have been adopted by the National Committee for Quality Assurance (NCQA) as part of their Healthcare Effectiveness Data and Information Set (HEDIS) measures (Garnick et al., 2006; Garnick, Lee, Horgan, Acevedo, & the Washington Circle Public Sector Workgroup, 2009). For new outpatient treatment episodes, treatment initiation captures whether clients with substance use disorders return for additional treatment within 14 days after the first service (Garnick et al., 2009). Engagement in outpatient treatment is an intermediate step between initially accessing care and completing a full course of treatment, and is defined as clients receiving two or more additional SUD treatment services within 30 days after the treatment initiation service (Garnick et al., 2009). These measures can be used as rates to assess treatment performance, of health plans or states, for example. The measures have also been used at the individual level in research examining their association with clients' post-treatment criminal justice involvement (e.g., Garnick et al., 2007). The WC measures have been tested in both the private sector (health plans) and public sector (state substance abuse systems) and have been endorsed by the National Quality Forum (National Quality Forum, 2007). They are used by various entities including the NCQA, the Veterans Health Administration, and some state substance abuse service agencies (Garnick et al., 2009; Harris, Humphreys, & Finney, 2007; NCQA, 2007).

Another indicator of treatment quality used extensively in the SUD treatment field is retention in treatment, as many studies have demonstrated that longer treatment stays are associated with better treatment outcomes (McLellan et al., 2007). SAMHSA's National Outcomes Measures (NOMS) initiative included increased client retention in treatment as one of its performance measures, defined as the length of stay between the first and the last treatment service provided. In addition, the Department of Veterans Affairs has adopted a continuity of care performance measure based on continuous treatment involvement over a 90-day retention period (Harris, Humphreys, Bowe, Kivlahan & Finney, 2009). Finally, the WC's original conceptualization of performance measures placed them on a continuum of care for SUD treatment services, which included prevention/education, recognition, treatment, as well as the "maintenance stage" following treatment (McCorry, Garnick, Bartlett, Cotter, & Chalk, 2000). Performance measures for this maintenance stage could assess programs' efforts to maintain clients' treatment-initiated gains, with strategies that may facilitate the use of mutual help groups (e.g., referrals to AA/NA) or through the provision of other relevant services (e.g., employment counseling) (McCorry et al., 2000).

Rationale and analytic approach

This analysis is one of the first to examine the impact of both individual factors and during-treatment process measures on mutual help group involvement after SUD treatment, using a large, national sample of SUD treatment clients. One substance abuse performance measure examined in this study (engagement) builds on a performance measure designed by the Washington Circle; another (retention) builds on research showing that longer treatment retention is associated with better treatment outcomes (McLellan et al., 2007). Two additional measures pertain to the "maintenance stage" following treatment; these aim to assess the impact of efforts to promote treatment-related gains through encouragement of mutual help group participation (i.e., whether the facility offered mutual help groups, referral to mutual help groups at discharge). Using the sizable outpatient sample available in the Alcohol and Drugs Services Study (ADSS), we studied 739 clients with substance use disorders who had received nonmethadone outpatient treatment. The term "mutual help groups" is used throughout this paper to include both 12-step and non-12-step mutual help

groups, as appropriate. For example, this study included non-12-step groups in its measure of mutual help group attendance after treatment. We refer to “12-step groups” when reporting the results of studies that examined 12-step groups distinct from other types of mutual help groups.

The study also advances the limited literature on participation in mutual help groups after treatment by employing a propensity score approach, an advanced analytic technique that adjusts for selection bias in non-experimental data. One challenge in conducting a research study using observational data is that selection bias on the treatment-related variables of interest could account for any beneficial effect on the outcome examined. That is, any treatment effect may be related, in part, to large differences in pretreatment client risk factors (Shwartz & Ash, 2003). For example, those who engaged in treatment or stayed in treatment 90 days or longer might be simply be more motivated, higher functioning or have a higher commitment to abstinence than other clients, and therefore might be more likely to attend mutual help groups after treatment. Thus, techniques that attempt to adjust for this potential selection bias and disentangle these effects are important.

Methods

Data source

The data analyzed in this study were from the Alcohol and Drug Services Study (Substance Abuse and Mental Health Services Administration, 2003). ADSS has three main phases, which gathered data on SUD treatment facilities, clients in treatment, and client outcomes, respectively. Phase I was a telephone survey of a nationally representative sample of substance use disorder treatment facilities; Phase II consisted of in-person interviews of administrators from a sample of those treatment facilities as well as client data collected from a sample of client records from these facilities; and Phase III was a retrospective survey of clients with SUDs discharged from treatment programs. Data were collected from 1996 to 1999.

Data analyses focused on the ADSS Phase III questionnaire of people with substance use disorders who were surveyed following discharge from a sampled outpatient non-methadone treatment episode ($n=756$). We excluded individuals with missing data on mutual help group attendance after treatment, resulting in a final analytic sample of 739 clients. Clients were contacted approximately one year post-discharge from treatment, although the time to follow-up varied. Independent variables from all three of the ADSS phases were used as appropriate. The unit of analysis was the client. The term “index treatment” refers to the treatment that the client received at the sampled facility, selected from a specified time interval for discharges. The response rate for Phase III was 44% (Substance Abuse and Mental Health Services Administration, 2003); however the cooperation rate, which excludes clients who could not be contacted, was 77% (Reif, Horgan, Ritter, & Tompkins 2004). A non-response analysis found few differences between survey responders and non-responders (Ritter, 2000).

Variables

Participation in mutual help groups after treatment—In this study, mutual help group involvement is measured by self-reported attendance at addiction-related mutual help groups, including attendance in any Alcoholics Anonymous (AA), Cocaine Anonymous (CA), Narcotics Anonymous (NA), or other types of addiction-related mutual help groups for persons with SUDs. Measures of the degree of involvement in mutual help groups, such as talking with a sponsor, engaging in specific 12-step activities or seeking support from other group members are not available in ADSS.

The two dependent variables are measures of addiction-related mutual help group attendance, both constructed as dichotomous measures. The first indicated whether a client **attended any mutual help groups** after discharge from treatment. Among clients who attended at least one mutual help group after treatment, the second dependent variable indicates if a client attended mutual help groups regularly. **Regular mutual help group attendance** was defined as weekly or more frequent attendance at addiction-related mutual help groups after treatment for six months or longer.

The definition of regular attendance was determined by review of the literature and examination of the distribution of attendance. Research has shown that weekly or more frequent 12-step group attendance is associated with better SUD treatment outcomes than less than weekly or no attendance (Cloud & Kingree, 2008). An additional consideration in defining regular attendance was evidence suggesting that longer attendance is more beneficial than shorter attendance (Donovan & Floyd, 2008). Ultimately, a measure based on weekly or more frequent attendance for six months or longer was chosen as the best measure of regular attendance, based on the distribution of attendance and an analysis of days to follow-up. A nine month limit was considered, but raised concerns about the level of missing data for clients who had been interviewed at less than nine months after treatment.

Performance measures—The main independent variables were four during-treatment process measures: 1) **engagement in treatment**, defined as four or more outpatient visits during the sampled treatment episode (a measure similar although not identical to the WC measure of engagement); 2) **retention in treatment**, defined as length of stay of 90 days or longer; 3) **facility offered mutual help groups**; and 4) **referral to mutual help groups** at discharge. A client was considered to have benefited from maintenance of treatment efforts if he or she had been treated in a facility that offered mutual help groups or had received a referral to mutual help groups at discharge.

Other independent variables—The remaining independent variables reflect theoretically important client, treatment-related characteristics related to participation in mutual help groups after treatment which were available in the ADSS dataset. Dummy coded variables included in logistic regression models predicting mutual help group participation were: 1) male, 2) Hispanic ethnicity, 3) non-White race, 4) less than high school education, 5) married/living together at admission, 6) homeless at admission, 7) income less than \$20,000 in the year before admission, 8) any full-time employment in the year before admission, 9) ever lost a job due to alcohol or drug use, 10) any arrests in year before admission, 11) any prior SUD treatment, 12) any mutual help attendance (or regular attendance when dependent variable is regular attendance after treatment) in the year before admission, 13) mental health treatment in the year before admission, 14) poor or fair health in the year before admission, 15) used alcohol or drugs during treatment, 16) on probation or parole during treatment. Pre-treatment and post-treatment mutual help group attendance variables were not highly correlated ($r < 0.34$ for all pairs). Continuous independent variables were age, the quadratic form of age (age squared), time to follow-up survey interview, and age at first use of alcohol or drugs. Age is presented as a categorical variable for bivariate tables, but was included as a continuous variable in multivariate analyses.

Analytic approach for multivariate analysis

Statistical tests were first conducted using chi-square tests for dichotomous variables and t-tests for continuous measures. Initial multivariate models used logistic regressions to examine predictors of mutual help without adjusting for selection bias with propensity score techniques. Engagement in treatment and retention were not included simultaneously in

multivariate models. Subsequent propensity score analyses and logistic regressions were employed to adjust for potential selection bias in the main independent variables of interest.

Propensity score approach—In a randomized study, randomization of clients into treatment and control groups ensures that observed and unobserved pretreatment risk factors are comparable across groups. This balancing does not occur in observational studies, and the potential for selection bias occurs (Shwartz & Ash, 2003). In this study, for example, clients who either adhered to or attained one of the substance abuse performance measures examined may be markedly different in measured or unmeasured baseline characteristics. A standard method of adjusting for selection bias, and the starting point for the present analysis, is multivariate logistic regression. Under this approach, we estimate mutual help group participation after treatment as a function of the performance measures achieved/attained and other covariates that might relate to participation. A more sophisticated statistical technique employed in this analysis to adjust for selection bias is the propensity score method, developed by Rosenbaum and Rubin (1983). This technique can reduce bias in treatment effect estimates that may result from flawed model specifications, which in turn can occur when many measured baseline risk factors differ greatly between client groups of interest (Shwartz & Ash, 2003). It has been used in a variety of studies that evaluate SUD treatment (e.g., Shwartz, Saitz, Mulvey, & Brannigan, 1999), AA effectiveness (e.g., Ye & Kaskutas, 2009) and health services (e.g., Payne, DiGiuseppe, & Tilahun, 2002).

Using propensity score methods, a balanced subsample may be created for the variable of interest that is more matched on observable risk factors (Shwartz & Ash, 2003). The propensity scores in this study are: 1) the probability that the client “engaged” in treatment, 2) the probability that the client stayed in treatment 90 days or longer, 3) the probability that the client was treated in a facility that offered mutual help groups and 4) the probability that the client received a referral to mutual help groups at discharge; each is predicted by observable factors using logistic regression analysis. These variables included baseline substance use and demographic variables, as well as health and psychological variables and treatment-related factors. The propensity score was divided into approximately five quintiles and an equal number of mutual help participants and nonparticipants were selected from each of the quintiles to balance the sub-sample. The distribution of covariates was subsequently re-examined across mutual help attendees (i.e., non-attendee vs. attendee, regular attendee vs. non-regular attendee) after balancing to determine the similarity of baseline risk factors in these subsamples. Logistic regression analyses were then conducted on the balanced sub-sample to reevaluate the effect of during-treatment process measures of quality on mutual help group participation after treatment.

Results

Descriptive analyses

We found many sociodemographic differences between clients who did and did not participate in mutual help groups after treatment (Table 1). On average, attendees were slightly older than non-attendees (36.8 years of age vs. 34.4 years of age), and attendees were less likely than non-attendees to be under the age of 21 and more likely to be older than thirty years of age. Attendees were significantly more likely to be female (31.2% vs. 21.1%), and less likely to be Hispanic (10.1% vs. 21.4%) than non-attendees. Attendees were also more likely (16.5% vs. 10.0%) to have been homeless in the year before admission to treatment compared to non-attendees. Significant differences were also found by employment status, with attendees less likely than non-attendees to have been employed full-time (56.9% vs. 65.1%) in the year before admission. Interestingly, a higher percentage of attendees (37.9%) reported having lost a job due to alcohol or drugs than non-attendees

(16.1%). Finally, attendees were significantly less likely to have been arrested during that period (44.5% vs. 55.3%). No differences were found between regular and non-regular attendees with two exceptions: regular attendees were more likely (22.1% vs. 12.4%) to have been homeless in the year before admission and were less likely to have been arrested in the year before admission (37.1% vs. 50.9%) than non-regular attendees. Table 2 presents pre- and during-treatment variables, including the four during-treatment process measures, by any mutual help group attendance and by regular mutual help group attendance. Similar to the findings presented in Table 1, far more differences were found between attendees and non-attendees than between regular and non-regular attendees. Compared to non-attendees, attendees were more likely to have had prior SUD treatment (53.3% vs. 29.4%), have had mental health treatment in the year before admission (28.7% vs. 19.4%), and report a younger age of first use of alcohol or drugs (13.8 years vs. 14.6 years), while they were less likely to have used alcohol or drugs during treatment (26.3% vs. 36.0%). Not surprisingly, attendees were much more likely to have attended any mutual help groups in the year before admission (47.7% vs. 16.1%) or to have attended regularly (18.7% vs. 5.3%). Examining the during-treatment process measures of quality, we found that attendees were more likely than non-attendees to have been treated in a facility that offered mutual help groups (70.1% vs. 60.8%) and to have received a referral to mutual help groups at discharge (76.6% vs. 48.3%). Regular attendees were significantly more likely than non-regular attendees to have a history of regular attendance at these groups in the year before admission (27.1% vs. 11.2%), and were also more likely to have had mental health treatment in the year before admission (35.0% vs. 22.4%).

Unadjusted multivariate analyses

Table 3 provides results for the logistic regression models that did not control for potential selection bias using propensity score methods. The first two unadjusted logistic regression models examined the predictors of any mutual help group participation after treatment, with Model 1 considering treatment engagement and Model 2 considering treatment retention. The second two unadjusted logistic regression models examined predictors of regular mutual help participation after treatment. Model 3 includes treatment engagement, while Model 4 includes retention.

Predictors of any mutual help group participation after treatment—Results from Models 1 and 2 were generally similar; thus, to be concise, only Model 1 findings are described here, except where noted when significant differences in the two models were found (both sets of results are presented in Table 3). Table 3 shows that receiving a referral to mutual help groups at discharge (OR=3.64, $p<.0001$) and treatment in a facility that offered mutual help groups (OR=1.52, $p<.05$, Model 2 only; Model 1 significant at $p<.10$ level) were significantly associated with subsequent attendance in at least one mutual help group, while engagement and retention were not significant predictors of any attendance at mutual help groups after treatment.

Older age was associated with a greater likelihood of attending any mutual help groups after treatment (OR=1.16, $p<.05$). However, the quadratic form of age (age squared) was also statistically significant (OR=1.00, $p<.05$), suggesting that mutual help group attendance peaks at some point in the middle age range, and then decreases. Controlling for other variables in the model, a client with a SUD-related job loss in his or her past was much more likely to attend any mutual help groups than someone without this history (OR=2.02, $p<.01$). Additionally, a client who attended any mutual help groups in the year before admission (OR=3.38, $p<.0001$) was much more likely to attend any mutual help groups after treatment than a client who did not attend any such groups in the year before admission.

Other positive predictors of attendance after treatment were being on probation or parole during treatment (OR=1.80, $p<.05$) and being in poor or fair health in the year before admission (OR=1.65, $p<.05$, Model 1 only). Conversely, clients who were significantly less likely to attend mutual help groups after treatment were those reporting Hispanic ethnicity (OR=0.52, $p<.05$, Model 1 only), incomes less than \$20,000 (OR=0.56, $p<.05$), any arrests in the year before admission (OR=0.54, $p<.01$), mental health treatment in the year before admission (OR=0.56, $p<.05$, Model 1 only), and use of alcohol or drugs during treatment (OR=0.59, $p<.05$).

Predictors of regular mutual help group participation after treatment—Similar to Models 1 and 2, Models 3 and 4 were generally similar and thus only Model 3 findings are described here, except where significant differences in the models were found (again, both sets of results are presented in Table 3). Table 3 shows that none of the four during-treatment process measures were significantly associated with regular mutual help group participation after treatment. Our analysis found four variables associated with a greater likelihood of regular attendance at mutual help groups after treatment: being homeless in the year before admission (OR=2.41, $p<.05$); older age at first use of alcohol or drugs (OR=1.09, $p<.05$); regular mutual help group attendance in the year before admission (OR=3.19, $p<.01$); and on probation or parole during treatment (OR=1.85, $p<.05$, Model 4 only). In addition, male clients (OR=0.44, $p<.05$) and clients who had been arrested in the year before admission (Model 3: OR=0.48, $p<.05$) were less likely to attend mutual help groups regularly, compared to female clients or clients who had not been arrested in the year before admission.

Multivariate analyses controlling for selection bias

Generally, the findings from propensity score-adjusted analyses tended to verify the unadjusted results for the during-treatment process measures (Table 4). The findings indicate that referral to mutual help groups at discharge remained predictive of subsequent attendance at these groups, even after using the balanced sub-sample (OR=2.92, $p<.0001$). Engagement and retention remained unassociated with participation in mutual help group participation after treatment (although results are inconclusive for engagement and regular mutual help group participation after treatment, as the multivariate model did not converge). Treatment in a facility that offered mutual help groups and referral to mutual help groups at discharge remained a non-predictor of regular attendance at these groups after treatment. However, results from the propensity score analysis indicated that being treated in a facility that offered mutual help groups remained predictive of attendance at one or more of these groups after treatment only at the level of a trend ($p<.10$).

The distribution of covariates was comparable across groups (i.e., non-attender vs. attendee, regular attendee vs. non-regular attendee) after balancing, indicating a reduction in bias (data not shown). As such, the propensity score-adjusted results confirmed that the impact of receiving a referral to mutual help groups at discharge was not due solely to selection bias.

Discussion

Description of mutual help group attendees

Overall, these results provide further evidence for treatment providers of the importance of providing clients with referrals to addiction-related mutual help groups as one bridge to an affordable and accessible form of continuing care for persons with SUDs. Our analysis found distinct client factors that predict who attends mutual help groups after treatment in outpatient non-methadone treatment facilities. We also found that, with a few exceptions, variables that predicted post-treatment attendance versus non-attendance did not

differentiate regular attendees from non-regular attendees. This finding makes intuitive sense, because clients who have attended meetings at least once have different experiences upon which to base decisions about how often to attend meetings than do clients who do not attend at all. Overall, the results highlight the dissimilarity of these groups and the value of analyzing these clients separately.

Among sociodemographic factors, several were found to significantly predict attendance at mutual help groups after treatment (e.g., age, gender, Hispanic ethnicity, low income, and homelessness), although these differed by frequency of attendance. No differences were found by race, education, marital status or employment status on either attendance measure. While a number of studies have reported similar results on specific predictors of mutual help group involvement, such as gender (e.g., Humphreys, Mavis & Stofflemayr, 1991); Hispanic ethnicity (e.g., Tonigan, Miller, Juarez, & Villanueva, 2002); race (e.g., Brown, O'Grady, Farrell, Flechner, & Nurco, 2001; Humphreys & Woods, 1993); and measures of social stability and resources such as education, marital status, or employment (e.g., Brown et al., 2001; Humphreys et al., 1991; McKay et al., 1998), the empirical evidence of sociodemographic differences in mutual help group participation is often weak or inconsistent (Emrick & Tonigan, 2004; Emrick, Tonigan, Montgomery & Little, 1993). The lack of findings on many sociodemographic characteristics in this study confirms that addiction-related mutual help groups attract a diverse group of clients.

Not surprisingly, attendance at mutual help groups in the year before treatment admission is the strongest predictor of post-treatment attendance across all models. This finding is consistent with earlier research examining predictors of post-treatment involvement in mutual help groups (e.g., Cloud, 2004; Fiorentine & Hillhouse, 2000; Mankowski, Humphreys, & Moos, 2001). The study also found that clients on probation or parole during treatment were more likely than their counterparts without this legal status to attend groups and to attend regularly after treatment. This finding is consistent with other research (e.g., Brown et al., 2001; McKay et al., 1998) that has shown that individuals with more severe legal problems are more likely to be involved with mutual help groups. Since many courts now require 12-step group attendance as a condition of probation or parole for some individuals with SUDs involved in the criminal justice system (Weisner, 1990), the data on probation and parole status may reflect this policy. As such, the results suggest that this type of tactic is working to increase participation for these clients. Interestingly, mutual help group participation after treatment was less likely among clients who had been arrested in the year before admission. It is not clear what accounts for this seemingly contradictory finding, although one possibility is that clients with this problem may be more likely to use substances after treatment and thus may be less likely to participate in mutual help groups emphasizing abstinence.

Impact of during-treatment quality process measures on mutual help group participation after treatment

This study was unique both in its examination of the relationship between during-treatment process measures of quality and mutual help group participation after treatment and in its use of propensity score analysis to control for potential selection bias on these measures. One major finding was that propensity score-adjusted analyses tended to verify findings from standard logistic regressions. These results demonstrated that referral to mutual help groups at discharge from treatment was consistently and strongly associated with subsequent attendance for a range of different clients, even after controlling for potential selection bias. This finding adds to the limited research examining the effect of referrals on later mutual help group attendance (e.g., Mankowski et al., 2001; Winzelberg & Humphreys, 1999). In addition, results suggested that the relationship between referral to mutual help groups and later attendance did not depend on experience with mutual help groups before treatment.

This study thus demonstrates the powerful impact that SUD treatment professionals may have on clients' mutual help group attendance, as referral to these groups at discharge from treatment was one of the strongest predictors of clients' attendance at any mutual help groups after treatment. It is not surprising that clients' involvement in mutual help groups after treatment could be influenced by treatment providers' endorsement of these groups and the finding underscores the need to facilitate referrals to mutual help groups, when appropriate. Since many programs already urge clients to attend mutual help, new approaches will likely be needed to foster participation in mutual help groups after treatment. For example, Laudet and White (2005) showed that increased information and education about 12-step programs is essential and desired by many clinicians. The Twelve-Step Facilitation (TSF) treatment evaluated in Project MATCH led to higher rates of AA attendance during the follow-up period than the other two other interventions with different treatment orientations (Tonigan, Connors, & Miller, 2003). Another study found that clients who received intensive referral to self-help groups had higher rates of self-help group participation and better alcohol and drug use outcomes than clients who received a standard referral (Timko & DeBenedetti, 2007). Laudet, Stanick and Sands (2007) observed, however, that while treatment orientation and referral intensity have been shown to increase mutual help group participation, new interventions such as TSF may be too costly or time-consuming for many treatment programs to provide; moreover, intensive referrals may not be feasible for many clients, as they are provided via individual therapy and group counseling sessions are far more common.

Another treatment-related factor examined in this study that could influence mutual help group participation after treatment was being treated in a facility that offered mutual help groups. In contrast to the finding on referrals, results were mixed on this variable. In this instance, the propensity score analysis yielded insignificant results where this during-treatment process measure had originally predicted greater post-treatment attendance. One explanation for this change is that the original significant finding was due to case-mix differences between clients served in facilities that offer mutual help groups and clients treated at sites that do not offer this type of service; thus, the propensity score technique employed was effective in reducing selection bias using observed factors in the sample. Although an instrumental variables approach to controlling for selection bias was not possible with these data, this technique would be useful to employ in future research on this topic, as it also adjusts for unobserved confounders. Another possible explanation for the insignificant adjusted finding is that the sample size was reduced due to missing values on covariates when estimating propensity scores, leading to a loss of statistical power and decreasing the probability of detecting a significant effect. The only other study, to the authors' knowledge, to examine the effect of being treated in a facility that offered mutual help groups, is by Laudet, Stanick, and Sands (2007). Using regression analyses, the study found that on-site presence of 12-step meetings in outpatient SUD treatment programs predicted 12-step group attendance during treatment and sustained abstinence after treatment, while the effect on post-treatment 12-step group attendance was mixed. During-treatment attendance at 12-step meetings was highly associated with later attendance, however.

Contrary to expectations, adherence to engagement and retention measures did not predict mutual help group participation after treatment. Several possible explanations could account for the lack of findings on these measures. One explanation relates to data limitations in variable construction. For example, we attempted to approximate the WC engagement measure using variables available in the ADSS dataset; however, ADSS reports only the total number of outpatient visits received without any indication of when those visits occurred. Thus, the constructed engagement variable might not have adequately measured the WC concept. In addition, the WC measure on retention is still under development, and

thus the retention measure used in this study might not be optimal. Retention was constructed as a dichotomous variable indicating a 90 day stay or longer, consistent with earlier research (e.g., National Institute on Drug Abuse, 2009) that has shown a 3-month stay to be the therapeutic threshold for adequate treatment retention needed for better client outcomes. The finding on retention is at odds with earlier research by Fiorentine and Hillhouse (2000) which showed that longer treatment duration was related to subsequent 12-step program involvement.

Limitations and strengths

This study has several important limitations that should be acknowledged. Limitations of this study include its retrospective nature, the one follow-up study design, the age of the ADSS data and the use of attendance at mutual help groups rather than other indicators of affiliation to measure involvement in these groups. In addition, some key independent variables, such as availability of social support or motivation to change were not available due to data limitations. Since propensity score methods do not control for unobserved case-mix differences, unlike instrumental variables approaches, different results may have been found if the latter technique could have been tested as well. Another potential weakness of the technique as used in this study is the loss of statistical power. Other possible explanations that cannot be ruled out are that clients who relapse after treatment drop out of or never attend mutual help groups or that other factors (such as the availability of social supports) not fully accounted for by propensity score adjustments could be influencing mutual help group attendance.

Despite these caveats, the strengths of this study are numerous. First, the ADSS data are a unique resource of information on SUD treatment programs and clients in the specialty treatment sector. ADSS provides a large national sample with a diverse set of clients and treatment settings, allowing the linkage of individual, treatment history and facility-level data with mutual help group experiences. Despite the age of the data, the concepts examined here should not be particularly susceptible to change over time. Although the low survey follow-up rate is problematic, it is countered by the relatively high cooperation rate (Reif et al., 2004) and the few differences found between responders and non-responders (Ritter, 2000). Thus, the survey can still be used to indicate significant effects.

Conclusions

Using a national sample of a diverse group of clients, this study provides valuable information on the characteristics of individuals discharged from outpatient non-methadone SUD treatment facilities who get involved in addiction-related mutual help groups after formal treatment ends. It also contributes to the small but growing body of literature on treatment-related factors that predict mutual help group attendance (e.g., Humphreys & Woods, 1993; Laudet et al., 2007; Tonigan et al., 2003). As such, it helps us better understand the factors influencing who chooses to participate in these types of groups. In addition, this research is one of the first to examine the relationship between during-treatment process measures and mutual help group participation after treatment. A greater understanding of this relationship could help inform and improve the quality of care provided during alcohol and drug treatment and ultimately aid in the recovery of individuals with substance use disorders, since these process measures can be directly influenced by treatment programs and clinicians. For instance, this information could be used by SUD treatment counselors or treatment organizations to better understand who is at risk of not attending groups or attending infrequently, and to target efforts accordingly to create policies that promote participation. While recognizing that mutual help groups may not be helpful for everyone, it is likely that some clients who do not attend or attend only a few meetings could benefit from greater involvement.

The findings of this study suggest that one of these process measures, referral to mutual help groups at discharge from treatment, does have an effect on subsequent attendance at these groups for some clients. Finally, this research developed and used a propensity score approach to the problem of selection bias in analyses of addiction-related mutual help groups that could be replicated in other studies of mutual help group participation. Further research is needed to confirm and elaborate on these findings, especially those related to referral and programs offering mutual help groups, and to improve on the limitations of this study. For example, additional research using more refined measures of engagement and retention than were possible in this analysis may shed additional light on their relationship with mutual help group participation after treatment. Studies are also needed to clarify the effect of programs offering mutual help groups on during-treatment and post-treatment mutual help group attendance and client outcomes. Finally, where possible, we need to examine these relationships using longitudinal studies over multiple and extended follow-up periods to clarify the causal relationship between during-treatment process measures of quality, mutual help group participation after treatment and client outcomes.

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[illegible]

^a Regular attendees after treatment are a subset of the any mutual help group attendance after treatment group

p<.001

Table 2

Ever in year before admission	220	29.8	47.7	16.1	***	53.6	42.2
Regularly in year before admission	82	11.1	18.7	5.3	***	27.1	11.2**
Mental health treatment in year before admission	173	23.4	28.7	19.4	**	35.0	22.4*
Health status in year before admission					***		
Excellent	141	19.1	10.0	26.1		11.4	8.1
Good	339	45.9	45.9	45.9		41.4	49.1
Fair	188	25.4	31.8	20.6		32.1	31.7
Poor	71	9.6	12.5	7.4		15.0	11.2
On probation/parole during treatment	306	41.5	45.6	38.4		50.7	43.8
Used alcohol or drugs during treatment	233	31.7	26.3	36.0	**	25.0	26.7
<u>Treatment Process Variables</u>							
Engaged in treatment (4 or more visits)	513	83.4	82.2	84.3		82.1	82.9
Length of stay 90 days or longer	451	61.4	58.8	63.4		62.1	56.9
Facility offered mutual help groups	479	64.8	70.1	60.8	*	65.7	73.9
Referral to mutual help groups at discharge	448	60.6	76.6	48.3	***	77.1	78.9

^a Excludes mutual help groups

Note: valid percents reported

^b Regular attendees after treatment are a subset of the *any mutual help group attendance after treatment group*

* p<.05

** p<.01

*** p<.001

Table 3

Time to follow-up interview	0.99	1.00	1.00	1.00
<u>Pre and During Treatment Characteristics</u>				
Age at first use of alcohol or drugs	0.99	0.99	1.09 *	1.08 *
Prior substance use disorder treatment	1.57	1.42	1.09	1.03
Any mutual help attendance in year before admission ^b	3.38	3.47	3.19	3.28
Mental health treatment in year before admission	0.56	*	0.71	1.25
Poor or fair health in year before admission	1.65	*	1.49	0.92
Used alcohol or drugs during treatment	0.59	*	0.54	0.84
On probation/parole during treatment	1.80	*	1.57	1.85
<u>Treatment Process Variables</u>				
Engaged in treatment (4 or more visits)	1.18		0.63	
Length of stay 90 days or longer		1.10		1.15
Facility offered mutual help groups	150	c	1.52 *	0.51 c
Referral to mutual help groups at discharge	3.64	****	3.21	1.27

^a Regular attendees after treatment are a subset of the *any mutual help group attendance after treatment* group

* p<.05

**

p<.01

p<.001

p<.0001

^b Regular mutual help group attendance in year before admission in models 3 and 4

^c In models 1 and 3, treatment in a facility that offered mutual help groups was significant at the p<.10 level.

Table 4

Independent variable	Unadjusted odds ratio	Sig	PS-adjusted odds ratio	Sig	Unadjusted odds ratio	Sig	PS-adjusted odds ratio	Sig
<u>Treatment Process Variables</u>								
Engaged in treatment (4 or more visits)	1.18		1.62		0.63			^c
Length of stay 90 days or longer	1.10		0.97		1.15			1.02
Facility offered mutual help groups	1.52	*	1.63	^d	0.64			0.62
Referral to mutual help groups at discharge	3.21	****	2.92	****	0.88			0.80

***= p<.01

****= p<.001

^a See Table 3 for other independent variables included in models

^b Regular attendees after treatment are a subset of the *any mutual help group attendance after treatment* group

*

p<.05

p<.0001

^c Model did not converge

^d Significant at the p<.10 level