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Services received and treatment outcomes in day-hospital and residential programs

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Abstract

This longitudinal health services study ($N = 733$) (1) examines the impact of services received on 6-month outcomes, and (2) compares day-hospital to residential programs on services received. Services were measured at 2, 4, and 8 weeks postbaseline using a version of the Treatment Services Review. Higher odds of total sobriety at 6 months were associated with greater participation in (a) extracurricular (but not curricular) 12-step meetings, (b) sober recreational events, and (c) educational sessions. Program effects also emerged. Unexpectedly, extracurricular 12-step meeting attendance and the odds of having a sponsor were lower among residential (vs. day hospital) participants through 4 weeks, despite higher participation in curricular 12-step meetings among residential participants at 2 weeks. Still, residential participants reported higher involvement in sober recreation and informal peer socialization across most analyses. Findings suggest that residential and day-hospital programs might maximize outcomes by facilitating optional 12-step involvement and sober recreation, respectively.

Keywords: Services received; Treatment components; 12-Step; AA; Sober recreation

1. Introduction

The active ingredients of an effective chemical dependency treatment program remain, to a large extent, unknown. Although research has addressed the overall impact of adding supplemental services to core alcohol- and drug-related services (Gerstein & Harwood, 1990; Institute of Medicine, 1990; McLellan et al., 1996, 1998), few studies have examined the impact of specific services received (such as types of groups and activities attended) on treatment outcomes (cf. Moos, Finney, & Cronkite, 1990; Orwin & Ellis, 2000). Understanding which treatment components work most effectively would help programs tailor their curricula to minimize costs and to maximize outcomes. Hence, the current research examines associations between specific sessions, meetings, and activities attended during treatment (i.e., at 2, 4, and 8 weeks) and 6-month outcomes in a longitudinal treatment sample. By sampling from residential and day-hospital programs, the current research also examines whether program modality affects the array of services that clients receive. Prior analyses of these same data found no effects of program modality on client outcomes; instead, time in treatment and subsequent 12-step meeting attendance emerged as key predictors (Witbrodt et al., 2007). These null program results point to a need for understanding whether there may be differential effects of specific treatment services, and for studying how program modality affects services received. Residential and day-hospital programs may achieve their goals via very different means; an understanding of their particular strengths could improve both.

1.1. Services received and client outcomes

Numerous studies address the impact of adding social, medical, psychiatric, and employment services to alcohol- and drug-focused addiction counseling, and the majority of

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such studies have found that providing additional services results in more and longer-lasting benefits to patients (Gerstein & Harwood, 1990; Institute of Medicine, 1990; McLellan et al., 1996, 1998). These findings have been replicated in controlled clinical trials varying the "dose" of treatment services received, in quasi-experimental conditions introducing supplemental services into existing programs, and in observational studies. Meanwhile, relatively few studies have addressed the impact of specific treatment components on client outcomes. In one exception, Orwin and Ellis (2000) examined the relationship between treatment components and positive treatment outcomes via a secondary analysis of data from the National Treatment Improvement Evaluation Study. They found that several components were significantly related to the odds of good treatment outcome over and above the effects of client background characteristics, including treatment dosage, whether clients saw their treatment plan, use of ancillary services, and medications. Still, both the direction and the significance of effects varied widely across the four treatment modalities (i.e., nonmethadone outpatient, short-term residential, long-term residential, and correctional facility), with no variable showing consistent effects. Similarly, Moos et al. (1990) examined the effects of treatment components in a naturalistic longitudinal study of four treatment programs. They found that higher odds of sobriety were predicted by use of disulfiram (Antabuse); frequency of Alcoholics Anonymous (AA) meeting attendance; number of therapy sessions; number of lectures and films; Sunday worship; and involvement in sober recreational activities. Again, however, several of these effects were exclusive to one or two programs. These sparse and inconsistent findings suggest the need for further research on larger samples.

The current research focuses on the relationship between positive treatment outcomes and receipt of various alcohol and drug services, including group counseling sessions; alcohol and drug education; relapse-prevention groups; individual sessions; sober recreational events; and 12-step involvement as part of treatment and on one's own initiative. The research also investigates the effects of informal peer socialization and supplemental psychiatric, family, medical, and legal services. The forgoing research, together with a substantial evidence base revealing associations between better treatment outcomes and both greater 12-step involvement (Emrick, Tonigan, Montgomery, & Little, 1993; McIntire, 2000; Tonigan, 2001; Tonigan, Connors, & Miller, 2003; Tonigan, Toscova, & Miller, 1996; Witbrodt et al., 2007; Zemore & Kaskutas, 2007) and larger social networks of sober friends (Bond, Kaskutas, & Weisner, 2003; Humphreys, Mankowski, Moos, & Finney, 1999; Kaskutas, Bond, & Humphreys, 2002), suggests the following predictions:

Hypothesis 1. Higher odds of sobriety at 6 months are predicted by greater: (a) 12-step meeting attendance, (b) attendance at sober recreational events, (c) informal socialization with peers, and (d) psychiatric, family, medical, and legal services.

1.2. Program modality and services received

In addition to examining the impact of services received on treatment outcomes, the present research explores whether services received differed by program modality (i.e., day hospital vs. residential). Study programs' differential investment in the social and medical model perspectives suggested that they would.

The terms "social model" and "medical model" derive from the Institute of Medicine's (1990) longstanding distinctions between these philosophies. According to the Institute of Medicine, the social model perspective views alcohol problems as the result of socialization in a particular social and cultural milieu. As a result, prototypic social model programs emphasize the environment of addiction, with providers encouraging new social structures and relationships that support an abstemious lifestyle. Consistent with their focus on supportive relationships, social model programs are usually residential and community based. The medical model perspective, in contrast, sees alcoholism as a progressive disease caused by physiological malfunctioning. Hence, medical model treatment traditionally weights individual-level psychological and medical problems heavily (while acknowledging social influences) and is delivered by, or under the supervision of, a physician and degreed staff. Programs are based in hospitals or clinical settings, and provide inpatient, day-hospital (intensive outpatient), and outpatient treatments. It is important to recognize, however, that these differences reflect relative, rather than exclusive, areas of emphasis. For example, both perspectives acknowledge that alcoholism is a disease affected by the environmental context. Furthermore, most medical model programs now adhere to the Minnesota Model approach (McElrath, 1997), which blends professional practices with 12-step philosophy. Thus, they employ some recovering nondegreed counselors, and some medical staff may be in recovery. Similarly, and to address clients' mental health problems, many social model programs now include one or more psychologists on staff (Kaskutas, Keller, & Witbrodt, 1999).

Consistent with these philosophical differences, several qualitative studies have documented substantial differences in the curricula and operation of social and medical model programs (Barrows, 1998; Borkman, Kaskutas, Room, & Barrows, 1998; Kaskutas, Greenfield, Borkman, & Room, 1998; Kaskutas, Piroth, & Karp, 1998; Room, 1998). This research has highlighted social model programs' stronger focus, relative to medical model programs, on peer-driven recovery, 12-step involvement, and the general environment of addiction (Barrows, 1998; Borkman et al., 1998; Kaskutas, Greenfield, et al., 1998; Kaskutas, Piroth, et al., 1998; Room, 1998). Program differences have also been identified in quantitative work, including a mixed-methods

study comparing two social model programs (one prototypic, one nonprototypic) to a medical model program (Kaskutas et al., 2005). Results from that study showed that residents at the prototypic social model program reported greater attendance at sober recreational events and more significant discussions about family problems, compared to medical model participants. Furthermore, observational data indicated that therapists at the prototypic social model program put relatively greater emphasis on experiential learning, interactive learning, and peer helping. Still, additional research is needed to test whether these results replicate in other samples.

The current study's residential sites were strongly grounded in the social model perspective, scoring above the criterion for social model classification on the Social Model Philosophy Scale (Kaskutas, Greenfield, et al., 1998; Room, 1996). Our day-hospital programs demonstrated relatively greater commitment to the medical model perspective, as evidenced in the site descriptions to follow and particularly by their staffing. These differences once again reflect relative, rather than exclusive, emphases. Still, we suspected that they would prove important. Based on the forgoing discussion, we hypothesized the following:

Hypothesis 2. Even after controlling for length of stay, residential participants will report, relative to day-hospital participants, greater (a) 12-step meeting attendance, (b) attendance at sober recreational events, (c) informal socialization with peers, and (d) family services.

2. Materials and methods

2.1. Sample

The current study uses data from our second Social and Medical Model Addiction Recovery Trial (SMMRT-2),[1] a health services study comparing day-hospital and residential recovery programs on services, outcomes, cost-effectiveness, and cost offset (for a more complete description, see Witbrodt et al., 2007). SMMRT-2 was conducted from 1999 to 2004 via collaboration with a private nonprofit managed health care plan and its contracted residential recovery sites.

Participants (baseline N = 733; 470 men, 263 women) were recruited from three intake units serving five chemical dependency recovery programs with contractual ties to residential programs in the same region (see Table 1 for descriptives). All adults aged ≥ 18 years were eligible for the study if they met the American Society of Addiction Medicine criteria qualifying them for residential recovery home benefits (i.e., Criteria 1–5 and, optionally, Criterion 6; for more details, see Witbrodt et al., 2007).

[1] The study reported here is not affiliated with the SMART Recovery (2006) program.

Table 1
Sample descriptives (N = 733)

Baseline variables	Values
Gender (%)	
Women	36
Race (%)	
White	54
Hispanic	17
Black	23
Other	6
Marital status	
Married/with partner (%)	36
Initial diagnosis (%)	
Alcohol dependent only	35
Drug dependent only	30
Alcohol and drug dependent	31
Undiagnosed	4
Age [M (SD)]	41.1 (10.9)
ASI severity [M (SD)]	
Alcohol	0.44 (0.33)
Drug	0.14 (0.12)
Medical	0.26 (0.34)
Psychiatric	0.44 (0.24)
Legal	0.12 (0.20)
Employment	0.41 (0.27)
Follow-up rates (%)	
2 weeks	78
4 weeks	71
8 weeks	72
6 months	79
12 months	74

All eligible participants were asked if they agreed to be randomized. Forty percent (n = 293) of the participants agreed and were randomized, using computerized urn randomization balanced on gender and ethnicity, to either day-hospital services at the parent program or a contracted residential program in the area. The remaining 60% (n = 440) of the participants were invited to participate as a nonrandomized group. This group included both clients who chose their own treatment and clients whose admitting physician prescribed a program based on clinical considerations. Nonrandomized participants attended either day-hospital or residential services and completed assessments in parallel with the randomized group. The study thus included two arms (randomized and nonrandomized) and two program modalities (residential and day hospital). Participants were interviewed at baseline (N = 733) and at 2 weeks, 4 weeks, 8 weeks, 6 months, and 12 months postbaseline. Our key follow-up here is the 6-month time point. Participants successfully followed at 6 months did not differ from those lost to follow-up on randomization arm, treatment assignment, length of stay, or baseline measures of demographics and problem severity, with the exception that those lost to follow-up were significantly younger (M = 39.5 vs. 41.5 years; $p < .05$) and reported more severe drug problems (baseline Addiction Severity Index [ASI] score = 0.16 vs. 0.14; $p < .05$) and legal problems (baseline ASI score = 0.15 vs. 0.11; $p < .05$).

2.2. Study sites

The study sites used were five day-hospital chemical dependency recovery programs affiliated with a large prepaid health plan and situated in three large metropolitan areas in the United States. The health plan provides integrated chemical dependency treatment and health services. Also included were seven state-licensed residential community treatment programs under contract with the day-hospital programs in each of the three metropolitan areas.

The five day-hospital sites are representative of mainstream private chemical dependency programs that are modeled on a 28-day Minnesota Model inpatient treatment (see Gerstein & Harwood, 1990) and conform to American Society of Addiction Medicine (2001) patient placement criteria for intensive outpatient/partial hospitalization. Treatment consists of didactic and counseling groups in a mixed-gender setting, although gender-specific groups are also offered. Clients are randomly drug tested. Sites are staffed by psychiatrists, primary care physicians, master's-level social workers and therapists, registered nurses, and certified/licensed alcohol and drug abuse counselors ("CADACS" most of whom are in recovery). Recovering staff comprise a minority of the staff. The prescribed length of stay is 2–3 weeks in a day hospital, followed by a recommended continuum of care in less intensive standard outpatient treatment for up to 1 year.

The study's contracted residential sites are typical of residential programs developed by members of substance abuse mutual-help programs (Borkman et al., 1998). Residential sites included two female-only programs, three male-only programs, and two mixed-gender programs. In addition to attending didactic and counseling groups, residential clients are expected to participate in daily living chores, sober recreational events, and meditation. Drug testing is performed occasionally (administered either randomly or on suspicion of use). Programs are staffed primarily by nondegreed counselors in recovery, some of whom are longstanding program graduates. Most programs have several state-certified alcoholism and drug abuse counselors on staff (in some programs, all are certified). Volunteers with long-term sobriety often lead recovery-oriented groups. The length of stay covered by the health plan in residential programs is 60 days; the recommended continuum of care afterward is usually 1 year of outpatient treatment.

2.3. Measures

2.3.1. Treatment services

Treatment services were assessed using a version of the Treatment Services Review (TSR; McLellan, Alterman, Woody, & Metzger, 1992), which solicits self-reports of the type and the number of services received in domains corresponding to subscales of the ASI (McLellan, Luborsky, Cacciola, & Griffith, 1985; McLellan, Luborsky, Cacciola, Griffith, Evans, et al., 1985). The current study examined services received in alcohol and drug, psychiatric, family, medical, and legal domains over the 7 days prior (see Appendix A for items). Questions assess the number of "significant discussions" about problems in the domain (e.g., "Have you had an individual or group counseling session with someone where there was significant discussion of your psychological or emotional problems?"), referrals to specialists, and so on. Services received were assessed at 2, 4, and 8 weeks postbaseline. To aggregate services, we summed over all sessions and services received within a given domain for a given follow-up point. Thus, to aggregate medical services received on Week 2, we summed (for each person) the number of groups on medical problems, individual sessions on medical problems, and the number of days the participant took medication for medical problems, all in the week prior to the 2-week follow-up. (We also summed across services received at the day-hospital and residential programs, which is an important point because residential clients received some services at the parent hospital program.) This approach to aggregating services (which follows prior work; e.g., McLellan, Alterman, Woody, et al., 1992) allowed us to limit the number of analyses performed, thus limiting Type 1 error. Prior studies on the complete TSR measure have indicated good test–retest reliability and generally good correspondence with clinic records (i.e., item correlations between .52 and .91; McLellan, Alterman, Cacciola, Metzger, & O'Brien, 1992). At each assessment, participants also indicated how many days they had attended treatment in the prior week, providing us with three length-of-stay variables corresponding to services windows.

2.3.2. Treatment outcomes

Our outcome variable was 30-day abstinence from alcohol and drugs, assessed at the 6-month follow-up.

2.3.3. Demographics and other covariates

Demographic variables included gender, age, race, income, education, employment status, marital status, and initial diagnosis. Baseline interviews assessed initial severity using the seven ASI subscales (i.e., Alcohol, Drug, Psychiatric, Medical, Family, Legal, and Employment; McLellan, Luborsky, Cacciola, & Griffith, 1985; McLellan, Luborsky, Cacciola, Griffith, Evans, et al., 1985). Program covariates included randomization status (randomized vs. nonrandomized), program modality (day hospital vs. residential), and length of stay. All dichotomous variables were dummy coded.

2.4. Data analysis

The main analyses used for Hypothesis 1 were hierarchical logistic regressions. Because we expected the effects of services received on outcomes to vary as a function of when those services were delivered (e.g., that services delivered at 2 weeks might be more strongly associated with outcomes than services delivered at 8 weeks), we conducted separate

analyses testing the effects of services delivered at 2, 4, and 8 weeks. In each case, we entered demographic and treatment covariates in an initial block, followed by services received (in subsequent blocks). Covariates entered in Block 1 were carefully selected based on preliminary analyses exploring associations between sobriety at follow-up and a wide range of demographic and treatment variables: Only those variables showing significant associations with 6-month sobriety were selected for entry. On this basis, we excluded randomization status, program modality, and baseline ASI severity scores from the analysis. Given our interests and the need to limit Type I error, we analyzed aggregates—but not individual services received—when exploring the effects of psychiatric, family, medical, and legal services (Hypothesis 1d).

Analyses used for Hypothesis 2 included *t* tests comparing the mean levels of alcohol and drug services received between residential and day-hospital participants. Analyses of covariance (ANCOVA) were used to compare alcohol and drug services received at residential and day-hospital programs while controlling for length of stay, baseline alcohol severity, and baseline drug severity, with the latter measured by the ASI. Alcohol and drug services received in the past week were log transformed to normalize their (skewed) distributions. Similarly, to test program effects on the odds of having a sponsor at follow-ups, we used both bivariate chi-square tests and multivariate logistic regression, controlling for length of stay, baseline ASI alcohol severity, and baseline ASI drug severity. Relatively few individuals received psychiatric, family, medical, and legal services, so the distributions for these variables were highly skewed. Hence, program effects were assessed for these variables using Pearson chi-square tests comparing the proportions of individuals receiving (vs. not receiving) services by program, and logistic regressions to examine program effects while controlling for length of stay and baseline ASI severity in the corresponding domain (following McLellan et al., 1998). (Baseline ASI severity was a significant predictor of services received in almost every analysis of supplemental services.) Each analysis used all individuals with data at relevant time points, rather than deleting cases with any missing follow-up data.

Evaluating program effects was complex because a substantial number of participants (n = 120) did not pursue treatment exclusively at their assigned program. Many participants assigned to residential programs received day-hospital treatment exclusively or in addition to residential treatment (n = 85), and some participants assigned to day-hospital programs actually received treatment at residential programs (n = 35). Among the former group, some (n = 20) initiated continuum-of-care services at the day hospital following residential treatment, in accord with standard recommendations. To produce the clearest possible picture of services received at day-hospital and residential programs for Hypothesis 2, we analyzed the data (1) excluding all 120 of these participants, and (2) excluding all but the 20 continuum-of-care residential participants. Because the results were almost identical and because the former analysis is conceptually cleaner, we present results from that analysis. Analyses for Hypothesis 1 include the entire sample because program was not included in the model. (Note that there were null effects of program on sobriety even after excluding the 120 people described above.)

3. Results

3.1. Hypothesis 1: Services received and 6-month sobriety

We hypothesized that higher odds of sobriety at 6 months would be associated with greater 12-step meeting attendance; attendance at sober recreational events; informal socialization with peers; and psychiatric, family, medical, and legal services (referred to summarily as "supplemental services"). Table 2 presents associations between 6-month sobriety and alcohol- and drug-related services. Table 3

Table 2
Effects of curricular and extracurricular alcohol and drug services on the odds of total sobriety at 6 months

Predictor variables	Week 2 (n = 457)	Week 4 (n = 428)	Week 8 (n = 450)
Block 1: Demographic and treatment covariates (adjusted OR)			
Age	1.02 *	1.02 *	1.02 *
Baseline dependence on alcohol and drugs (vs. no dependence)	0.64	0.96	0.77
Number of days attended treatment in the past week	1.03	1.06	1.14
Block 2: Curricular services received in the past week (adjusted OR)			
Number of group counseling sessions on alcohol and drugs	1.01	0.96	0.98
Number of education sessions on alcohol and drugs	1.04	1.12 *	1.07
Number of relapse-prevention groups	1.02	1.01	1.05
Number of individual sessions on alcohol and drug problems	0.89	0.89	0.88
Number of sober recreational events	1.38 *	1.36 *	0.99
Number of 12-step meetings attended as part of treatment	1.00	1.05	1.02
Block 3: Extracurricular services received in the past week (adjusted OR)			
Number of times socialized informally with others in recovery	1.01	0.93	0.95
Number of optional 12-step meetings attended	1.07	1.11 *	1.12 *
Currently has a 12-step sponsor (vs. does not have a sponsor)	1.36	1.18	1.23
Model component (chi-square tests for each block, p value)			
Block 1: Demographic and treatment covariates	<.001	<.01	<.001
Block 2: Curricular services	*ns*	<.05	*ns*
Block 3: Extracurricular services	*ns*	<.05	<.05
Full model	<.001	<.001	<.001

Note. The table reports the results of hierarchical logistic regressions. Chi-square tests examine the reduction in log likelihood from one step of the model to the next (with Block 1 being compared to the constant alone).

* $p < .05$.

presents findings for supplemental services. The tables show separate equations for 2-, 4-, and 8-week services.

Table 2 reveals relatively weak effects overall for both curricular and extracurricular alcohol and drug services. Nevertheless, the data do offer evidence supporting relationships between 12-step involvement and sobriety. Attending more extracurricular (i.e., optional) 12-step meetings at the 4- and 8-week assessments predicted significantly higher odds of sobriety at 6 months; curricular (i.e., required) meeting attendance was not a good predictor of sobriety, however. An additional predictor of sobriety was greater attendance at sober recreational events at 2 and 4 weeks, as expected (although there were no effects of sober recreational events at 8 weeks). Contrary to expectations, informal socialization with peers was not related to the odds of sobriety. Results show null effects for all other alcohol and drug services, except for receipt of educational sessions at 4 weeks, which was positively associated with the odds of sobriety. For the 2- and 8-week assessments, the demographic and treatment covariates (i.e., age, baseline dependence status, and days in treatment over the previous week) contributed as much, or more than, all alcohol and drug services combined to explaining the variance in 6-month total sobriety. Alcohol and drug services received at 4 weeks contributed slightly more toward explaining sobriety.

Table 3 reveals similarly weak effects for psychiatric, family, medical, and legal services when controlling for the impact of age, baseline diagnosis, and days in treatment.

Table 3
Effects of supplemental services on the odds of sobriety at 6 months

Predictor variables	Week 2 (n = 462)	Week 4 (n = 431)	Week 8 (n = 451)
Block 1: Demographic and treatment covariates (adjusted OR)			
Age	1.02 *	1.02	1.02 *
Baseline dependence on alcohol and drugs (vs. no dependence)	0.70	0.94	0.81
Number of days attended treatment in the past week	1.10 *	1.10 *	1.13 **
Block 2: Supplemental services received in the past week (adjusted OR)			
Number of psychiatric services received	1.00	0.98	1.00
Family services received (vs. not received)	1.06	1.30	1.31
Medical services received (vs. not received)	0.98	0.87	1.00
Legal services received (vs. not received)	4.01	1.14	–
Model component (chi-square tests for each block, p value)			
Block 1: Demographic and treatment covariates	<.01	<.05	<.001
Block 2: Supplemental services	*ns*	*ns*	*ns*
Full model	<.01	*ns*	<.01

Note. This table reports the results of hierarchical logistic regressions. Chi-square tests examine the reduction in log likelihood from one step of the model to the next (with Block 1 being compared to the constant alone).

* $p < .05$.

** $p < .01$.

Although we had hypothesized significant associations between 6-month sobriety and all supplemental services, results reveal no significant associations between 6-month sobriety and supplemental services, despite a large odds ratio for legal services. We did not assess the impact of legal services provided at 8 weeks in light of the small number of people (n = 8) who received such services at that time point. The 4-week model did not fit the data well, as indicated by the overall fit for the full model, indicating caution in interpreting all effects of that model.

3.2. Hypothesis 2: Program mode and services received

Our second hypothesis was that residential clients would report, relative to day-hospital clients, greater 12-step meeting attendance, attendance at sober recreational events, informal socialization with peers, and family services. Table 4 displays program effects on continuous measures of services received at 2, 4, and 8 weeks, including both raw means by program and program effects, adjusting for days in treatment over the same period (i.e., the week prior) and baseline alcohol and drug severity. Note that, although the table presents the means of untransformed scores for interpretability, the reported significance levels associated with these means come from analytic tests performed using log-transformed scores (see Materials and Methods). Similarly, Table 4 presents bivariate and multivariate tests of program effects on categorical measures of services received at 2, 4, and 8 weeks. Any services received by day-hospital participants beyond 3 weeks would have been received as outpatient aftercare (and not core day-hospital treatment), so that services received at the two programs should be most comparable at 2 weeks.

The unadjusted means and proportions in Tables 4 and 5 indicate that residential clients tended to receive more alcohol and drug services overall, especially at 4 and 8 weeks. This makes sense considering that the planned dosage was 30–60 days at residential programs, versus 14–21 days at day-hospital programs. The adjusted values (indicated in parentheses) indeed show few differences by program. Nevertheless, some program effects emerged even after controlling for length of stay and baseline severity. Program effects on 12-step involvement were unexpectedly mixed. Residential clients reported significantly higher participation in curricular 12-step meetings at 2 weeks, relative to day-hospital participants, as expected. Yet this effect reversed over time: The multivariate model shows lower curricular attendance among residential (vs. day hospital) participants at 8 weeks. Furthermore, residential participants attended fewer extracurricular 12-step meetings than day-hospital participants at both 2 and 4 weeks when controlling for length of stay and baseline severity. In addition, and again considering the multivariate models, residential participants were less likely than day-hospital participants to report having a sponsor at both 2 and 4 weeks. In other findings from the multivariate analyses,

Table 4
Program effects on services received over 7 days prior (continuous measures)

	2 weeks			4 weeks			8 weeks		
Services	Overall (*M* [range]) (*n* = 483)	Residential [*M* (adjusted OR)] (*n* = 116)	Day hospital [*M* (adjusted OR)] (*n* = 367)	Overall (*M* [range]) (*n* = 427)	Residential [*M* (adjusted OR)] (*n* = 108)	Day hospital [*M* (adjusted OR)] (*n* = 319)	Overall (*M* [range]) (*n* = 432)	Residential [*M* (adjusted OR)] (*n* = 107)	Day hospital [*M* (adjusted OR)] (*n* = 325)
Group counseling sessions	8.4 [0–25]	8.9 (7.6)	8.2 * (8.6)	4.5 [0–20]	8.8 (5.6)	3.1 *** (4.1)	2.0 [0–24]	3.9 (2.7)	1.4 *** (1.8)
Education sessions on alcohol and drugs	4.2 [0–25]	4.9 (4.3)	4.0 * (4.2)	2.5 [0–20]	4.7 (2.9)	1.7 *** (2.4) *	1.1 [0–24]	2.2 (1.6)	0.7 ** (1.0)
Relapse-prevention groups	2.4 [0–20]	2.8 (2.4)	2.3 (2.4)	1.5 [0–20]	2.9 (1.8)	1.0 *** (1.4)	0.9 [0–20]	1.3 (0.8)	0.7 (0.9) *
Individual sessions on alcohol and drugs	0.9 [0–7]	1.1 (1.0)	0.8 (0.9)	0.7 [0–18]	1.1 (0.6)	0.6 *** (0.8)	0.5 [0–11]	0.7 (0.5)	0.4 * (0.4)
12-Step meetings attended as part of treatment	5.2 [0–30]	7.5 (6.8)	4.4 *** (4.6) ***	4.1 [0–28]	7.3 (4.3)	3.1 *** (4.1)	2.5 [0–25]	3.9 (2.4)	2.0 *** (2.5) **
Sober recreational events	0.4 [0–7]	0.9 (0.9)	0.3 *** (0.3) ***	0.6 [0–14]	1.0 (0.9)	0.4 *** (0.5) **	0.5 [0–10]	0.7 (0.6)	0.4 ** (0.4) *
Times socialized with others in recovery	2.3 [0–20]	3.8 (3.5)	1.8 *** (1.9) ***	2.1 [0–20]	3.8 (2.9)	1.5 *** (1.8)	1.6 [0–20]	2.9 (2.4)	1.2 *** (1.4) **
Optional 12-step meetings attended	1.0 [0–14]	0.4 (0.4)	1.1 *** (1.1) ***	1.7 [0–14]	0.8 (1.0)	1.9 *** (1.9) **	2.0 [0–15]	2.1 (2.3)	1.9 (1.8)

Note. Significance tests were conducted using log-transformed scores (and not the untransformed scores reported here). The bivariate tests used were *t* tests and the multivariate tests were ANCOVAs, examining program effects while controlling for the number of treatment days in the past week and baseline ASI alcohol and drug severity.

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

Table 5
Program effects on services received over 7 days prior (categorical measures)

	2 weeks				4 weeks				8 weeks			
Services	Overall (%) (n = 483)	Residential (%) (n = 116)	Day hospital (%) (n = 367)	Residential vs. day hospital (adjusted OR) (n = 477)	Overall (%) (n = 427)	Residential (%) (n = 108)	Day hospital (%) (n = 319)	Residential vs. day hospital (adjusted OR) (n = 425)	Overall (%) (n = 432)	Residential (%) (n = 107)	Day hospital (%) (n = 325)	Residential vs. day hospital (adjusted OR) (n = 430)
Had a 12-step sponsor	28	20	31 *	0.48 **	38	34	39	0.39 ***	46	53	44	0.91
Psychiatric services	85	91	83 *	1.24	82	89	80 *	0.48	73	80	71	0.99
Family services	24	35	20 ***	1.62	18	33	13 ***	1.10	13	20	11 *	0.68
Medical services	59	64	59	1.21	53	59	51	1.15	49	52	48	0.94
Legal services	4	7	3	1.16	2	6	1 *	1.35	2	4	1 *	0.58

Note. The bivariate tests used were chi-square tests and the multivariate tests were logistic regressions, examining treatment effects while controlling for the number of treatment days in the past week and baseline ASI severity in the corresponding domain (using alcohol and drug severity for sponsorship).

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

residential participants showed greater participation in sober recreational events (across assessments) and informal socialization with peers (at 2 and 8 weeks), relative to day-hospital participants and as predicted. Finally, residential clients participated in significantly more education sessions at 4 weeks and fewer relapse-prevention groups at 8 weeks, relative to day-hospital participants.

Turning to supplemental services, bivariate analyses show that residential participants were more likely than day-hospital participants to receive family services across time points (as predicted); effects favoring residential participants also emerged for psychiatric and legal services. These effects lose significance in the multivariate models, however.

Additional analyses explored whether, when controlling for length of stay and baseline ASI problem severity, the program influenced the mean level of psychiatric, family, and medical services received among those receiving services in each domain (results not shown). (We did not attempt this analysis on legal services because the number of individuals receiving legal services at any point was smaller than that sufficient for reliable estimates.) These analyses show no program effects, with the exception that among the (relatively fewer) day-hospital participants receiving family services at 2 weeks, the mean number of services received was higher than that among residential participants (adjusted means of 3.5 and 2.3 per week, respectively; $p < .05$).

4. Discussion

Important findings from the current investigation of the relationship between services received and outcomes of chemical dependency treatment were that higher participation in optional or extracurricular 12-step meetings was associated with better treatment outcomes, whereas curricular involvement in 12-step groups (i.e., groups required as part of treatment) showed no association with treatment outcomes. These findings agree with existing evidence suggesting a role for 12-step involvement in recovery (Bond et al., 2003; Emrick et al., 1993; Humphreys et al., 1999; Kaskutas et al., 2002; McIntire, 2000; Tonigan, 2001; Tonigan et al., 1996, 2003), and with evidence suggesting stronger relationships between better treatment outcomes and voluntary (vs. coerced) 12-step participation (Brandsma, Maultsby, & Welsh, 1980; Ditman, Crawford, Forgy, Moskowitz, & MacAndrew, 1967; Kownacki & Shadish, 1999; Walsh et al., 1991). The findings may also illustrate the well-established relationship between freedom of choice to perform a counterattitudinal behavior and attitude change toward that behavior (e.g., Brock, 1962; Brock & Buss, 1962; Holmes & Strickland, 1970). Compliance under conditions of choice may be more persuasive than coercion because volitional compliance requires the actor to generate justification for his or her behavior, facilitating attitude change.

The study also found associations between participation in sober recreational events at 2 and 4 weeks and better treatment outcomes at 6 months, dovetailing with Moos et al.'s (1990) positive results for sober recreational activities. These findings underline the importance of informal and out-of-treatment engagement with peers, and merit particular attention because many existing programs do not emphasize recreation. Indeed, 3 (2 day hospital, 1 residential) of our 12 study sites included no recreation in their curricula. Future research might study what it is about sober recreation that helps to produce better outcomes, as sober recreation has received little research attention until now. Relatedly, it is interesting that informal socialization with peers was not significant (although the more organized sober recreational events were). Another analysis with this sample found that a similar peer-related variable, peer helping, did not directly predict abstinence; nevertheless, helping during treatment was associated with increased AA involvement posttreatment, which in turn affected abstinence (Zemore & Kaskutas, 2007). We believe that peer helping during treatment served to prepare clients for the give-and-take they would encounter in AA circles, making it easier for them to engage with AA. Informal socialization with peers may serve a similar function, although this remains a question for further analysis.

The data suggested weak effects for other alcohol and drug treatment services. However, such weak findings are not discordant with prior work showing inconsistent effects from services received (Moos et al., 1990; Orwin & Ellis, 2000). Indeed, in 1998, an Institute of Medicine report reviewed the treatment services literature and found "little indication" that better or longer-lasting treatment outcomes were linked to the quantity of either general group therapy sessions or alcohol and drug education sessions (Lamb, Greenlick, & McCarty, 1998). We did, nevertheless, find that receiving more educational sessions on alcohol and drugs at 4 weeks predicted higher odds at sobriety at follow-up, suggesting that alcohol and drug education may be important later in treatment. Given the large number of analyses and the novelty of the effect, especially in light of the ubiquity of alcohol and drug education in treatment curricula, this finding calls for replication.

More surprising were the weak effects for supplemental psychiatric, family, medical, and legal services: We found null associations between delivery of these services and the odds of 6-month sobriety across the board. This may indicate that the effects of supplemental services vary as a function of client characteristics. Specifically, it may be that because the current sample was selected based on meeting American Society of Addiction Medicine criteria for residential treatment—and hence was higher in severity than is typical of treatment populations—services delivered within the short treatment window had less effect than they ordinarily would. It is important to note here that, although (based on preliminary analyses) our models did not include baseline psychological, family, medical, and legal problem severity as

covariates, models including these variables yielded almost precisely the same (nonsignificant) estimates for services received on abstinence.

Another interesting finding was that the role of length of stay in predicting outcome varied when considering different types of services. In the model studying sobriety as a function of alcohol and drug services, length of stay was not significant (Table 2), whereas it was significant in the model entering supplemental services (Table 3). This suggests that the effect of length of stay on sobriety was at least partially explained by alcohol and drug services. Otherwise, length of stay would have been significant in both models. Because length of stay is generally a robust predictor of outcome (De Leon, Wexler, & Jainchill, 1982; Gottheil, McLellan, & Druley, 1992; McKay, Alterman, McLellan, & Snider, 1993; Moos & Moos, 2003; Stark, 1992), future research might further unpack the contribution of services received versus treatment dose.

Results also showed that services received differed by program, although not always as expected. In bivariate analyses, residential participants tended to receive more services overall than day-hospital participants, although many of these effects disappeared in multivariate analyses. This suggests that program effects on services received were mostly explained by residential clients' greater treatment dosage and greater problem severity at baseline, rather than by intrinsic differences in program orientation. Toward this point, residential participants reported significantly more days in treatment ($p < .001$); scored significantly higher than day-hospital participants on baseline measures of psychiatric, legal, and employment severity (all p's $< .01$); and showed a trend toward higher baseline family severity ($p = .13$). Still, a few program effects surfaced in multivariate analyses. Among the most important were mixed findings for 12-step involvement. We found that residential participants showed higher participation in curricular 12-step meetings at 2 weeks, relative to day-hospital participants and as expected; however, this effect was not maintained throughout follow-ups, and residential participants actually showed relatively lower rates of extracurricular 12-step meeting attendance and working with a sponsor through 4 weeks. These latter differences may be the consequence of residential clients' tightly scheduled time, intensive involvement in curricular 12-step meetings, and/or restrictions on leaving the treatment site. Regardless, findings suggest that any differences favoring residential programs on client 12-step involvement occur early and are not maintained over time. This may be because the focus on 12-step involvement is relatively strong across the board: Indeed, the mean number of 12-step meetings attended as part of treatment in the past week was 7.5 for residential clients and 4.4 for day-hospital clients at the 2-week assessment.

The multivariate analyses did not produce the expected program effects on family services; services were equivalent across programs when accounting for treatment dosage and baseline severity. On the other hand, residential participants reported higher involvement in sober recreation and informal peer socialization across most analyses, as expected. Thus, some results accord with findings from ethnographic research indicating a greater emphasis on the social context of recovery at social model programs (Barrows, 1998; Borkman et al., 1998; Kaskutas, Greenfield, et al., 1998; Kaskutas, Piroth, et al., 1998; Room, 1998). Altogether, the results suggest that residential programs might focus on facilitating optional 12-step involvement independently of that expected by the program, given their relatively low extracurricular participation and the relationship between extracurricular (but not curricular) involvement and better treatment outcomes. For similar reasons (i.e., relatively low involvement in sober recreation combined with findings relating sober recreation to better outcomes), day-hospital programs might benefit from incorporating more sober recreation, insofar as reimbursement regulations allow.

The current study's findings should be interpreted with caution for several reasons. One reason is that the forgoing analyses combined randomized and nonrandomized study arms. Combining heterogeneous groups can be problematic because the effects so obtained may apply to only one group or to neither group (as in an artifactual association). Because of limited sample sizes and large models, we were unable to replicate all analyses in both randomized and nonrandomized arms. We did, however, replicate the analyses reported in Tables 2 and 3 in the nonrandomized arm exclusively and found that the results corresponded closely to those for the full sample. Since data from the nonrandomized arm are most likely to reflect real-world associations (because people do not typically enter treatment via randomization), we feel relatively confident about generalizing from these results.

Caution is also warranted because measurement issues may have contributed to explaining why we did not see stronger effects for services received on recovery outcomes and for program modality on services received. Previous research has found evidence for associations between better recovery outcomes and both self-report measures of services received and service utilization collected from program records. For example, one study using self-report TSR data found greater reductions at 6 months in alcohol, psychiatric, and medical problems in programs where clients received more services in those domains (McLellan et al., 1998); another study, using administrative data from the health plan, found that psychiatric services received during the year of an index treatment event were associated with higher rates of abstinence at 5 years (Ray, Mertens, & Weisner, 2005). The inconsistency between our results and these prior results may indicate problems with our foreshortened assessment periods. We may have missed important services by assessing services received for only 3 weeks of our 8-week posttreatment window (i.e., the weeks prior to the 2-week, 4-week, and 8-week follow-ups)—especially given that about half of the sample (49%) completed <14 days of treatment. This, combined with the error inherent in self-

report data (stemming, for example, from recall problems and subjective interpretation of the items), could have washed out the effects of some genuinely effective services on client outcomes. This brings up the general point that all data for this study were self-report. In light of the inherent problems with self-report data, future research might examine whether this study's findings can be replicated using objective measures of services received, such as utilization databases tracking sessions received in various problem domains (given that such data are available, which is not the case here). Future research might also examine whether the current findings can be replicated in representative treatment populations demonstrating typical (i.e., less severe) profiles. Replication is particularly desirable given the large number of analyses conducted herein, as discussed. Some of the current results could have occurred by chance, although this seems less likely for strong and consistent associations, such as the association between sober recreation and positive outcome.

Measurement issues aside, one final recommendation is that researchers do make a point of assessing clients' participation in activities that are not typically accounted for in service utilization databases, such as attending informal events, socializing informally with others in recovery, and attending 12-step meetings independent of treatment. These activities may help to explain any differences—or lack thereof—in the effects of dissimilar programs on outcomes. Toward that point, this study's data reveal different strengths for residential and day-hospital programs, with residential programs providing more opportunities for attending sober recreational events and with day-hospital clients showing greater engagement in extracurricular 12-step meetings. This balance, combined with the fact that each of these variables was associated with better treatment outcomes, may help explain the equivalence between day-hospital and residential outcomes in this study.

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Appendix A. Treatment Services Review: Items

Curricular alcohol and drug services

- In the past 7 days, how many times have you attended a group counseling session at [program] devoted to maintaining sobriety or reducing your alcohol or drug use? (_ times)
- In the past 7 days, how many times have you attended a session at [program] devoted to education about alcohol or drugs and their effects? By "education," we mean instruction about the effects of alcohol or drugs. (_ times)
- In the past 7 days, how many times have you attended a group on relapse prevention? (_ times)
- How many times in the past 7 days have you had an individual counseling session at [program] devoted to maintaining sobriety or reducing your alcohol or drug use? (_ times)
- In the past 7 days, did you attend any sober recreational events (such as dances, picnics, or outings)?
  If yes, how many times? (_ times)
- In the past 7 days, how many meetings of Alcoholics Anonymous, Narcotics Anonymous, or Cocaine Anonymous have you attended as part of a treatment program? (_ meetings)

Extracurricular alcohol and drug services

- In the past 7 days, did you do anything socially with other people in recovery (such as a movie, lunch, or coffee before meetings)?
  If yes, how many times? (_ times)
- Not counting the meetings that you were required to attend as part of treatment, how many meetings of Alcoholics Anonymous, Narcotics Anonymous, or Cocaine Anonymous have you attended on your own in the past 7 days? (_ meetings)
- Do you currently have a sponsor? (yes/no)

Psychiatric services

- In the past 7 days, have you had an individual or group counseling session with someone at [program] where there was a significant discussion about your psychological or emotional problems? (yes/no)
  If yes, how many of these were in a group counseling session led by program staff?
  If yes, how many of these were in an individual session with program staff?
- In the past 7 days, how many days have you received or taken medication for an emotional or psychological problem? (_ days)
- In the past 7 days, how many times have you practiced relaxation training, biofeedback, or meditation? (_ times)

Family services

- In the past 7 days, how many times did you have a group session at [program] where there was a significant discussion about getting along, or regaining contact, with family members? (_ times)
- In the past 7 days, how many times did you have an individual session with someone at [program] where there was a significant discussion about getting

along, or regaining contact, with family members? (_ times)
- In the past 7 days, has anyone at [either program] made an appointment for you with—or referred you to—any specialist or agency to help you with your problems in getting along with anyone in your family? (_ times)

Medical services

- In the past 7 days, have you had an individual or group counseling session with someone at [program] where there was a significant discussion about your medical problems?
  If yes, how many of these were in a group session led by program staff?
  If yes, how many of these were in an individual session with program staff?
- In the past 7 days, has anyone at [program] made a medical appointment for you with—or referred you to—a Kaiser doctor, nurse practitioner, or clinic? (yes/no)
- In the past 7 days, how many days have you received or taken medication for a medical problem? (_ days)

Legal services

- In the past 7 days, how many times have you attended a group session at [program] where there was a significant discussion about your legal problems? (_ times)
- In the past 7 days, how many times have you had at least part of an individual session at [program] where there was a significant discussion about your legal problems? (_ times)
- In the past 7 days, has anyone in [program] made an appointment for you with—or referred you to—any specialist or agency to help you with your legal or court-related problems? (yes/no)
- In the past 7 days, has anyone at [program] contacted, or helped you contact, the courts or criminal justice system regarding any problems you may have? (yes/no)

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