Affiliation With Alcoholics Anonymous After Treatment: A Study of Its Therapeutic Effects and Mechanisms of Action

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Relatively little is known about how substance abuse treatment facilitates positive outcomes. This study examined the therapeutic effects and mechanisms of action of affiliation with Alcoholics Anonymous (AA) after treatment. Patients (N = 100) in intensive 12-step substance abuse treatment were assessed during treatment and at 1- and 6-month follow-ups. Results indicated that increased affiliation with AA predicted better outcomes. The effects of AA affiliation were mediated by a set of common change factors. Affiliation with AA after treatment was related to maintenance of self-efficacy and motivation, as well as to increased active coping efforts. These processes, in turn, were significant predictors of outcome. Findings help to illustrate the value of embedding a test of explanatory models in an evaluation study.

Substance use disorders are among the most prevalent mental disorders in the United States, affecting about 1 in 10 Americans each year (Kessler et al., 1994) and resulting in great personal suffering and costs to society estimated at over $100 billion (U.S. Department of Health and Human Services, 1990). Treatments available in the United States operate primarily within the context of the 12-step intervention model (Wallace, 1996), on the basis of the principles and practices of Alcoholics Anonymous (AA). About 1 million Americans enter formal treatment for substance use problems yearly (National Institute of Alcoholism and Alcohol Abuse, 1993), predominantly in 12-step-oriented programs, and about 3.5 million attend AA or other 12-step self-help meetings (Room, 1993).

In spite of its availability, the 12-step model remains one of the most controversial, least understood, and least evaluated approaches for treating substance use disorders. Special concern has been raised in each of the past 3 decades regarding the dominance of the 12-step model and the ubiquitous practice of recommending AA affiliation as the prime form of aftercare following treatment (Emrick, Tonigan, Montgomery, & Little, 1993; Miller & Hester, 1986; Tournier, 1978). However, few studies have adequately evaluated the efficacy of affiliating with AA after treatment, and no study has examined its hypothesized mechanisms of action.

Studies have demonstrated positive but modest relationships between AA meeting attendance after formal treatment and outcome (Emrick et al., 1993). However, methodological shortcomings of prior studies severely limit their ability to estimate the effects of AA affiliation. For example, Tonigan, Toscova, and Miller (1996) reviewed AA studies and rated their overall methodological quality as poor. In particular, past studies failed to control for the effects of prior motivation, formal treatment, and psychosocial correlates of outcome (e.g., demographics and problem severity). As a result, positive findings may simply reflect the fact that more motivated patients with better prognoses seek out AA as a way of maintaining abstinence. In addition, most studies used retrospective designs and used assessment measures with few or unknown psychometric properties.

Two types of theories have been proposed to explain the mechanisms of action that underlie AA's effects on substance use. One set of theories, widely shared by clinicians operating within a 12-step treatment model, argues that mechanisms mobilized by AA are unique to its intervention strategy and are aimed at resolving basic characterological problems (e.g., grandiosity, self-centeredness) that maintain substance use problems (e.g., Brown, 1993; Tiebout, 1994). These theories highlight the acceptance of powerlessness, belief in alcoholism as a disease, and dramatic shifts in self and other schema (e.g., Bateson, 1971) that occur through surrender and conversion experiences as critical therapeutic processes facilitated by affiliation with AA. An alternative approach (DiClemente 1993; McCrady, 1994) argues that although there are dramatic theoretical differences between 12-step and other treatment approaches, in practice AA shares a number of common change strategies with effective behavioral treatments and mechanisms used by successful self-changers. AA's ability to mobilize these generic change processes, common to both treatment-assisted and self-initiated resolution of many types of addictive problems, serves to explain its therapeutic effects. Differences in theories reflect...
respectively the belief that AA works based on its unique or "specific" therapeutic effects or through mobilization of a set of common change factors (Prochaska, DiClemente, & Norcross, 1992).

With the exception of one study (Snow, Prochaska, & Rossi, 1994), virtually no systematic attempts have tested either proposed theory. Snow et al. (1994) examined the relation of affiliation with AA and common change processes in the maintenance of long-term sobriety. Results demonstrated the usefulness of a process analysis of AA but only partially supported the proposed theory. Snow et al. (1994) examined the relation of affiliation with AA immediately after treatment. Third, the study assessed whether interventions affect these variables, and whether improvements were sustained across the month after discharge. Second, the study assessed whether process factors predicted affiliation with AA after formal treatment. All participants met criteria for a current diagnosis of psychoactive substance use disorder in accordance with the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV; American Psychiatric Association, 1994). We assigned substance use disorder diagnoses using the substance use disorder module of the Structured Clinical Interview for DSM-III-R (SCID; Spitzer, Williams, Gibbon, & First, 1990). Criteria, probe queries and diagnostic algorithms were modified slightly in order to generate DSM-IV diagnoses. Trained research assistants conducted the SCID interviews, and we generated diagnoses using the modified algorithms. All diagnoses were reviewed by 2 senior staff members for consistency and accuracy. In addition, all SCID interviewers met regularly with Jon Morgenstern or another doctoral-level psychologist with expertise in diagnosis to review diagnostic protocols. Twenty-seven percent of participants (n = 27) had a current drug use disorder but no current alcohol use disorder; 43% (n = 43) had a current alcohol use disorder, but no drug use disorder, and 30% (n = 30) had both a current alcohol and drug use disorder diagnosis. On average, participants met 6.1 (SD = 2.47) of the nine DSM-III-R criteria for current dependence of the DSM (3rd ed., revised; DSM-III-R; American Psychiatric Association, 1994).

The sample was 58% male (n = 58) and was racially and ethnically diverse (24 African Americans, or 24%; 63 Caucasians, or 63%; 7 Hispanics, or 7%; and 6, or 6%, from other ethnic groups). Mean age was 34.3 (SD = 8.8). About 18% (n = 17) of the sample did not have a high school diploma, 26% (n = 26) had graduated from high school, 40% (n = 40) had some years of college or technical school education and 16% (n = 16) had graduated from college. About 25% (n = 25) of the sample had a family income of less than $20,000. 20% (n = 20) had incomes of $20,000-$34,999, 27% (n = 27) had incomes of $35,000-$59,999 and 27% (n = 27) had incomes over $60,000.

Procedures

All participants completed a battery of measures at entry into treatment, at discharge from treatment, 1 month after discharge, and at 6 months after the initial baseline assessment. Measures were administered by 2 master’s-level (MA) individuals with extensive experience in clinical and research assessment of substance abusers and 2 bachelor’s-level (BA) research assistants. Assessors received extensive training on all interview measures. At a minimum, this included didactic instruction and scripted role-play rehearsals followed by supervised practice administration on several clinical participants. In addition, BA research assistants were observed by MA research assistants during the first 5 interviews. Overall, interviewers received about 40 hr of training on measures described in the study. In addition, monthly meetings were held to discuss problematic cases and control for interviewer drift. Sequential admissions were approached and asked if they would participate in the study. Because of the length of the assessment battery (about 11 hr) and the limited number of assessors, recruitment continued
until all available assessors were assigned to participants and then were ceased temporarily until an assessor was available. In addition, we oversampled women and ethnic minorities to ensure adequate representation of these groups in the study. Overall, 44 individuals who were approached either refused (n = 18) or dropped out of the study (n = 26) before completing the baseline battery. Refusers did not differ in age, gender, ethnicity, or education from participants completing the baseline battery (n = 119). Demographic information and scores on process variables—commitment to abstinence, self-efficacy, commitment to AA, and harm appraisal—at entry into treatment were available for dropouts (n = 26). Dropouts and baseline completers did not differ in age, marital status, education, ethnicity, or scores on process variables including commitment to AA at entry into treatment. However, more women, χ²(1, 145) = 9.2, p < .01, than men dropped out before completing the baseline assessment, possibly because more women than men were transferred to a dual-diagnosis treatment program after having been admitted to regular chemical dependency treatment. Other reasons for refusing or dropping out of the study were quite varied and did not appear to create a systematic bias in participant selection.

One hundred (84%) of 119 participants completed an in-person 1-month follow-up (1MFU) interview. We followed 93 of these 100 participants, and they provided a continuous record of substance use during the 6 months after the baseline assessment; 6 participants were lost to follow-up and 1 dropped out of the study. A comparison of participants assessed (n = 100) versus those not assessed at the 1MFU indicated no differences in gender or education. However, those assessed were significantly more likely to be married, χ²(2, N = 119) = 8.9, p < .01, and tended to be older, t (1) = 1.9, p < .06. Thus, those assessed at 1MFU appeared to represent a somewhat more socially stable group. Participants did not differ on substance use severity and on process variables, including commitment to AA, assessed at entry and discharge from treatment (all ps > .20). Similar analyses comparing participants followed versus participants lost to follow-up among the 100 completing the 1MFU indicated no significant differences.† Participants met with a research assistant for four assessment interviews during treatment. Process measures were collected during the first and then the last of these interviews; one conducted within 48 hr of entry into treatment, and the other within 72 hr of discharge from treatment. Baseline substance use measures were collected during the second interview session. Research assistants met with participants at each follow-up interview and administered the process measures followed by an assessment of substance use during the outcome period.

Variables and Measures

Change process constructs and measures. Four change processes—primary appraisal, self-efficacy, commitment to an abstinence goal, and cognitive and behavioral coping—were assessed. Established measures exist and were used to assess three of these constructs. A measure to assess primary appraisal was developed as part of this study.

Self-efficacy. We measured self-efficacy using the Situational Confidence Questionnaire (SCQ; Annis, 1982), which was designed as a measure of Bandura's concept of self-efficacy for alcohol-related situations and has demonstrated adequate reliability and validity (Annis & Davis, 1988; Annis & Graham, 1988). The questionnaire assesses subjective confidence to resist drinking in eight situations. A briefer 16-item version of the scale (Annis, 1984) was used in this study. This scale abbreviates the number of items assessing each of eight situation to 2 items per situation. This 16-item scale demonstrated high internal consistency and was highly correlated with the original 39-item measure (Annis & Graham, 1988). Items were modified slightly (where necessary wording was changed to reflect drug rather than alcohol use) to create a version appropriate for drug users. Both the alcohol and drug versions of the SCQ were administered to participants who used both types of substances. As part of the assessment, participants were queried regarding which type of substance represented a greater problem, and this SCQ score was used in the analyses. The SCQ was administered three times: at entry into treatment, at discharge from treatment, and 1 month after discharge. Items and subscales of both versions demonstrated adequate response distributions and good internal consistencies at each assessment point (all alphas > .95).

Commitment to abstinence. We measured this construct using the self-report Commitment to Lifetime Abstinence subscale drawn from the Addiction Treatment Attitude Questionnaire (ATAQ; Morgenstern & McCrady, 1993; Morgenstern, Frey, McCrady, Labovitz, & Neighbors, 1996). The ATAQ assesses beliefs and intentions related to the 12-step treatment model. The five-item Commitment to Abstinence subscale assesses commitment to absolute abstinence (e.g., "I believe I should never use alcohol or any mood altering chemical again," or "I can have a drink once in a while, as long as I limit it to special occasions"; reverse scored). This subscale has demonstrated good internal consistency, test-retest reliability, and predictive validity (Morgenstern, Frey, et al., 1996).

Cognitive and behavioral coping. The Processes of Change (POC) Questionnaire consists of 41 items generated through an extension of previous work in smoking and alcohol (Prochaska et al., 1992; Snow et al., 1994) and through consultation with one of the scale's authors (Carlo C. DiClemente, personal communication, September 1995). The POC assesses the frequency of occurrence of nine theoretically distinct behavioral or cognitive coping or change-related activities. Behavioral processes include stimulus control, counterconditioning, contingency management, helping relationships, and interpersonal system—control. Cognitive processes included consciousness raising, self-liberation, self-revaluation, and environmental reevaluation. Several processes assessed in the original change model were not included (Prochaska & DiClemente, 1985) because they did not appear relevant for a substance-using population. We administered the POC at entry into treatment and 1 month after discharge, and we assessed change processes used in the past 30 days. Appropriately worded versions of the scales were constructed for those with primary alcohol or primary drug use problems.

Because this version of the measure represented a modification of prior versions, its psychometric properties were examined. Overall, items and subscales demonstrated good response distributions and adequate internal consistencies. Mean alphas for subscales were as follows: alcohol version baseline, α = 0.79; drug version baseline, α = 0.78, alcohol version follow-up, α = 0.83, drug version follow-up, α = 0.75. A factor analysis of subscales at baseline using promax rotation yielded a two-factor solution accounting for 73% of variance, with behavioral coping subscales loading on the first rotated factor and cognitive coping sub-scales loading on the second factor. The two factors were highly correlated, r = .73. A factor analysis of follow-up scores yielded similar results. These findings are quite similar to those reported by Snow et al. (1994) and are consistent with prior studies of smoking cessation (Prochaska & DiClemente, 1985).

Primary appraisal of harm. Primary appraisal refers to the cognitive process of categorizing a behavior or event with respect to its significance for well-being. Primary appraisal of substance use can be divided into an assessment of losses already sustained, losses that are anticipated if use continues, and gains that might be achieved through quitting (Carey et al., 1989). The Primary Appraisal Measure (PAM) was developed to assess this construct. Participants were asked for appraisal in each of three evaluation dimensions: harm caused by past drinking—drug use, harm anticipated for continued drinking—drug use, and benefit

——1 Two participants were given missing values for substance use outcomes at 1MFU and 6MFU because these participants had spent more than one half of the outcome period in an environment where alcohol and drugs were not available.
affiliation with AA

anticipated if abstinence were to be maintained. Both short-term (within the next 6 months) and long-term time frames were used to assess appraisal of future harm and benefit. Participants rated harm and benefit separately for seven domains drawn from the Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992): Standard of Living, Work, Physical Health, Relations With Family, Friendships, Love Relations, and Self-Regard. The response format for each item was a 5-point Likert-type scale ranging from no harm (benefit) (1) to extreme harm (benefit) (5). The PAM was administered as a structured interview and pilot tested before use in the study. First, interviewers read a passage describing the evaluation dimension (e.g., past harm caused by use); then they read a passage drawn from the QOLI describing each domain and asked participants to rate harm–benefit for that domain. In total, 7 scores were generated for past harm, 14 scores for future harm (7 short-term and 7 long-term), and 14 scores for future benefit of abstinence. The PAM was administered three times: at intake, discharge, and 1 month after discharge.

The psychometric properties of the measure were examined. Overall, items and subscales demonstrated good response distributions and good internal consistency. Mean alphas (α = 98) were as follows: Past Harm, α = 0.80; Short-Term Future Harm, α = 0.87; Long-Term Future Harm, α = 0.87; Short-Term Future Benefit, α = 0.89; Long-Term Future Benefit, α = 0.85. A principal-components analysis indicated that all subscales loaded highly on a single factor that accounted for a minimum of 61% of the variance across the three administrations. Accordingly, we used the sum of subscale scores (benefit was reverse scored) as a composite measure of harm appraisal in our analyses. The PAM demonstrated good test–retest reliability over a 3-week interval, r = .78 (n = 98, p < .0001); it was not significantly correlated with demographic indices (age, gender, education, and marital status), but it was significantly correlated with a measure of baseline alcohol–drug use problem severity as measured by the Rutgers Consequences of Use questionnaire (RCU; Pople et al., 1994) r = .52 (n = 98, p < .0001). Other evidence supporting the validity of the PAM is presented in the Results section.

Affiliation with AA. We assessed affiliation with AA using the Recovery Interview (RI; Morgenstern, Kahler, Frey, & Labouvie, 1996). The RI is a fully structured interviewer-administered measure developed to assess 12-step behaviors. To construct the measure, we culled the literature on AA affiliation to identify a diverse set of behaviors that would represent affiliation with AA. Overall, nine behaviors were identified as appropriate for assessment: (a) AA meeting attendance, (b) talking with a sponsor, (c) attending 12-step meetings, (d) engaging in 12-step activities, (e) reading AA literature, (f) seeking support from AA members, (g) prayer or meditation, (h) the extent to which one’s life revolved around AA activities, and (i) seeking advice from AA sources. We assessed the frequency of each of these behaviors occurring within the past 30 days using Likert scaling. The sum of responses on these nine items divided by the number of items was used as a continuous measure of intensity of involvement with AA. Overall, the RI had a good response distribution, good internal consistency (α = 0.87), yielded a one-factor solution, and demonstrated good convergent validity. A more complete description of the development and psychometric properties of the RI is available elsewhere (Morgenstern, Kahler, et al., 1996).

The RI was administered at the 1-month follow-up. Collaterals were contacted by telephone to obtain information on self-help meeting attendance during this period. A comparison of AA meeting attendance assessed by the RI and by collateral report indicated high levels of agreement, r = .59, p < .001 (Morgenstern, Frey, et al., 1996).

In addition, the Commitment to AA subscale of the ATAQ was used to assess affiliation with AA. This five-item subscale measures the importance of AA and intentions to engage in AA-related behaviors. The subscale has demonstrated adequate psychometric properties (Morgenstern, Kahler, et al., 1996). Commitment to AA was assessed at discharge from treatment.

The RI score provided the primary measure of AA affiliation in our analyses. However, the Commitment to AA score was used in one analysis. Specifically, the RI measures affiliation during the month after discharge, a period that is concurrent with 1-month drinking–drug use outcome measures. Commitment to AA was also examined because it measured commitment before discharge. Commitment to AA was highly correlated (r = .58, p < .0001) with the RI score.

Baseline substance use severity. We assessed baseline substance use problem severity using the RCU (Pople et al., 1994). Because of the high comorbidity of alcohol and drug use problems in clinical populations, the RCU was designed to assess consequences and dependence symptoms of alcohol and other drug use simultaneously. The RCU is a 37-item self-report questionnaire that measures consequences that have occurred in the past 6 months because of substance use. The RCU has demonstrated good item response distributions and good internal consistency (α = 0.93). The Alcohol subscale of the RCU was highly correlated with the Alcohol Dependence Scale (ADS; Skinner & Allen, 1982), r = .81, p < .001, and the Michigan Alcohol Screening Test (Pokorny, Miller, & Kaplan, 1972), r = .55, p < .001 (Pople et al., 1994).

Substance use. The time-line follow-back procedure (Ehrman & Robins, 1994; Sobell et al., 1980) involves using a calendar to reconstruct and chart an estimate of drinking or drug use occurring on a daily basis. We used this procedure at baseline to interview participants about their drinking and use of illicit drugs for 180 days before treatment. Overall, participants used substances an average of 64.1% of days (SD = 31%) before treatment. At the 1MFU and 6-month follow-up (6MFU), we used similar procedures to obtain information since the last reporting. These data were used to construct a measure of the percentage of days used (actual days used divided by possible use days) during the baseline and outcome periods. Collaterals also reported estimates of the participants’ drinking or drug use during the 6MFU period. Disagreements between collateral and self-report were defined as instances where the participant reported being abstinent and the collateral reported at least one instance of substance use or where the participant reported no more than 2 days of use and the collateral reported more than 2 days of use. Overall, percent agreement between self-report and collateral was .88 and kappa was .80, indicating a good level of agreement.

Treatment experiences. A measure of the number of days each participant attended intensive treatment was assessed using chart review procedures. Length of stay ranged from 4 to 33 days (M = 20.9, SD = 7.7). In addition, the number of aftercare treatment sessions attended during the month after treatment was assessed. Participants attended an average of 10.3 aftercare sessions (Mdn = 3, SD = 24.3).

Results

The Relationship of AA Affiliation and Substance Use Outcomes

On average, participants reported attending AA meetings several times per week (M = 3.1, SD = 1.3) and engaging in other AA-related activities fairly often during the month after treatment, although there was substantial variability in this behavior. For example, on average, participants reported talking to a sponsor about twice per week (M = 1.9, SD = 1.7), reaching out to other AA members once per week (M = 2.2, SD = 1.4), and reported that their lives revolved around AA activities to a moderate degree (M = 2.2, SD = 1.3; see Morgenstern, Kahler, et al., 1996, for a more complete description).

To examine the relationship between AA affiliation and outcome, we selected percentage of days of substance use as a measure of substance use outcome at 1MFU and 6MFU. Twenty-
five participants (25.5%) drank or used drugs during the month after treatment. All 25 participants used the substance for which they met diagnostic criteria at baseline (e.g., no drug-use-only participant solely returned to drinking). These participants used an average of 21.1% of possible days ($SD = 32.5$). Overall, 49.5% ($n = 45$) of participants had used at least once at the 6MFU. Percent use days for those who used by 6 months averaged 22.2% of possible days ($SD = 29.9$). Because this sample included participants with current alcohol only, drug only, and polysubstance use diagnoses, we examined whether these differences might affect relapse patterns. We regressed percent use days at each outcome period onto two contrast-coded variables—alcohol-only users versus all other users and drug-only users versus polydrug users—in separate regression equations. Neither predictor was significant in either equation (all $ps > .40$), supporting the use of the entire sample in analyses.

To control for the relationship between other factors and outcome, we examined four sets of variables: (a) demographics (age, gender, education, marital status, ethnicity), (b) baseline substance use (problem severity, percent days used at baseline), (c) quantitative measures of treatment experiences (length of stay in intensive treatment, number of aftercare sessions), and (d) change processes during treatment (primary appraisal, commitment to abstinence, self-efficacy and coping at treatment entry) and self-efficacy at discharge). To limit the number of predictors entering the equation, we examined correlations among outcome and control variables first. No demographic variable significantly correlated with outcome (all $ps > .25$). Four control variables—problem severity, percent days used at baseline, commitment to abstinence at treatment entry, and self-efficacy at discharge—were selected and used in subsequent regression analyses based on their significant correlations ($p < .05$) with outcome and their intercorrelations with other variables. Means, standard deviations, and correlations for AA affiliation after treatment, control, and outcome variables are presented in Table 1.

Table 2 presents results of a simultaneous multiple regression analysis predicting days use at 1 month from the four control variables and AA affiliation. Less intense involvement with AA in the month after treatment predicted more days of use, uniquely accounting for 12.9% of the variance. AA affiliation was measured during the month after treatment and, thus, is concurrent with percent days use at 1 month. To clarify the direction of the relationship, we substituted Commitment to AA, a measure assessed before treatment discharge, for AA affiliation in the equation. This variable was also a significant predictor ($b = -0.30, p < .01, r^2 = .06$). Three control variables—problem severity, commitment to abstinence at treatment entry, and self-efficacy at discharge—were also significant unique predictors of substance use at 1MFU.

The second portion of Table 2 presents findings for predictors of percent days use at 6MFU. Greater affiliation with AA in the month after treatment continued to be a significant predictor of less use over 6 months, uniquely explaining 9.3% of the variance in percent days used. Problem severity was the only other significant predictor. Overall, reports of greater affiliation with AA consistently predicted better outcomes in each analysis. Change process variables assessed during treatment were unique predictors of better outcomes at 1MFU, but these unique effects appeared weaker at 6MFU.

### A Process Analysis of Common Change Factors in 12-Step Treatment

**Absolute analysis and change across time of common factors.** Table 3 shows means for three change process scores—primary appraisal, commitment to abstinence and self-efficacy—at treatment entry, treatment discharge, and 1MFU. Cognitive and behavioral coping were assessed only at treatment entry and 1MFU. Coping was not assessed at discharge because all participants took part in highly structured intensive treatments. Change across time was assessed using five separate repeated-measures one-way analyses of variance (ANOVAs). As expected, self-efficacy increased significantly during treatment, $F(2, 97) = 18.78, p < .0001$, and was sustained between discharge and follow-up. Cognitive coping increased significantly from baseline to 1MFU, $F(1, 98) = 51.78, p < .0001$, as did behavioral coping, $F(1, 98) = 155.17, p < .0001$. Primary appraisal did not change across the assessment period. On average, participants entered treatment appraising harm related to substance use at a moderate-to-considerable level. Commitment to abstinence scores did not change during treatment but decreased significantly during the month after treatment, $F(2, 97) = 8.95, p < .01$. On average, participants entered treatment endorsing abstinence goals at the agree to strongly agree level.

**The relationship of common factors to AA affiliation after treatment.** We examined whether change process factors during treatment were important predictors of AA affiliation after treatment. Primary appraisal ($r = .37, p < .0001$) and commitment to abstinence ($r = .31, p < .0001$) at treatment entry were significantly related to greater AA affiliation in the month after treatment. Neither coping nor self-efficacy at treatment entry or discharge was significantly related to AA affiliation. Because drinking severity has been a consistent predictor of AA affiliation (Tongan et al., 1996), we computed this correlation. Problem severity was significantly related to AA affiliation ($r = .24, p < .05$), but percent use was not. To assess further which measure was a better predictor, we regressed AA affiliation onto each process variable and problem severity in two separate regression equations. When examined simultaneously, primary appraisal predicted AA affiliation ($b = .31, p < .01$), whereas problem severity was no longer a significant predictor. When examined simultaneously, commitment to abstinence predicted AA affiliation ($b = .27, p < .01; r^2 = .07$), and problem severity remained a significant predictor ($b = 0.20, p < .05, r^2 = .04$), but accounted for less variance in AA affiliation than commitment to abstinence.

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2 We did not enter primary appraisal or commitment to abstinence at discharge into the equation because (a) primary appraisal and commitment to abstinence scores did not change from treatment entry to discharge (see Table 3), and (b) examination of bivariate correlations with outcome indicators suggested that scores at discharge were not better predictors of outcome than scores at entry.

1 Primary appraisal at treatment entry was not selected because of its redundancy with commitment to abstinence and problem severity, and because its correlation with outcome was not consistent across outcome periods.
Table 1
Mean, Standard Deviations, and Correlations among AA Affiliation, Control Variables and Percent Use Days at IMFU and 6MFU

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<th>Variable</th>
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<td>1. AA affiliation after treatment</td>
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<td>2. Problem severity at baseline</td>
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<td>3. Percent use days at baseline</td>
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<td>4. Commitment to abstinence at treatment entry</td>
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<td>5. Primary appraisal at treatment entry</td>
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<td>8. Cognitive coping at baseline</td>
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<td>9. Behavioral coping at baseline</td>
<td>2.3</td>
<td>0.84</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10. Days of intensive treatment</td>
<td>20.7</td>
<td>7.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Aftercare sessions</td>
<td>10.3</td>
<td>24.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Outcome variables</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Percent use days at IMFU</td>
<td>5.4</td>
<td>18.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Percent use days at 6MFU</td>
<td>11.5</td>
<td>24.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Note. AA = Alcoholics Anonymous; IMFU = 1-month follow-up; 6MFU = 6-month follow-up.
*p < .05. **p < .01. ***p < .001. ****p < .0001.

The relationship between AA affiliation and change processes at IMFU. Next, we examined whether greater AA affiliation after treatment was associated with an increase or maintenance of change process factors. A series of separate hierarchical regression analyses tested whether AA affiliation predicted common processes at IMFU. First, common processes at IMFU were regressed onto a set of control variables that included all common processes assessed at both treatment entry and discharge. This controlled for the effects of prior processes on processes at IMFU. The overall R²'s are presented in Step 1 of Table 4. Overall, prior processes were strong predictors of processes at IMFU. AA affiliation was entered next, and results are presented in Step 2 of Table 4. AA affiliation predicted each common process in the expected direction. The largest prediction was for behavioral coping with an ΔR² of 19%, followed by commitment to abstinence with an ΔR² of 11%.

Some of these effects may not be uniquely related to AA affiliation, but they might be effects of either baseline treatment experiences or attendance at aftercare on change processes. To assess this, we examined correlations between change processes at discharge and follow-up and length of baseline treatment episode or frequency of aftercare attendance. Length of treatment episode did not correlate significantly with any process variable. Aftercare attendance was significantly correlated only

Table 2
Results of Simultaneous Multiple Regressions Predicting Percent Days Used 1 and 6 Months After Treatment

<table>
<thead>
<tr>
<th>Predictor variable and outcome time frame</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
<th>sr²</th>
<th>F(5, 89) = 12.15****</th>
<th>40.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Month outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent days used at baseline</td>
<td>1.07</td>
<td>5.12</td>
<td>0.02</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Problem severity at baseline</td>
<td>9.53</td>
<td>4.26</td>
<td>0.20*</td>
<td>3.5</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Commitment to abstinence at treatment entry</td>
<td>−5.19</td>
<td>2.28</td>
<td>−0.21*</td>
<td>3.5</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy at treatment discharge</td>
<td>−0.24</td>
<td>0.08</td>
<td>−0.28**</td>
<td>6.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA affiliation after treatment</td>
<td>−7.18</td>
<td>1.63</td>
<td>−0.39****</td>
<td>12.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-Month outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent days used at baseline</td>
<td>6.73</td>
<td>8.46</td>
<td>0.08</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem severity at baseline</td>
<td>18.03</td>
<td>6.72</td>
<td>0.27**</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment to abstinence at treatment entry</td>
<td>−4.96</td>
<td>3.78</td>
<td>−0.14</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy at treatment discharge</td>
<td>−0.17</td>
<td>0.12</td>
<td>−0.15</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA affiliation after treatment</td>
<td>−8.94</td>
<td>2.73</td>
<td>−0.34***</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Adjusted R² at 1-month follow-up = 37.2%; adjusted R² at 6-month follow-up = 24.2%. AA = Alcoholics Anonymous.
*p < .05. **p < .01. ***p < .001. ****p < .0001.
Table 3

Mean Change Process Scores (and Standard Deviations) During and 1 Month After Leaving Treatment

<table>
<thead>
<tr>
<th>Time of administration</th>
<th>Change process</th>
<th>Intake</th>
<th>Discharge</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appraisal</td>
<td>3.82 (0.74)</td>
<td>3.86 (0.73)</td>
<td>3.84 (0.87)</td>
</tr>
<tr>
<td></td>
<td>Commitment to abstain</td>
<td>4.46 (0.70)</td>
<td>4.57 (0.65)</td>
<td>4.35 (0.86)</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>65.4 (29.8)</td>
<td>77.9 (22.2)</td>
<td>78.4 (20.9)</td>
</tr>
<tr>
<td></td>
<td>Cognitive coping</td>
<td>3.00 (0.87)</td>
<td></td>
<td>3.68 (0.62)</td>
</tr>
<tr>
<td></td>
<td>Behavioral coping</td>
<td>2.27 (0.84)</td>
<td></td>
<td>3.58 (0.78)</td>
</tr>
</tbody>
</table>

Note. Response formats for all measures used Likert-type scales. For appraisal, relevant anchors included the following: 3 = moderate harm, 4 = considerable harm, and 5 = extreme harm. For commitment to abstain, anchors included the following: 3 = neutral, 4 = agree, 5 = strongly agree. For self-efficacy, anchors included the following: 40% confident, 60% confident, and 80% confident. For cognitive and behavioral coping, anchors included the following: 2 = seldom, 3 = sometimes, and 4 = often.

with primary appraisal ($r = .20, p < .05$) at 1MFU. However, aftercare attendance was no longer significantly related to primary appraisal ($\beta = 0.12, p > .10$), once prior process variables were controlled for. Thus, effects on change processes appear to be uniquely related to AA affiliation.

To assess the impact of differential attrition of unmarried participants at follow-up, we regressed change process variables at treatment entry and self-efficacy at discharge onto marital status, gender, and drop-out status. Marital status was not significantly related (all $p > .20$) to processes. Thus, the differential attrition of unmarried participants did not appear to affect the findings.

The mediational status of common processes. Next, we tested whether AA’s relationship to 6-month substance use outcome is mediated by its effects on processes at 1MFU by testing for three conditions that Baron and Kenny (1986) recommended for establishing mediation. Results presented earlier establish the first two conditions: (a) the independent variable (AA affiliation) predicts the mediator (processes at 1MFU), and (b) the independent variable predicts the dependent variable (substance use outcome at 6MFU). To test the third condition, we regressed percent use days at 6MFU onto AA affiliation and problem severity in a first step and then the set of processes at 1MFU (i.e., the mediators) were entered in a second step. The addition of the set of mediators yielded a significant increase of $\Delta R^2 = .15$, incremental $F(5, 80) = 3.76, p < .01$, over the variance explained by AA affiliation and problem severity. In addition, the unique effects of AA affiliation dropped ($\beta = -0.15, p > .20$). This pattern satisfies the third condition that the mediators affect the dependent variable and the effect of the independent variable is less in the third equation than in the second. The pattern also indicates that the relationship between AA affiliation and outcome is completely mediated by the process variables.

Discussion

Overall, findings suggest that increased affiliation with AA after formal treatment is associated with better proximal substance use outcomes. Our findings are consistent with those of other studies (e.g., Thurston, Alfano, & Nerviano, 1987). Methodological features of the present study, including carefully controlling for possible confounds and use of a prospective design, help to strengthen inferences relating AA involvement to outcome. Findings also support a common-factors model of how affiliation with AA helps to promote reduced substance use. Affiliation with AA was significantly associated with each change process, and it uniquely predicted increased active coping efforts. Affiliation with AA also significantly and uniquely predicted sustained high levels of commitment to abstinence, primary appraisal of harm, and self-efficacy at follow-up, even after controlling for prior levels of these variables. These processes, in turn, appear to mediate the positive relationship between AA involvement and substance use outcomes.

Findings differ from those proposed by 12-step theorists, who postulate that AA works through unique effects that share little or nothing in common with mechanisms mobilized by self-changers or other treatment approaches. Findings here indicate that AA’s association with outcome was mediated by its effects on sustaining beliefs in the cost–benefit of maintaining behavior change, commitment to a specific goal, and ability to achieve this goal and through promoting active coping efforts. Finally, it should be noted that AA affiliation had a substantial and broad association with change factors in a population with severe substance use problems. These findings suggest the heuristic value of further study of change strategies within AA.

Findings also indicate that change processes have direct as
well as indirect effects on substance use outcomes. Greater commitment to abstinence at treatment admission and greater self-efficacy at discharge were significantly related to less frequent use at 1MFU and 6MFU. In addition, both processes uniquely predicted 1-month outcome, even after we controlled for the effects of each other and AA affiliation. These findings support the predictive validity of measures of these constructs and their unique role in mediating short-term outcomes. Overall, findings are consistent with the limited number of prior studies that have examined the effects of cognitive variables in substance abuse treatment samples. For example, studies have shown that self-efficacy (Rychtarik, Prue, Rapp, & King, 1992; Stephens, Wertz, & Roffman, 1995) and a commitment to abstinence (Hall, Havassy, & Wasserman, 1990) are significant outcome predictors. Other processes measured during treatment were not significantly related to 1- and 6-month outcomes.

Findings also indicate indirect effects on outcome for some cognitive variables. Primary appraisal of harm and commitment to abstinence at admission were related to greater affiliation with AA after treatment and were better predictors than problem severity. Neither coping at admission nor self-efficacy was related to AA affiliation. In this context, it should be noted that self-efficacy increased during treatment, but primary appraisal of harm and commitment to abstinence did not change. These findings reveal a different pattern of treatment effects than would be anticipated. Self-efficacy (a process not explicitly targeted by 12-step treatment) increased, whereas commitment to abstinence and primary appraisal of harm (processes targeted by the treatment model) did not change.

Overall, findings suggest that cognitive variables both mediate and are mediated by other prognostic indicators and, thus, do not function like static predictors such as problem severity. This, in part, may explain why their predictive effects weaken across lengthier outcome time frames. These effects were particularly marked for the two motivational constructs assessed, commitment to abstinence and primary appraisal of harm. Individuals with greater pretreatment motivation affiliated more with AA. Affiliation with AA was associated with sustained motivation, and AA affiliation and pretreatment motivation independently predicted improved short-term outcomes. By contrast, individuals with low pretreatment motivation affiliated less with AA. Perhaps as a result, they experienced a significant reduction in motivation after treatment. Findings demonstrate the importance of motivation, how motivation to change behavior may fluctuate over time, and illustrate how differences in pretreatment motivation can be amplified by subsequent events leading to substantially different outcome pathways.

This study had a number of methodological limitations that should be noted. This study used a correlational design. Thus, unassessed variables may account for the observed relationships between AA affiliation and outcome. However, the study did control for demographic variables, problem severity, treatment experiences, and change processes. In addition, this study relied primarily on self-report data, and correlations may have been inflated because of shared method variance. Furthermore, findings concerning the effects of AA on both substance use and change processes are limited to short-term outcomes. Further study is required to determine whether these effects are sustained across time. In addition, findings are limited to an examination of the relationship of AA affiliation and substance use. Further study is required to explore AA's common and specific effects on areas of intrapersonal and interpersonal change and the relation of these to substance use process and outcome.

Finally, a large number of potential participants either refused participation or dropped out of the study. Comparison suggests that the study sample composition was biased in favor of male participants and more socially stable individuals. Limits on the generalizability of findings to female participants and less socially stable individuals should be noted. In addition, it may be inappropriate to generalize findings to involvement in community-based AA. Participants in this study received intensive treatment before affiliating with AA. This prior formal treatment experience may have had stronger effects than we were able to measure or may have interacted with processes invoked by subsequent AA affiliation.

Finney (1995) has argued that testing explanatory models substantially increases the clinical usefulness of evaluations by helping to explain how interventions achieve their effects, as well as by identifying "weak links" in the treatment process. The present findings illustrate this point. Interventions in 12-step programs may achieve their effects through increasing self-efficacy, promoting active coping efforts after treatment and through helping to sustain high levels of motivation to refrain from use, among those whose level of motivation is already high at treatment entry. Findings also identify points in the treatment process where 12-step model interventions may have weak effects and, thus, where intervention strategies potentially could be strengthened. First, patients with low pretreatment motivation appear to fare poorly in intensive 12-step model programs. These intensive treatment interventions do not increase initial levels of motivation and pretreatment motivation is an important predictor of outcome. Second, patients with low self-efficacy at discharge have poorer outcomes, independent of motivation, prior problem severity, and affiliation with AA.

These findings may be of substantial value to clinicians working within a 12-step model, because they highlight the usefulness of monitoring both motivation and self-efficacy and identify points in the treatment process where low levels of these constructs might have their most negative prognostic effects. In addition, findings have implications for guiding treatment-matching studies. For example, those with high primary appraisal of harm affiliated more with AA. Finally, findings highlight the need for careful reevaluation of current practice standards for addressing low motivation among dependent users. Current practice (American Society of Addiction Medicine, 1991) recommends placement in an intensive program where directive and often confrontational techniques are used to "break through" denial and convince the user to accept an abstinence goal. The present results raise questions concerning the effectiveness of these techniques, and they point to the importance of discovering effective strategies both to increase initial motivation (e.g., Miller & Rollnick, 1991) and to sustain motivation over time, as both play an important role in early treatment failure.

In summary, findings indicate that increased affiliation with AA predicted better proximal treatment outcomes. Findings also suggest that treatment effects in the 12-step model may be mediated by a set of common change factors, despite divergence at
the level of theory between 12-step and other substance abuse treatment models. Increased affiliation with AA predicted sustained self-efficacy and motivation to refrain from use as well as increased active coping efforts. These processes, in turn, were significant predictors of outcome. Findings also illustrate the value of embedding a test of explanatory models in evaluation studies. Results identified “weak links” in the process of 12-step treatment and may guide future efforts at patient–treatment matching.

References


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The Publications and Communications Board has opened nominations for the editorships of Experimental and Clinical Psychopharmacology, Journal of Experimental Psychology: Human Perception and Performance (JEP:HPP), Journal of Counseling Psychology, and Clinician's Research Digest for the years 2000–2005. Charles R. Schuster, PhD, Thomas H. Carr, PhD, Clara E. Hill, PhD, and Douglas K. Snyder, PhD, respectively, are the incumbent editors.

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Room 2004
American Psychological Association
750 First Street, NE
Washington, DC 20002-4242

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