

**FACTORS THAT INFLUENCE POSTTREATMENT
ATTENDANCE IN ALCOHOLICS ANONYMOUS:
THEORY AND METHODS TO INFORM
PROVIDER REFERRALS**

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ABSTRACT

Substance abuse researchers are reporting that weekly posttreatment twelve-step (TS) meeting attendance predicts substantially superior drinking outcomes. Unfortunately, research has consistently observed a high rate of posttreatment AA attrition and underutilization. The primary aims of this analysis are to advance theory of TS affiliation and to test the feasibility of identifying patients who are at risk for posttreatment AA disaffiliation. The analysis uses Project MATCH data consisting of subjects who were assigned to the twelve-step facilitative treatment condition ($N = 582$). Corroborating other research, results suggest that average weekly attendance at one year posttreatment is associated with abstinent rates almost two times that of less than weekly attendance; unfortunately, over 70% of the subjects attended *less than* weekly. Analysis using binary logistic regression suggests seven variables can explain a large proportion of the variance among those with less than weekly or no AA attendance at the one year follow-up interval. The results are explained in terms of two theories: First, those who attend weekly may have a greater need for social support (stress and coping theory); and second, those who are a better fit within the AA culture (person-in-AA organizational fit theory). Last, a simple four variable prediction model was able to predict a large proportion of those who reported less than weekly attendance (*sensitivity = .78, specificity = .77*).

Although research has generally reported favorable effects related to treatment, alcohol dependence is best characterized as a chronic-relapsing condition with

posttreatment recidivism the rule rather than the exception (Miller et al., 2001). Summarizing results of seven of the better designed and controlled multisite treatment outcome studies, Miller and colleagues (2001) report that complete abstinence in the year following treatment is only achieved by approximately 24% of those treated for alcohol problems. Fortunately, a number of recent studies are finding that posttreatment involvement in formal aftercare (or continuing care) and in twelve-step (TS) groups appears to significantly reduce the incidence of posttreatment relapse (e.g., Brown et al., 2002; Fiorentine, 1999, 2001; Fiorentine & Hillhouse, 2000a). This study focuses on *TS affiliation*, a complex behavioral construct, defined here as the level of weekly meeting attendance, which contributes to greater program involvement (e.g., step work, sponsorship, reading program literature, etc.) and a sense of group membership (Cloud et al., in press).

Although controversial, a large volume of correlational evidence suggests that posttreatment meeting attendance and involvement in Alcoholics Anonymous (AA) improve substance abuse outcomes (e.g., Emrick et al., 1993; Tonigan et al., 1996a, 2000, 2003). Of note, recent research from a controlled trial that randomly assigned subjects to a cognitive behavioral or a TS facilitative aftercare program concluded that the TS approach was superior for “most” clients (Brown et al., 2002). Tonigan and colleagues (2000) review the Project MATCH data (this study is described under the methods section) and note that the magnitude of the relationship between increased AA experiences and subsequent improvement in drinking outcomes was substantial and much larger than other variables at predicting treatment response. Also, an increasing number of other treatment outcome studies are consistently reporting benefits associated with posttreatment involvement in TS programs (e.g., Brown et al., 2002; McKellar et al., 2003; Ouimette et al., 1997; Ritsher et al., 2002; Tonigan et al., 2003). Finally, AA effectiveness is qualitatively supported by vast majority of treatment providers in the United States who rely on some form of TS facilitative treatment (e.g., Borkman et al., 1998; Humphreys, 1997; Miller & McCrady, 1993).

However, researchers have reported a minimum posttreatment TS dose that may be required to accrue substantial benefit; this threshold is described in multiple studies as regular and weekly posttreatment attendance (e.g., Fiorentine, 1999, 2001; Fiorentine & Hillhouse, 2000a; Moos et al., 2001). Unfortunately, research has repeatedly observed TS program low levels of posttreatment involvement as the most common outcome, even among subjects who have completed a TS facilitative treatment (e.g., McKay et al., 1998; McKellar et al., 2003; Miller & McCrady, 1993; Ouimette et al., 1997; Tonigan et al., 2003). For example, Tonigan and colleagues (2003) have reported AA attendance patterns among Project MATCH subjects assigned to the TS treatment group, describing a “substantial dropout from AA” occurring at the end of treatment, with the highest rate of attrition occurring in the three months following treatment. Evidence supporting a minimum beneficial dose consisting of weekly attendance combined

with evidence suggesting sporadic or no attendance is problematic-and calls into question the effectiveness of TS facilitative treatment methods at achieving their intended purpose.

The problem associated with posttreatment underutilization of AA and the related need to identify theories to guide provider referrals to AA has been raised by a number of researchers in the past (e.g., Emrick, 1994, 1989; Timko et al., 1993; Tonigan & Hiller-Sturmhoefel, 1995). In this regard, exhaustive literature reviews and meta-analysis have been conducted to inform provider referrals to AA (Emrick, 1994, 1989; Emrick et al., 1993; Tonigan et al., 1996a). Though useful, these analyses and their interpretations were: 1) correlational in nature, not ruling out alternative explanations of cause for affiliation; 2) overly simplistic, consisting of bivariate relationships to explain a complex construct; and 3) admittedly atheoretical, not advancing any integrated theory of affiliation. A decade later, no accepted model of affiliation has emerged and only a few researchers have attempted to advance a theory of affiliation.

On the positive side, a few studies have suggested evidence to support plausible socio-cultural theories of affiliation: 1) relying on stress and coping theory, Humphreys and colleagues (1994, 1996) observed that subjects who possessed more and higher functioning social-support networks were less likely to affiliate with TS programs, noting that AA can be viewed as a source of interpersonal coping with people who are deficient and in need of social support more likely to affiliate; and 2) using social ecology (Mankowski et al., 2001) and person-in-organizational fit theories to explain TS affiliation, researchers (Cloud, 2000; Mankowski et al., 2001) have supported theoretical contentions with large datasets using multivariate analysis. In support of the social support theory (Humphreys et al., 1994, 1996), a number of studies have since observed convergent evidence consisting of enhanced social-support networks as an outcome associated with TS program involvement (e.g., Humphreys et al., 1999; Humphreys & Noke, 1997; Kaskutas et al., 2002). These findings would seem to compliment and support Humphreys theoretical contentions that people who attend TS programs and who have a need for greater social support are able to fulfill the need, and are thereby rewarded to continue attendance. In support of person-in-organizational fit theory, value congruence, or the fit between individual beliefs and the organizational culture, has been widely applied in predicting the level of affiliation (e.g., longevity, commitment, involvement, and even success) in employment organizations (e.g., O'Reilly et al., 1991; Schneider et al., 2001). In general, fit theory used to explain AA affiliation would posit that the individual's beliefs interact with the AA organizational culture (defined in terms norms, values, and beliefs) to influence the level of long-term affiliation. The fit model has also been applied to predicting non-employment organizational affiliation including selection of a sorority (Burnett et al., 1997) and utilization of self-help groups (Luke et al., 1993).

In view of the literature suggesting a minimum-benefit threshold consisting of weekly TS attendance, clinicians relying on a TS approach would logically benefit from an easy to administer method of identifying clients at risk for less than weekly TS attendance. The ability to predict clients who are likely to attend TS programs less than weekly generate information that would logically enhance treatment planning. The ability of treatment content to influence posttreatment AA involvement is well established with strong evidence from four randomly controlled trials. Findings from two large multisite experiments suggest that TS treatment content designed to orient, facilitate, and acculturate clients into TS recovery practices are effective at increasing one-year posttreatment involvement and attendance (Ouimette et al., 1997; Tonigan et al., 2003). Also, in another randomly-controlled trial, Sisson and Mallams (1981) demonstrated that introducing clients to a more seasoned member of AA during treatment and arranging for the AA member to escort the newcomer to an initial AA meeting resulted in significantly higher attendance in the month following treatment compared to a treatment-as-usual control group that received counselor encouragement and an AA meeting schedule. Also, in a study involving male alcoholics, McCrady and colleagues (1996) demonstrated that significant gains in attendance and in getting subjects to obtain an AA sponsor could be achieved during treatment through the use of therapist encouragement, goal setting, and involvement of their non-alcoholic spouses. Finally, Schilling and colleagues (2002) have recently reported significantly better two month post-detoxification TS program attendance among those who received a brief motivational intervention (three sessions) toward the conclusion of detoxification compared to a control group.

In addition to treatment factors, lesser quality correlational evidence supporting other factors that may predict or influence posttreatment involvement in TS programs. Although tautological, measures of current and past attendance and involvement stand as the best predictor of posttreatment AA involvement (e.g., Connors et al., 2001; Fiorentine & Hillhouse, 2000a; Mankowski et al., 2001; Tonigan et al., 2003). In addition, and most emphasized in the Emrick and colleagues (1993; Emrick, 1994) meta analysis, was a large correlation between measures of affiliation and history of seeking external help for drinking problems ($r = .43$; $SD = .06$, compiled from four studies). Another theory advanced by researchers suggested that greater motivation explained greater AA involvement and that involvement had a reciprocating effect on maintaining motivation (e.g., DiClemente, 1993; Emrick, 1994; Morgenstern et al., 1997); however, the strength and consistency of this relationship has not been consistent across studies. Studies in the decade since the Emrick et al. (1993) review have suggested a number of other correlates that have been observed in more than one study or are theoretically compelling, including: greater education (Fiorentine & Hillhouse, 2000b; Mankowski et al., 2001), minority race (Kaskutas et al., 1999; Mankowski et al., 2001; Tonigan et al., 2002; although these findings are not consistent), greater addiction severity (Connors et al., 2001;

McKay et al., 1998; Tonigan et al., 1996a; Weiss, 2000), greater person-in-TS-organizational fit (e.g., Fiorentine & Hillhouse, 2000b; Mankowski et al., 2001; Tonigan et al., 2002b), more religiosity (Connors et al., 1996; Emrick et al., 1993; Mankowski et al., 2001; Tonigan et al., 2002b), and deficits in interpersonal coping resources (Humphreys et al., 1994, 1996).

Most of these findings and theories can be used to support sociocultural theories of affiliation (Cloud, 2000; Humphreys et al., 1994, 1996; Mankowski et al., 2001). The theoretical contentions advanced in this article consist of the following: 1) many of the above findings support a person-in-organizational fit theory, which would posit that the affiliative outcome is influenced by congruence between the person's values and beliefs and AA's prominent cultural beliefs, norms, and values; 2) the success of twelve-step facilitative treatment at improving posttreatment involvement is believed to be analogous to employment orientations that are used to enhance organizational affiliation by advancing acculturation and socialization processes; and 3) deficiencies in interpersonal coping contribute to a greater need for social support, that, if satisfied, would render the person more amenable and tolerant of discomfort normally associated with newcomer socialization/acculturation processes, thus contributing to a greater chance of continued attendance.

There are a number of questions that are addressed in this analysis related to posttreatment meeting attendance among those who have received some form of TS facilitative treatment, including the following: 1) what is the rate of attrition in the year following TS facilitative treatment; 2) do findings replicate evidence suggesting a posttreatment-TS-dose threshold consisting of minimum-weekly attendance; 3) do variables predicting posttreatment involvement support a socio-cultural theory of affiliation; 4) how and to what degree can TS program providers identify or predict those who are at risk of dropout or insignificant posttreatment attendance? More generally, that analysis will advance the understanding of TS program affiliation and could advance adoption of practices that assess and attempt to identify those at risk of TS program dropout or inadequate involvement (defined as less than weekly attendance), such that alternative treatment strategies can be implemented.

METHODS

This analysis utilizes data from Project MATCH (Project MATCH Research Group, 1993, 1997a, 1997b), a large ($N = 1,726$), multi-site ($N = 9$) experiment that randomly assigned subjects to three posttreatment outpatient aftercare conditions (i.e., cognitive behavioral skills training (CBT), twelve-step facilitation (TSF), and a motivational enhancement treatment (MET); see Kadden et al., 1992; Miller et al., 1992; Nowinski et al., 1992) to prospectively test patient treatment matching. Project MATCH subjects were recruited from five outpatient treatment centers ($N = 952$) and six aftercare treatment centers ($N = 774$) in nine

geographically dispersed U.S. metropolitan areas in the early to mid 1990s. Researchers were rigorous in collecting subject characteristics and psychometric instruments at both treatment intake and a three-month follow-up interval representing completion or discharge from treatment, as well as conducting follow-up interviews at three, six, nine, and twelve-month posttreatment intervals (Connors et al., 1994). The follow-up interviews were conducted using a structured interview guide referred to as "Form 90" (Miller, 1995a), which has been reviewed and found to be a reliable interview procedure (Tonigan et al., 1997). The Project MATCH study is well known and respected, having been the subject of numerous research reports and data analyses.

A subset of the Project MATCH subjects are used in the current study representing those who were randomly assigned to the manual guided TS facilitative treatment (Nowinski et al., 1992) condition. These subjects ($N = 582$) reported that they were 75% male, were 40% married or cohabitating, were 80% white, were 83% employed at intake, fell into a mean age bracket of 35-39 ($SD = 10$ years or two age brackets), reported 13.4 ($SD = 1.8$) mean years of education, scored 25.2 ($SD = 6.4$) on the composite of the AUDIT, retrospectively reported 6.4 ($SD = 1.9$) mean DSM-III-R alcohol-use disorder symptoms at the worst point in their life, and attended 7.4 ($SD = 4.3$) or 62% of 12 total TS treatment sessions. The TS facilitative treatment used in Project MATCH (Nowinski et al., 1992) included objectives commonly seen in community TS facilitative treatments including a focus on orienting clients to TS beliefs and engaging patients in attendance and involvement during and after the treatment.

Weekly Attendance Dependent Variable

The dependent variable is 12 -month posttreatment attendance in AA. Given recent evidence that weekly TS meeting attendance appears to represent a minimum threshold necessary for improving drinking outcomes, the dependent variable in this analysis was operationalized as a dichotomous variable split into groups representing: 1) average or more weekly attendance at one year posttreatment ($N = 160$; 30% of total cases; coded as a "1"); or 2) no attendance or less than weekly meeting attendance at one year posttreatment ($N = 375$; 70% of total cases; coded as "0"). The proportion of days attended AA meetings was collected and compiled by Project MATCH researchers at quarterly intervals. This analysis uses this proportion for the calendar quarter ended one year posttreatment. The number of meetings attended during the quarter ended 12 months posttreatment was also collected independently as part of the an AA involvement scale (Tonigan et al., 1996b). These two attendance indicators are highly correlated ($\rho = .92$; $N = 520$; $p < .001$, two-tailed), suggesting a high degree of reliability. The dependent measure was calculated using the proportion representing average weekly attendance of .14 (52 weeks per year divided by 365 days per year) as a cut point.

Predictor Variables

Predictors suggested by prior research and theory used in this analysis are organized into seven theoretical domains and operationalized as follows.

1. Four variables are used to represent *culturally defining demographics* (gender, marital status, age, and race).

2. Three variables are included representing a domain of AA *cultural beliefs* including two disease model belief indicators from the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) (Miller & Tonigan, 1996) and a religiosity scale, all administered at discharge. The SOCRATES items included item #3 “if I don’t change my drinking soon, my problems are going to get worse,” depicting a belief in the disease model premise of progression, and item #18, “I am an alcoholic.” Both items are scored on a 5-point Likert scale (strongly disagree, disagree, neutral or unsure, agree, strongly agree) and are treated as a continuous variable. These items were administered at discharge. Religiosity is measured at discharge using the Religious Background and Belief Scale (Connors et al., 1996) ($Alpha = .86$, $N = 1,637$), a composite indicator of religious beliefs and practices.

3. Seven variables administered at intake are used to measure different dimensions of *addiction severity*, including: the Addiction Severity Index—Psychiatric Severity (*Interrater* $r > .71$, $N = 325$) (McLellan et al., 1980), the Ethanol Dependence Scale—Alcohol Dependence Severity (Babor, 1996) ($Alpha = .90$, $N = 1,726$); the composite score from the Drinker Inventory of Consequences (Miller, 1995b) ($Alpha = .91$, $N = 1,389$); the DSM-III-R Computerized Diagnostic Interview Schedule of Co-occurring Psychopathology (yes/no) and worst lifetime number of dependence symptoms (Blouin et al., 1988), the Alcohol Use Inventory-Number of Prior Attempts To Deal With Drinking (e.g., Wanberg et al., 1977), and the Alcohol Use Disorders Identification Test (AUDIT; e.g., Allen et al., 1997; Saunders et al., 1993).

4. The domain of *motivation* is represented with the composite scale from the University of Rhode Island Change Assessment Motivation administered at treatment intake (DiClemente & Hughes, 1990) ($Alpha = .69$ to $.82$, $N = 224$) and two motivational subscales administered at discharge using the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) (Miller & Tonigan, 1996). The SOCRATES subscales include recognition of the problem (Miller & Tonigan, 1996) ($Alpha = .85$), and ambivalence about change ($Alpha = .60$, $N = 1,672$).

5. Three measures of *action orientation*, a hybrid category representing a higher level motivational construct that is also consistent with the AA value of persistent action, which has been observed in the AA culture and is documented in its literature (e.g., regular meeting attendance, step work, and maintenance of the spiritual condition). This domain is measured using the Alcohol Use Inventory--number of prior attempts to deal with drinking (Wanberg et al., 1977) administered

at intake. This indicator is the number of past occasions of using help outside oneself and outside of established social networks (friends, significant others, or family). Other measures include taking steps to initiate change SOCRATES subscale ($Alpha = .83$, $N = 1,672$) and the proportion of total Project MATCH treatment sessions attended.

6. A single *social network functioning* measure, the Psychosocial Functioning Inventory (Feragne et al., 1983) ($Alpha > .70$; $N = 420$) administered at intake is a composite measure of the degree of social functioning within domains of friends, spouse, housemate, and parents.

7. Two prediction variables are used to represent *history of AA involvement*: the Alcoholics Anonymous Involvement Scale (AAI) (Tonigan et al., 1996b), ($Alpha = .85$, $test-retest r = .76$) administered at intake and the proportion of TS meetings that the subject attended during the three months of treatment collected as part of the Form 90 structured interview (Miller, 1995a).

Categorical variables with two attributes are dummy coded (i.e., gender and psychopathology) and variables with more than two attributes are effects coded (i.e., race, marital status). Multi-collinearity did not appear to be a problem. All 23 variables were loaded into a regression model and tolerance was observed at greater than .20 for all variables.

Data Analysis

Given the dichotomous nature of the dependent variable, binary logistic regression is used to: 1) test for the independent effects of predictor variables in an effort to expand theory of TS affiliation processes; and 2) assess the degree to which we can predict those who are at risk of dropout using information available at the time of treatment. Two variable sets are used for these purposes: 1) a *theory development variable set* consisting of 21 variables and excluding measures of past or present AA involvement and attendance; and 2) a *prediction variable set* comprised of the theory development variables plus history of AA affiliation indicators, including the AAI scale administered at intake and the proportion of days attended AA during the three months of Project MATCH treatment. Three procedures are run to identify the most parsimonious and influential predictor variables. These procedures include running a separate analysis or block of variables consisting of those found to be statistically significant when all variables are loaded, and by running forward and backward entry procedures based upon the Wald statistic. Prediction accuracy and model fit is reported using proportions of overall prediction accuracy, *sensitivity* (proportion of true positive prediction), *specificity* (proportion of true negative prediction), and the *Nagelkerke R^2* (a pseudo R^2 statistic explaining the proportion of variance explained by the model), which is roughly comparable in interpretation to the traditional linear regression R^2 .

It should be noted that some Project MATCH researchers have noted substantial differences in and performed separate analyses for subjects recruited from inpatient versus outpatient treatment sources (e.g., Connors et al., 1996; Tonigan et al., 2002b), or have controlled for this factor in the analyses. This has been done given evidence that the inpatient aftercare subjects presented with significantly greater severity, had experienced a more intense prior treatment experience that was more likely to have included 12-step facilitative treatment, and manifested significantly different patterns of AA attendance and involvement than outpatients (Tonigan et al., 2003). However given the objectives of the current study it would make little sense to analyze differences in these two groups, since the recruitment source is an artificial distinction unique to Project MATCH and has little meaning and is not applicable in the “real world” of community treatment. This variable would therefore be difficult to interpret and could confuse implication for theory and prediction.

RESULTS

The data included 535 (92% of 582 total) of the Project MATCH TS facilitative treatment condition subjects who responded to the AA attendance follow-up questions for the quarter ended one-year posttreatment, of which 70% ($N = 375$) were not attending AA at an average of one time per week and 30% ($N = 160$) were attending AA one or more times per week on average. Missing cases were tested for significant differences in age, gender, race, and marital status against the full dataset that was used in these analyses. No significant differences were detected, suggesting that missing cases may have been random in nature.

Prevalence and Significance of Weekly Attendance on Abstinence

First, cross tabulations on those who were ($N = 160$; 30% of total) or were not ($N = 375$; 70% of total) attending 12-step meetings an average of weekly were contrasted with those who were or were not reporting complete abstinence during the calendar quarter ended one-year posttreatment. Results support prior contentions that weekly attendance is significant at predicting complete abstinence with almost two times the proportion of those who reported average weekly attendance also reporting complete abstinence (63%) compared to those reporting less than weekly average attendance and complete abstinence (32%, $\chi^2 = 43.91$, $df = 1$, $p < .001$, $N = 535$). Further analysis of the less than weekly attendance group observed that 75% of this group reported no attendance compared to 25% who reported less than average weekly attendance.

Theory Development

The theory development variable set consisted of 21 predictor variables defined in the methods section. The theory development variable set was entered as a block and three variables were significant at the $p \leq .04$ level (years of education, $p = .04$; number of prior attempts to deal with drinking, $p < .01$; and number of alcohol dependence symptoms, $p = .02$), and two were significant at the .10 trend level (religiosity, $p = .10$; and the admission of being an alcoholic item from the SOCRATES, $p = .06$). These five variables were entered in a second model by themselves and statistical results are summarized in Table 1 under the heading of “five significant variables.” In addition, both Wald forward and backward entry procedures were run on the theory development variable set and the results are included in Table 1.

An interpretation of the results of logistic regression on the significant variables from the theory development variable set is included under the table heading as “five significant variables” and would suggest the following: having one more year of education increases the odds of weekly attendance by 1.15 times; one prior attempt to deal with drinking using external help increases the chance of weekly attendance by 1.29 times; scoring one greater on the religiosity scale increases the chance of weekly attendance by 1.03 times; though not significant, this model suggested that reporting one *less* DSM-III-R alcohol dependence symptom increases the odds of weekly attendance by 1.09 times (1 divided by the odds ratio of .92); and last, responding to the question “I am an alcoholic” with one Likert point stronger agreement increases the odds of being in the weekly attendance group by 2.85 times (strongest predictor in this model). It should be noted that the number of alcohol dependence symptoms was not significant ($p = .16$), and, some would argue that it should not be interpreted. In this regard, the Wald forward elimination models reported in Table 1 report results for the same four variables without the number of symptoms variable. The forgoing interpretation is offered as a sample of how to interpret data from the tables. Other results of testing reported in tables can be interpreted in the same manner as illustrated above, but are not included in this text in the interest of economy of expression.

Overall, results of all three analyses summarized in Table 1 provide evidence that years of education, number of prior attempts to deal with drinking, admitting being an alcoholic, number of alcohol dependence symptoms, religious beliefs (measured at discharge), level of social functioning (intake), admitting to being an alcoholic (discharge), and taking steps to deal with drinking (discharge) have a significant influence on regular weekly attendance. Of note is the strength of the Wald backward elimination odds ratio for the social functioning scale of .11, suggesting that as a person’s social functioning score increases one point he or she is 9.1 times *less likely* to be in the average weekly attendance group.

Table 1. Significant Variables for Theory Development

Description	Beta	Wald	Sig.	Odds
Five significant variables (<i>constant</i> = -9.57, $\chi^2 = 91.35$, <i>df</i> = 5, <i>p</i> < .001, <i>Nagelkerke R</i> ² = .25, <i>N</i> = 474)				
Years of education	.14	5.32	.02	1.15
Prior attempts to deal with drinking	.26	21.03	.00	1.29
Religiosity	.03	6.53	.01	1.03
Number of symptoms	-.08	1.70	.19	.92
Admit being alcoholic	1.05	22.04	.00	2.85
Wald Forward (<i>constant</i> = -8.92, $\chi^2 = 89.65$, <i>df</i> = 4, <i>p</i> < .001, <i>Nagelkerke R</i> ² = .25, <i>N</i> = 474)				
Years of education	.15	6.09	.01	1.16
Prior attempts to deal with drinking	.23	19.72	.00	1.26
Religiosity	.03	6.58	.01	1.03
Admit being alcoholic	.99	20.9	.00	2.68
Wald Backward (<i>constant</i> = -7.32, $\chi^2 = 97.32$, <i>df</i> = 6, <i>p</i> < .001, <i>Nagelkerke R</i> ² = .26, <i>N</i> = 483)				
Years of education	.15	6.07	.01	1.16
Prior attempts to deal with drinking	.23	15.91	.00	1.26
Number of symptoms	-.16	5.84	.02	.85
Admit being alcoholic	.83	13.37	.00	2.29
Social functioning	-2.26	8.72	.00	.11
Taking steps scale	.06	6.19	.01	1.06

Prediction

A prediction variable set was used to assess the ability to predict weekly attendance using information readily available to treatment providers. The prediction variable set consisted of all of the variables in the theoretical variable set plus a measure of prior involvement in TS programs (the baseline AAI) and the number of AA meetings attended during the three months of Project

Table 2. Significant Predictors

Description	Beta	Wald	Sig.	Odds
Three significant variables				
Years of education	0.14	4.80	0.03	1.15
Prior AA involvement	0.24	25.55	0.00	1.27
Number meetings attended during treatment	3.84	75.93	0.00	46.70
Wald Forward and Backward				
Years of education	.14	4.42	.04	1.15
Admit being alcoholic	.63	7.60	.01	1.89
Prior AA involvement	.24	21.83	.00	1.27
Number meetings attended during treatment	3.56	60.05	.00	35.28

MATCH treatment. Table 2 also summarizes results of binary logistic regression to identify a parsimonious set of robust predictor variables. The full predictor variable set included 23 variables previously defined, which when loaded into a logistic regression block suggested three highly influential variables significant at the $p < .01$ level (years of education, prior AA involvement, and the number of meetings attended during treatment). None of the other 20 variables were close to significance, with the next most significant result equaling $p = .19$.

Running these three variables in a prediction block resulted in overall prediction accuracy of 76% with similar levels of sensitivity and specificity when the classification cutoff was adjusted to .30 ($constant = -5.20$, $\chi^2 = 166.69$, $df = 3$, $Nagelkerke R^2 = .40$, $p < .001$, $specificity = .78$, $sensitivity = .73$, $N = 505$). Wald forward and backward entry procedures suggested four variables consisting of the same three variable solution suggested by the prior procedure plus the addition of the SOCRATES Likert response to the statement "I am an alcoholic" (at discharge). Prediction accuracy was somewhat superior to the three variable solution ($constant = -8.02$, $\chi^2 = 171.13$, $df = 4$, $Nagelkerke R^2 = .42$, $p < .001$, $overall\ percentage\ accuracy = .78$, $specificity = .77$, $sensitivity = .78$, $N = 478$). In both cases, the magnitude of the $Nagelkerke R^2$ suggested a large overall effect size. Also notable in these analyses is the magnitude of the impact of the number of meetings during treatment as a predictor (odds ratio exceeding 35).

DISCUSSION

First, this analysis has supported prior research suggesting average weekly AA attendance is associated with far superior abstinence outcomes, and has also provided evidence depicting substantial underutilization of AA among people previously treated with a TS facilitative method. Related to this, the focus of this study was to improve our theoretical understanding of factors that influence posttreatment AA weekly attendance and to identify simple methods of prediction that can be useful in screening clients who are at elevated risk for posttreatment dropout or inadequate attendance. This analysis resulted in a number of significant findings that should provide valuable insight to 12-step treatment providers as well as advance theory of AA affiliation processes.

As stated, average weekly AA attendance at one-year posttreatment was associated with remarkably superior drinking outcomes. Those attending AA an average of weekly or more reported abstinence at a rate nearly two times greater than those who were attending an average of less than weekly or not at all (63% compared to 32%). Confirming prior research, over two times as many reported zero (52% of the total) or less than weekly (18% of the total) attendance compared to those reporting regular weekly attendance (30% of the total). Given this evidence, developing theory and prediction models that can aid in identifying those who are at risk for posttreatment attrition or inadequate attendance would seem to be a fruitful strategy for future research.

This study also examined factors that could add to theory and inform model development. These results implicated seven variables that could predispose or explain how it is that people come to affiliate at a level that includes average weekly attendance. Variables that were found significant, when controlling for the effects of other predictors, included: 1) three variables from domains representing *AA cultural fit* including more years of education, more agreeable about admitting to alcoholism, and greater religiosity; 2) a lower level of *social network functioning*, interpreted to suggest a greater need for social support may influence the perceived need for TS program involvement; 3) two variables from a motivational domain that is highly congruent with the AA culture and labeled *action orientation*, including a greater number of prior attempts to use external help to deal with drinking problems and higher scores on a scale measuring the degree to which the subject is taking action to deal with the drinking problem; and 4) although a weaker and inconsistent finding, the fewer number of symptoms of alcohol dependence suggesting *less severity* predicts greater posttreatment attendance.

First, in interpreting these findings, the overall strength of the findings taken as a whole seems to confirm prior characterizations suggesting that a combination of the level of need for greater social support (stress and coping theory: Humphreys, 1994, 1996) and the fit within the AA culture (person-in-AA organizational fit theory: Cloud, 2000; Mankowski et al., 2001) combine to influence the outcome. Second, while the domain labeled action orientation could arguably be interpreted

in terms of motivational theory, in the absence of other significant motivational indicators (i.e., the URICA composite motivational measure and the SOCRATES recognition and ambivalence subscales were not significant), we are inclined to interpret these variables as fitting with AA cultural fit theory. This would seem logical given AA's documented penchant for persistent action (e.g., attend lots of meetings, work the 12 steps, continue spiritual maintenance, engage in lifelong recovery initiatives). Unexpectedly, the direction of the number of symptoms was inconsistent with prior research that has suggested a positive relationship. This finding was not significant in all models, and the statistical "*p*" value was weaker than other significant variables; therefore, uncertainty exists on how and if to interpret this finding. However, interpreting this from a cultural fit perspective, it could be that those who would otherwise be congruent within the AA cultural world, might not fit, might not feel comfortable, or might not be able to relate to people of substantially less severity. These findings taken as a whole are collectively interpreted to consist of two primary theoretical influences: that people who have a greater need for social support (stress and coping theory) or those who are congruent with norms and values prevalent within the AA culture, or both, are more likely to affiliate with AA (person-in-organization fit theory).

In terms of prediction, this analysis raises the possibility that reasonably accurate prediction models consisting of few variables could be customized to specific agencies and refined across time. Identifying clients at risk for dropout could be used to inform treatment planning and may improve treatment outcomes. Furthermore, variables and formulas suggested by this analysis are readily available and easy to administer (years of education, prior AA involvement, AA attendance during treatment, and the degree of agreement with admitting alcoholism at discharge).

While TS treatment providers can initiate screenings based upon variables and formulas suggested in this analysis, implementing a system of client tracking and follow-up to improve prediction has a number of advantages. In this regard, follow-up on AA attendance at three- or six-month posttreatment intervals has been shown to describe the majority of attrition from AA (Tonigan et al., 2003) and for this reason is suggested for initial model development. Sampling meeting attendance during these follow-up points should be adequate for refining a TS risk prediction model that is agency specific. Follow-ups performed at three and or six months would facilitate faster implementation than waiting for results of one-year attendance. In addition to advancing more accurate prediction models, the relatively small investment in initiating systematic client tracking and follow-up has a number other advantages including: 1) the follow-up data is a valuable TS treatment outcome indicator; 2) the data would enable providers to systematically monitor the effects of specific treatment content on posttreatment TS program attendance and substance use outcomes; 3) the follow-ups could be used as a checkup on client progress and trigger referrals for added services when needed; 4) the follow-up would also enable providers to identify clients who are not amenable to TS posttreatment involvement and provide customized

alternatives to reduce relapse; and 5) implementing these practices would be consistent with trends encouraged by stakeholders and funding sources (e.g., evidence-based practice, continual progress improvement, program evaluation, customized treatment planning).

These results should be interpreted with caution since the study design does not rule out extraneous explanations of AA involvement and the models did not include measures of all known predictors of AA involvement. In addition, Project MATCH exclusion criteria are not representative of treatment populations, having excluded those with a secondary diagnosis of dependence on any drug other than marijuana. Hence, the results may not generalize well to community-based treatment. Given evidence that treatment influences can influence meeting attendance, future research could randomly assign subjects to a treatment condition that systematically encourages and rewards subjects to attend more meetings during treatment and through 90 days post treatment compared to a treatment as usual group. In addition, this analysis has suggested theory that could be tested with path analysis.

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