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Part VI: Interpersonal Functioning and Support

Network Support for Drinking

Prior Alcoholics Anonymous Involvement and Treatment Outcome

Social Functioning

Network Support for Drinking

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ABSTRACT

Network support for drinking is prognostic of poorer drinking outcomes. To examine whether treatment can negate this effect, two a priori matching hypotheses involving network support for drinking were tested: Cognitive-Behavioral Coping Skills Therapy (CBT) will be incrementally more effective than Motivational Enhancement Therapy (MET) for clients who have pretreatment networks highly supportive of drinking, and Twelve Step Facilitation (TSF) will be incrementally more effective than MET for clients with networks highly supportive of drinking. Results from the first 15 months indicated no support for a sustained matching effect for either matching hypothesis. However, for outpatient clients followed for 3 years from the end of treatment, the hypothesized support by TSF versus MET matching effect was observed for both percentage of days abstinent and drinks per drinking day. Causal chain analyses tested the assumptions underlying these two matching hypotheses. While increased drink refusal skills reported at 9 months among clients with network support for drinking predicted subsequent drinking, CBT did not result in greater self-reported drink refusal skills than did MET. Thus, the breakdown in the CBT causal chain was the failure of CBT to increase drink refusal skills more than MET did. Clients with pretreatment networks supportive of drinking who had networks less supportive of drinking 9 months after treatment initiation drank less often and less intensely subsequently than clients whose network support for drinking did not diminish. However, TSF did not result in a greater reduction in network support for drinking by clients with pretreatment networks supportive of drinking than did MET. Thus, once again, the breakdown in the causal chain was attributed to the failure of treatment, in this case TSF, to have a differential effect on a hypothesized mediator of treatment outcome, network support for drinking. The failure of this causal chain, in the presence of a longer term TSF versus MET matching effect in the outpatient arm of the study, led to a search for another explanation, and participation in Alcoholics Anonymous by TSF clients during followup was identified as a partial mediator. AA participation by clients with pretreatment networks highly supportive of drinking improved their drinking outcomes. This matching effect was most pronounced for clients assigned to TSF and least apparent for those assigned to CBT.

Social support has had an inconsistent role as a variable in alcohol treatment outcome research (Beattie and Longabaugh 1999). Conceptual ambiguity in the use of this construct contributes to this inconsistency (Longabaugh and Beattie 1985, 1986; Beattie et al. 1993; Longabaugh et al. 1993; Beattie and Longabaugh 1999). One important distinction needed is to differentiate general support from alcohol-specific support, that is, support for abstinence or drinking. Historically, these two constructs have been confounded. Consequently, it has not been generally possible to identify the impact that each has on drinking

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outcomes of treatment-seeking clients. However, in the few instances in which alcohol-specific support has been compared with general support as predictors of drinking outcomes, alcohol-specific support has been found to be a better predictor (Beattie et al. 1991; Beattie and Longabaugh 1999; Karno and Longabaugh 1999).

Given this prognostic effect, an important question is whether treatments can be devised that will decrease social support for drinking and, by doing so, decrease drinking. Our prior research has shown that clients varying in alcohol-specific support will have different drinking outcomes as a function of assignment to treatments that vary in amount of relationship-based treatments that include a goal of increasing alcohol-specific support. This research also suggested that clients treated with extended cognitive-behavioral therapy will be less affected by an unsupportive social network (Longabaugh et al. 1995).

The Matching Hypotheses

These results stimulated the development of two matching hypotheses in the present study.

Cognitive-Behavioral Therapy Versus Motivational Enhancement Therapy

Cognitive-Behavioral Therapy (CBT) teaches coping skills for dealing with situations involving high risk for relapse (Kadden et al. 1992). These high-risk situations include those in which a client is exposed to interpersonal encounters where there is pressure to drink, either because people around the client are drinking or because the client is being offered alcohol or being subjected to more subtle pressures to drink.

Motivational Enhancement Therapy (MET) does not attempt to teach the client coping skills but rather how to utilize preexisting resources to set treatment goals and strategies relying on these preexisting skills (Miller et al. 1992). Clients with networks supportive of drinking would not be taught the skills for coping with this network. *Therefore, we hypothesized that clients treated with CBT who had pretreatment social networks supportive of drinking would have better drinking outcomes than comparable MET clients.* For clients having networks that were not supportive of drinking, we did not expect differential drinking outcomes. Thus, an ordinal interaction was hypothesized.

Twelve Step Facilitation Versus Motivational Enhancement Therapy

Twelve Step Facilitation (TSF) treatment, with its aim of involving the client in Alcoholics Anonymous (Nowinski et al. 1992), is conceptualized as a relationship-based intervention that will increase alcohol-specific support for the client. Attendance at AA meetings will expose the client to a large network of people who have a goal of maintaining abstinence and supporting one another in achieving this goal. The AA fellowship's support was expected to assist clients in disengaging from elements of their pretreatment networks that were supportive of drinking. Therefore, TSF would promote support for abstinence both by the client's getting involved in a mutual self-help group supportive of abstinence and by the client's disengaging from a pretreatment social network supportive of drinking.

In contrast, AA involvement is not an important aim of MET. Rather, MET therapists are instructed to support a goal of AA involvement when raised by the client but not to initiate a discussion of this topic. *We therefore hypothesized that to the extent that the client's pretreatment social network was supportive of drinking, assignment to TSF versus MET would result in better drinking outcomes.* Figure 1 portrays the two matching hypotheses as well as the anticipated prognostic effect of a network supportive of drinking.

Network Support for Drinking

Network support for drinking was measured prior to treatment and 9 months after treatment initiation by the Important People and Activities (IPA) instrument (Clifford and Longabaugh 1991). The IPA is a structured interview that asks clients to identify important people in their networks with whom they have had frequent contact within the past 4 months. As implemented in Project MATCH, clients could identify up to 12 people over the age of 12. For

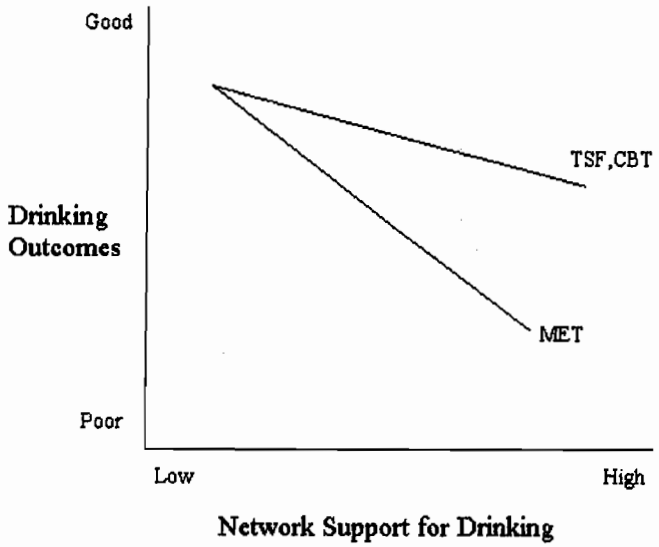

Figure 1. Hypothesized effects of network support for drinking on drinking outcomes.

each person so identified, the client is asked to identify the relationship (e.g., spouse, brother, friend, coworker), along with the duration of the relationship and the frequency of contact with the person. The client is also asked to assess the drinking behavior of each person: how often the person drinks, how much the person drinks on a drinking occasion, and the person's overall drinking status (e.g., heavy drinker, moderate drinker, abstainer). Finally, the client is asked to select from this network the four people who are most important. For each of these four people, the client is asked to rate his or her importance (from totally important to unimportant), how much the client likes the person (totally like to dislike), and how the person behaves in relation to the client's drinking and not drinking: Is the person supportive of drinking, accepting, neutral, not supportive, or nonaccepting? Is the person supportive of the client's not drinking, accepting, neutral, nonsupportive, or nonaccepting?

The interview takes 20–30 minutes to administer. A summary measure of alcohol-specific network support derived from this instrument has previously been found to be prognostic of posttreatment drinking outcome at 1-year followup (Longabaugh et al. 1993). The version of the IPA used in Project MATCH was found to have test-retest reliability over a 2- to 3-day period. With a heterogeneous sample of 70 heavy drinkers and clients who had received treatment, the summary index of overall support for drinking had a Shrout-Fleiss (1979) intraclass correlation of 0.80 and a product moment correlation of 0.95.

Because the version of the IPA used in Project MATCH was revised to suit the purposes of this study, it was necessary to develop a new single summary measure of alcohol-specific support based on this modified instrument. The single measure operationalized to test the alcohol-specific support matching hypotheses involved 11 indices, each standardized to have a mean of 0 and a standard deviation of 1. The values assigned to each index are summed to yield an overall measure of network support for drinking. Three indices focus on the client's investment in the network and eight focus on the network's support of the client's drinking (table 1).

The indices are correlated with one another in predicted directions, but the degree of association is quite modest, average r=0.256. Thus, the overall index is a composite of a fairly heterogeneous set of indices reflecting various dimensions of network support for drinking. However, because of the trialwide need to set the number of tests for each matching hypothesis to a minimum, this summary variable was utilized as the single measure of network support for drinking.

The client's baseline score was used to test the matching hypotheses in each arm of the study. In the aftercare arm, the hypotheses were tested for two periods of observation: during the planned 12 weeks of treatment and during the 12 months following planned treatment completion (months 4–15). In the outpatient arm, because clients were reinterviewed 39 months after treatment initiation, it was possible to test the matching hypotheses at this third period as well. In this interview, monthly drinking data were collected for months 37–39 using the Form 90 (Miller 1996). Therefore, the sample population was the 806 outpatients who had complete outcome data, 84 percent of the 952 outpatients included in the original study.

Alcohol Consumption

Two measures of drinking were designated as primary to test the matching hypotheses:

Table 1: Composite Index of network support for drinking

	Investment in the identified network[1]
* Number of People in the Network	The square root of the number of members listed in the overall network, which can range from 0 to 12. The number is squared to provide a more normal distribution.
* Amount of Contact With One's Network	The number of members within the overall network with whom the client has daily contact.
* Average Importance of Most Important People	The average value of "How important this person has been to you" among the people listed as most important.
	Support for drinking[2]
Drinking Status of Network Members	The contact the client has with each member in the network multiplied by the drinking status ascribed to the network member by the client (ranging from abstainer or recovering alcoholic to heavy drinker) and averaged across the network.
Frequency With Which Network Members Drink	The frequency with which each person in the listed network drinks multiplied by the amount of contact the client has with that person, averaged across the entire network.
Maximum Drinking of Network Members on a Drinking Day	The value each person described in the network receives on the variable, "What is the maximum this person drinks on a drinking day" multiplied by the amount of contact the client has with this person.
Percentage of Heavy Drinkers in Network	The number of network members listed as heavy drinkers, divided by the total number of network members listed.
* Percentage of Abstainers and Recovering Alcoholics in Network	The number of network members who are recorded as abstainer or recovering alcoholic, divided by the total number of network members listed.
Most Support for Drinking Among Most Important People	The most supportive reaction to the person's drinking, in response to the question: "How has this person responded to your drinking?" among the people listed by the client as most important.
*Least Support for Drinking Among Most Important People	The least supportive reaction to the person's drinking in response to the question: "How has this person responded to your drinking?" among the people listed by the client as most important.
Average Support for Drinking Among Most Important People	The product of three values for each person listed as most important: how much the client likes the person, how important the person is to the client, and the person's response to their drinking.

*The signs are reversed for indices with asterisks so that all indices have the same direction, with larger scores indicating more support for drinking. The indices are standardized to a mean of 0 and a standard deviation of 1, and a Composite Support Index is created by summing the standardized scores for each of the 11 indices.

[1] Information concerning investment in the person's network is drawn from two sections of the IPA: the client's description of the overall network and of the four most important people in this network.

[2] Information concerning support for the person's drinking is also drawn from two sections of the IPA: the client's description of the drinking behavior and status of the entire network and of the reactions of the most important people to the client's drinking.

percentage of days abstinent (PDA) during a period of observation and drinks per drinking day (DDD). These measures were both transformed to reduce skewness (Project MATCH 1997*a*).

Data Analytic Procedures

As reported elsewhere, a hierarchical latent growth model was used to test for matching effects in each arm of the study for the initial 12-month followup period (Project MATCH 1997*a*; Longabaugh and Wirtz, this volume, pp. 4–17).

Analysis of the 37- to 39-month data for outpatients indicated the data could be combined into a single 3-month data point for the purposes of testing for matching effects present at 3 years. Therefore, to test for the hypothesized matching effect during this followup period, ANCOVAs were conducted separately for each primary drinking variable—PDA and DDD.

To control for rival explanations for results, covariates included the two primary drinking variables measured during the 3 months prior to treatment, treatment site, treatment site by treatment assignment, and treatment site by treatment assignment by pretreatment support for drinking. Independent variables were treatment assignment, pretreatment network support for drinking, and their interaction term (Project MATCH 1998).

Results

Aftercare Arm

CBT Versus MET

No matching effects were observed for the CBT versus MET contrast that were independent of time (tables 2 and 3). While a quadratic time by matching effect for both PDA and DDD was observed during the within-treatment period, in no single week during this period was the matching contrast significant, with or without a Bonferroni correction. There was no support for the hypothesized matching effect of CBT and network support for drinking following treatment either.

Table 2. Hierarchical linear modeling results for within-treatment drinking in the aftercare arm for the Network Support for Drinking matching hypothesis

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
MV × Tx		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	*t*	.61	-1.21	.58	-1.11	-2.39	2.29
	p	.54	.22	.56	.26	**.016**	**.022**
CBT–TSF	*t*	1.54	-1.36	.96	-.74	-1.03	1.22
	p	.12	.17	.34	.46	.30	.22
MET–TSF	*t*	.69	.08	.22	.51	1.56	-1.29
	p	.49	.93	.82	.61	.12	.20
Overall effect	*F*	1.19	1.16	.40	.66	2.86	2.65
	p	.30	.31	.62	.52	.057	.071

NOTE: MV=matching variable, Network Support for Drinking; Tx=treatment; T=linear time; T^2=quadratic time. *F* tests were used for the overall effect, and *t* tests were used for pairwise treatment contrasts. Reported *p* values are based on nondirectional tests (i.e., two tailed).

Table 3. Hierarchical linear modeling results for posttreatment drinking in the aftercare arm for the Network Support for Drinking matching hypothesis

		MV × Tx		MV × Tx × T		Mv × Tx × T^2	
MV × Tx		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	*t*	-1.17	-.29	.79	.21	.27	.00
	p	.24	.77	.43	.83	.79	1.00
CBT–TSF	*t*	.12	-.85	-.07	.74	.56	-.38
	p	.90	.40	.94	.46	.57	.71
MET–TSF	*t*	1.29	-.41	-.86	.40	.20	-.31
	p	.20	.68	.39	.69	.84	.76
Overall effect	*F*	.92	.36	.41	.28	.16	.09
	p	.40	.69	.66	.75	.85	.92

NOTE: MV=matching variable, Network Support for Drinking; Tx=treatment; T=linear time; T^2=quadratic time. *F* tests were used for the overall effect, and *t* tests were used for pairwise treatment contrasts. Reported *p* values are based on nondirectional tests (i.e., two tailed).

TSF Versus MET

No matching effects were observed for the TSF versus MET contrast either during the treatment period or in the year following treatment. Thus, there was no support for the hypothesized matching effect of TSF and network support for drinking in aftercare.

Outpatient Arm

CBT Versus MET

There were no significant matching effects observed for the CBT versus MET contrast within treatment, in the 1 year following treatment, or at the 3-year followup (tables 4 and 5). In summary, there was no support for the CBT versus MET by network support for drinking contrast in either arm of the study at any data point.

TSF Versus MET

A matching effect was observed within treatment that changed over time (table 4). During the first 3 weeks of treatment for PDA and the first month of treatment for DDD, clients with networks supportive of drinking who were assigned to TSF were doing less drinking than those assigned to MET, while this was not the case for clients with networks unsupportive of drinking (figure 2). The matching effect was present during the first month of treatment for TSF clients with high network support for drinking, PDA=91 percent, versus MET clients, PDA=82 percent; in contrast, clients with low network support for drinking assigned to TSF and MET did not differ in their PDA: TSF=85 percent, MET=87 percent. This effect was strong enough to survive the Bonferroni correction. However, this initial effect dissipated during the second month of treatment and had totally disappeared by the end of treatment. The effects observed for drinks per drinking day were comparable (not shown).

No matching effect was observed during the 1 year following treatment either (table 5). Rather, network support for drinking had a consistent prognostic effect on drinking outcome. Irrespective of treatment condition, clients with networks supportive of drinking had fewer days abstinent (F=9.74, p<.0018 for PDA and F=8.39,

Table 4. Hierarchical linear modeling results for within-treatment drinking in the outpatient arm for the Network Support for Drinking matching hypothesis

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
MV × Tx		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	t	.35	-.76	-1.88	1.91	-.88	.57
	p	.72	.45	.06	.06	.38	.57
CBT–TSF	t	-.42	.15	.92	-.54	-.57	.78
	p	.68	.88	.36	.59	.57	.44
MET–TSF	t	-.78	.92	2.85	-2.50	.31	.22
	p	.43	.35	**.004***	**.012***	.76	.82
Overall effect	F	.31	.49	4.22	3.46	.39	.32
	p	.74	.61	**.015**	**.032**	.67	.72

NOTE: MV=matching variable, Network Support for Drinking; Tx=treatment; T=linear time; T^2=quadratic time. F tests were used for the overall effect, and t tests were used for pairwise treatment contrasts. Reported p values are based on nondirectional tests (i.e., two tailed). *p<.0125 (refers to the Bonferroni-corrected level of significance for a one-tailed test)

Table 5. Hierarchical linear modeling results for posttreatment drinking in the outpatient arm for the Network Support for Drinking matching hypothesis

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
MV × Tx		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	t	-.98	.50	-1.22	1.52	-.41	.43
	p	.33	.62	.22	.13	.68	.67
CBT–TSF	t	-1.71	1.62	-.84	1.75	.67	-1.17
	p	.09	.10	.40	.08	.46	.24
MET–TSF	t	-.71	1.11	.39	.21	1.15	-1.61
	p	.47	.27	.69	.83	.25	.11
Overall effect	F	1.47	1.38	.77	1.79	.69	1.39
	p	.23	.25	.46	.17	.50	.25

NOTE: MV=matching variable, Network Support for Drinking; Tx=treatment; T=linear time; T^2=quadratic time. F tests were used for the overall effect, and t tests were used for pairwise treatment contrasts. Reported p values are based on nondirectional tests (i.e., two tailed).

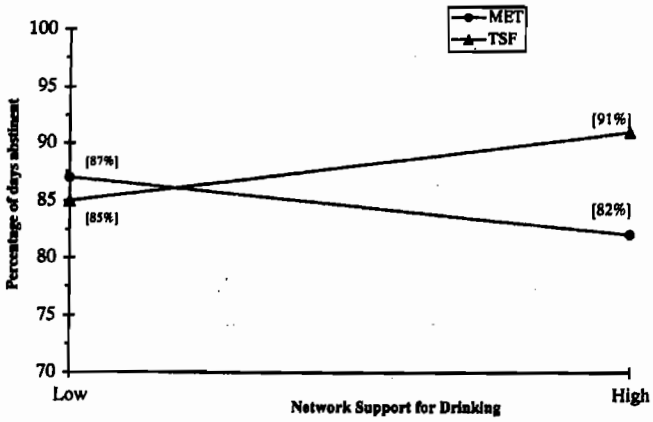

Figure 2. Percentage of days abstinent during first month of treatment: TSF versus MET clients with high and low network support for drinking.

$p<.0039$ for DDD). Thus, it would appear that the temporary buffering effect that TSF provides outpatients during the first month of treatment is overwhelmed by the adverse effect of a network supportive of drinking.

At 3 years followup, however, the matching effect surprisingly reappeared. For PDA, $p=.0057$ (one-tailed test) and for DDD, $p=.0036$. As hypothesized, the effect was attributable to TSF clients with networks supportive of drinking having better drinking outcomes than comparable MET clients, while for clients with networks unsupportive of drinking, treatment assignment did not affect drinking outcome. Clients with high network support for drinking assigned to TSF had more days abstinent (83 percent) than those assigned to MET (66 percent), whereas for those with low network support for drinking, there was no significant difference (TSF=80 percent, MET=83 percent).

In order to achieve a better understanding of why this matching effect reappeared 3 years after treatment, the average PDA and DDD (not shown) were graphed for the three treatments for clients with high and low network support for drinking throughout the entire period of observation starting from month 1 and continuing through month 39 (figure 3). Because the Form 90 (Miller 1996) was not used to collect data during months 16 to 35, averages for this period could not be plotted.

The graph confirms that the matching effect was not present during this initial period of followup. The overall poor prognostic effect of network support for drinking is also evident, as those with low network support for drinking have higher PDA than those with high drinking support. Of note, among clients with high network support for drinking, the MET clients were doing less well than the TSF clients, who were doing about as well as clients with networks not supportive of drinking.

Apparently, between months 15 and 39, MET clients with networks supportive of drinking continued to decline, to 66 percent PDA by 39 months, whereas comparable TSF clients maintained their level of PDA at 83 percent. A comparable pattern emerged for DDD.

A Posteriori Effects: TSF Versus CBT

Support for the hypothesis prompted us to examine post hoc the TSF versus CBT matching contrast. Our question was: Does pretreatment

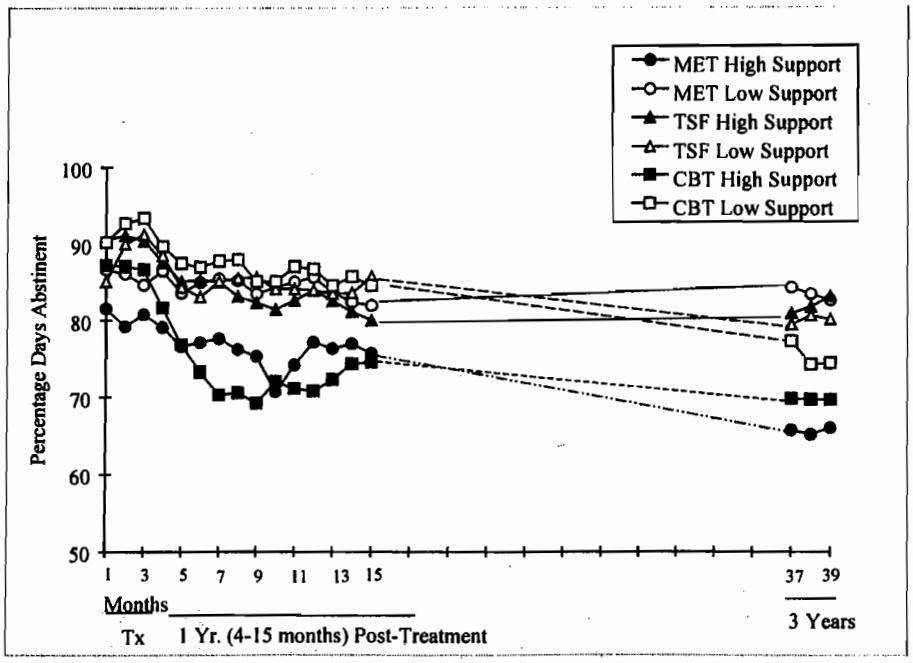

Figure 3. Percentage of days abstinent over entire followup period as a function of Network Support for Drinking and treatment assignment.

network support for drinking interact with TSF versus CBT in the same way as TSF versus MET?

A review of figure 3 suggests that CBT clients with networks supportive of drinking look like comparable MET clients, except during the first 3-month treatment period, when their PDA looks like that of comparable TSF clients. Thus, it appears that CBT is a protective factor for clients with networks supportive of their drinking during treatment. Table 4 supports this picture. The CBT versus MET by network support matching effect interacts with time and approaches a two-tailed unprotected significance level for both PDA ($p<.06$) and DDD ($p<.06$).

Once treatment had ended, however, these CBT clients rapidly declined to a level of PDA comparable to the MET clients. Another look at table 5 provides some statistical support for a TSF versus CBT matching effect that is the result of this decline in MET clients. While the CBT versus MET matching contrast observed during treatment is no longer evident, the CBT versus TSF by network support posttreatment contrast has a two-tailed significance level of $p<.09$ for PDA and $p=.105$ for DDD. The lesser difference between CBT clients with high and low network support for drinking than between MET clients with high and low network support at 3 years suggests that CBT clients are less affected by network support for drinking than are MET clients.

Summary

Tests of the a priori matching hypotheses provided no support for matching aftercare clients to either CBT or TSF versus MET based on their network support for drinking.

When these hypotheses were tested on the outpatient sample, CBT did not protect clients from the adverse effects of network support for drinking any more than did MET, except for a brief period during the beginning of treatment. Similarly, it initially appeared as though TSF protected clients from the adverse effects of network support for drinking only during the first month of treatment. However, drinking reported 3 years later indicated that there was a reemergence of the matching effect for TSF clients who had pretreatment networks supportive of drinking. In contrast to comparable clients in the other two treatments, TSF clients with networks supportive of drinking were able to maintain the abstinence they had achieved by 1-year followup for the subsequent 2 years. In contrast, MET and CBT clients with networks supportive of drinking continued to decline over this 2-year period.

These provocative findings point to the need for an analysis of the causal links underpinning the success and failure of the two matching hypotheses.

Causal Chains

CBT Versus MET

Figure 4 diagrams one putative causal chain underlying the hypothesized superior effectiveness of CBT versus MET for clients with networks supportive of drinking. It was anticipated that by teaching clients cognitive and behavioral skills for coping with interpersonal pressures to drink, CBT would provide clients with coping mechanisms to reduce the risk of drinking in such situations. Specifically, it was hypothesized that clients assigned to CBT would be taught drink refusal skills which they would then utilize in high-risk social situations, resulting in more days abstinent and fewer drinks per drinking day. As clients with networks supportive of drinking would more often be exposed to these high-risk social situations, they would be more likely to benefit from this skill acquisition than clients with networks unsupportive of drinking prior to treatment. Change in drink refusal behavior from pretreatment to posttreatment was measured by self-report items on the self-efficacy confidence and temptation instrument (DiClemente et al., this volume).

Tests of the drink refusal causal chain occurred in two steps. First, examination of the relationship between drinking and change in drink refusal skills indicated that increased drink refusal skills from baseline to 9 months was significantly related to decreased drinking frequency ($p=.0001$) and intensity ($p=.0001$). However, in the second step tested, there was no relationship between increase in drink refusal skills and CBT versus MET treatment assignment. Thus, the causal chain indicated that the

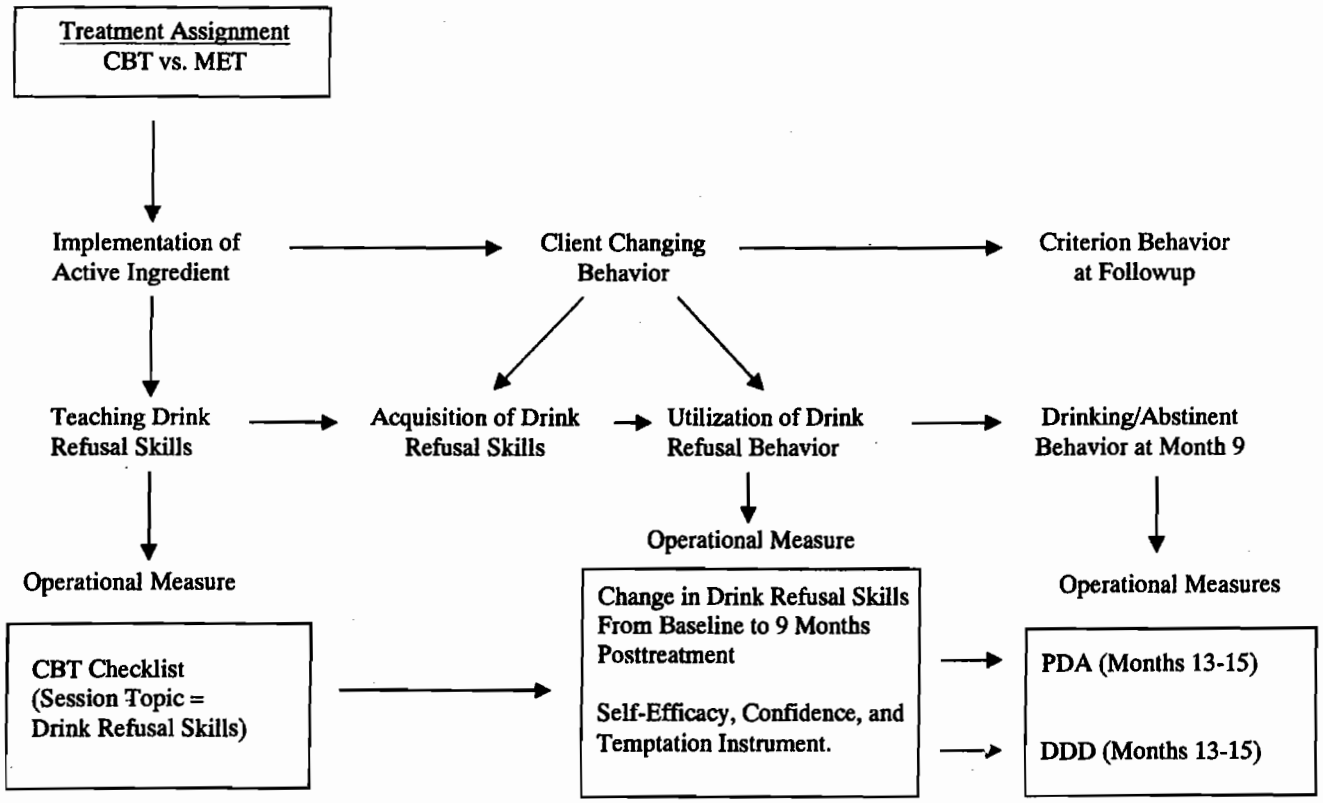

Figure 4. CBT versus MET, causal chain analysis, increased drink refusal skills

failure was in CBT's not increasing drink refusal skills more than did MET. Those who reported an increase in confidence in using these skills, in fact, did have fewer drinking days and less intensive drinking on drinking days.

TSF Versus MET

The A Priori Causal Chain

Figure 5 displays the putative causal chain for TSF clients. Because of the TSF therapist's support for client involvement in AA, TSF clients would be more likely to be involved in AA than would MET clients. This greater AA involvement, in turn, would lead to a decrease in network support for drinking posttreatment (measured at 9 months by a readministration of the IPA). This reduction in network support for drinking would in turn result in decreased PDA and DDD by months 13–15. Because network support for drinking is problematic for clients, those with networks highly supportive of drinking prior to treatment would benefit more from this reduction in network support for drinking than would those whose networks were unsupportive of drinking.

This causal chain was tested in two steps. First, the change in network support for drinking from pretreatment to 9 months was related to the two drinking measures during months 13–15. The results indicate a highly significant relationship between change in network support for drinking and change in drinking. Clients whose network support for drinking had declined between baseline and 9 months reflected significantly greater decreases in drinking intensity and frequency than those whose network support for drinking had increased.

However, in the second step, which tested the relationship between treatment assignment to TSF versus MET and change in network support for drinking, we found no association between these two measures. TSF did not lead to a greater decrease in overall network support for drinking than did MET.

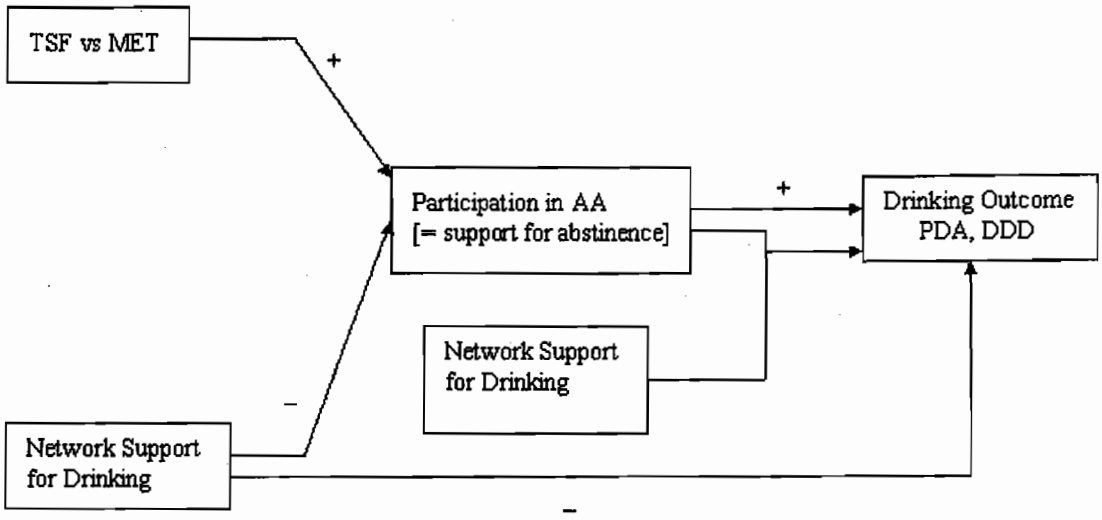

Figure 5. Causal chain for TSF versus MET by network support for drinking matching effect

Thus, as was the case with the CBT causal chain, treatment assignment failed to lead to differential changes in the putative mediating variable. And, as was also the case with the CBT causal chain, clients who reported positive change in the mediating variable—in this case, a network less supportive of drinking—did in fact also report better drinking outcomes. The failure of the matching hypotheses during this period appears to be attributable at least to the failure of the CBT and TSF treatments to bring about the greater changes anticipated.

The A Posteriori Causal Chain

Given the evidence for the long-term support for the treatment matching effect, our focus turned to identifying a causal chain that mediated this effect. How does it happen that TSF clients with networks supportive of drinking have increasingly better drinking outcomes than either MET or CBT clients with networks supportive of drinking, whereas for those with pretreatment networks unsupportive of drinking, such a differential effect is not evident? What does TSF have that CBT and MET lack that would differentially affect clients with high and low network support for drinking? What TSF ingredient would increase in impact as the time between formal treatment completion and followup observation increases?

The most obvious candidate for a mediating variable is AA participation itself, one of the two goals for TSF treatment not shared by either CBT nor MET. If a client does indeed become involved in AA, exposure to this social network is in itself highly supportive of abstinence, irrespective of any wider impact that AA involvement might have on the broader social network of the client.

We therefore revised the causal chain, as follows: First, clients with networks supportive of drinking prior to treatment will have fewer days abstinent after treatment than clients with networks unsupportive of drinking. Second, clients having networks supportive of drinking will also be less likely to participate in AA. Third, however, because of the primary aims of TSF, clients assigned to TSF would be more likely than clients assigned to either MET or CBT to participate in AA, irrespective of pretreatment network support for drinking. Fourth, we stipulate that clients participating in AA will have greater support for abstinence than those who do not participate.

Therefore, AA participation will reduce the negative impact of network support for drinking on posttreatment abstinence. This effect will be greatest for clients with pretreatment networks more supportive of drinking. Therefore, the greater AA participation of such clients in TSF will mediate the observed matching effect of the combination of TSF treatment assignment and network support for drinking on drinking outcome.

To conduct this analysis, we included a measure of AA participation, namely, the number of days the client reported going to meetings throughout the initial 3 months of treatment and during the year that followed. These data were collected by self-report through the Form 90 (Miller 1996). Number of days of attendance were summed and divided by the number of days within the period of observation to yield a percentage of available days within a period in which the client attended meetings.

For purposes of the causal chain analysis, the variable was dichotomized into high and low AA participation. Prototypically, a high AA participant attended AA on more than 20 percent of the days during the treatment period and about 16 percent during the year following treatment. In contrast, low AA participants attended fewer than 20 percent of days during the treatment period and stopped attending AA in the year following. Measures of attendance have been criticized as a poor proxy for operationalizing AA involvement (Tonigan et al. 1996). For this reason, we also used a measure of involvement in AA provided by the Alcoholics Anonymous Involvement (AAI) questionnaire (Tonigan et al. 1996). The results of this analysis have been reported elsewhere (Longabaugh et al. 1998). Only small differences were observed between the results of using these alternative measures of AA involvement.

Results

Network support for drinking is a prognostic indicator of fewer posttreatment days of abstinence and more drinks per drinking day during months 37–39 (PDA, p=.03; DDD, p=.01, one-tailed tests). Thus, the first step in the causal chain is supported.

Table 6 displays AA participation as a function of pretreatment network support for drinking and treatment assignment. Network support for drinking decreased the participation of a client in AA: 46 versus 54 percent (p<.0003), as hypothesized in the second step of the causal chain. Nevertheless, also as predicted, assignment to TSF resulted in greater AA participation than assignment to MET or CBT: TSF=75 percent versus MET, 38 percent, or CBT, 35 percent (also highly significant). Most pertinent, for those with high network support for drinking, TSF resulted in 70 percent AA participation versus only 37 percent for MET clients and 28 percent for CBT clients. Thus, the third step in the causal chain was supported. TSF leads to higher AA participation by clients with networks supportive of drinking than does either CBT or MET.

Table 6. AA participation months 1–15 as a function of network support for drinking and treatment assignment

MV/AA participation	CBT *N*	MET *N*	TSF *N*	Total *N*
Low support				
Low	83	92	33	208
High	62	61	125	248
% high participants	42.6%	39.9%	79.1%	54.4%
High support				
Low	105	95	48	248
High	40	55	114	209
% high participants	27.6%	36.7%	70.4%	45.7%
All participants				
Low	188	187	81	456
High	102	116	239	457
% high participants	35.2%	38.3%	74.7%	50.0%
Total	290	303	320	913

NOTE: MV=matching variable, Network Support for Drinking

The next link in the causal chain was to test whether greater participation in AA by TSF clients with high network support for drinking accounted for the matching effect that high network support for drinking clients assigned to TSF have better drinking outcomes at 3-year followup.

The test was conducted by a series of multiple regression analyses. In the first analysis, after entering the appropriate covariates, the product term of TSF versus MET was entered into the predictor equation, along with the network and treatment variables. In the second analysis, a third-order interaction term was created by the product of network support for drinking,

treatment condition, and AA participation. This term was added to the prior variable set. If AA participation were mediating the observed matching effect, we would expect to find that partialing out this effect would reduce or decrease to nonsignificance the strength of the relationship between the treatment assignment for these clients and their drinking outcomes.

As can be seen from table 7, when the effect of differential AA participation is partialed out of the relationship between treatment assignment and PDA for each of the three groups, only one group is markedly affected. As anticipated, the PDA of clients with high network support for drinking who were assigned to TSF was reduced by 7 percent when the effect of their AA participation was partialed out. In all other groups, there was only a small change. Once the effect of AA participation was removed from this group, their PDA was significantly reduced. (The one-tailed p value dropped from .0053 to .04.) Thus, AA participation by clients with networks highly supportive of drinking was a partial mediator of the observed matching effect. That the p value remained significant, at a reduced level, indicates that other partial mediators, still to be identified, were also operative.

The difference in PDA for those with networks supportive of and nonsupportive of drinking who did and did not participate in AA was largest for clients assigned to TSF. Clients with networks highly supportive of drinking who nevertheless participated in AA averaged 90 percent PDA at 39 months. Those not participating in AA had a PDA of only 61 percent, a 29-percent difference. In contrast, for those with networks unsupportive of drinking, AA participants had a PDA of 81 percent, while those not participating in AA had a PDA of 76 percent, only a 5-percent difference.

The same pattern held for MET clients. For clients with networks supportive of drinking, those who participated in AA had an average 39-month PDA of 80 percent, whereas those who did not averaged a low PDA of only 55 percent, a difference of 25 percent. Again, in contrast, for those with networks unsupportive of drinking the difference was less, with those participating in AA having a higher PDA of 90 percent than those who did not, 77 percent, a 13-percent difference.

Finally, for clients assigned to CBT, the relationship was also apparent. CBT clients with networks supportive of drinking who participated in AA had a 39-month PDA of 82 percent, while those not participating had a PDA of 65 percent, a 17-percent difference. In contrast, clients with networks unsupportive of drinking differed less in their PDA as a function of AA participation. AA participants had an average PDA of 80 percent, while nonparticipants had an average PDA of 70 percent, only a 10-percent difference.

In summary, the causal chain developed to explain the long-term TSF versus MET/CBT matching effect was supported. Clients with networks supportive of drinking prior to treatment are less likely to become involved in AA than clients with networks unsupportive of drinking. However, TSF increased the probability of clients being involved in AA. This was true irrespective of pretreatment network support for drinking. Participation in AA, in turn, was associated with more abstinent days. Partialing out this effect from the relationship of pretreatment network support by treatment matching effect to drinking at months 35–37 reduced the significance of the relationship, thus indicating that AA participation is a partial mediator of this matching effect.

Table 7. Average percentage of days abstinent in month 39, before and after partialing out the effects of AA participation

MV/AA participation	Treatment		
	TSF	MET	CBT
High support			
Included	83	66	70
Partialed out	76	68	73
Difference	-7	+2	+3
Low support			
Included	80	83	74
Partialed out	79	84	75
Difference	-1	+1	+1

NOTE: MV=matching variable, Network Support for Drinking.
TSF/network support verses MET/network support contrast: p value reduced from .0053 to .04.

Given the causal chain support for the TSF versus MET matching hypothesis at 3-year followup, the obvious questions to be addressed are:

- Why did this matching effect not appear earlier in the outpatient group?
- Why did this matching effect not appear in the aftercare sample?

In order to examine these questions, we tested the AA participation causal chains for the earlier posttreatment periods separately for clients in the outpatient and aftercare arms, substituting the last 3 months of posttreatment drinking measures (months 13–15) for the 37–39 month measure indexing the 3-year outcomes.

Outpatient 1-Year Posttreatment

When the TSF versus MET by network support for drinking matching effect was tested for months 13–15, no evidence for matching appeared. When regression analyses were conducted to include the product term of AA participation by treatment by network support for drinking, this product term had no main effect on PDA, thus confirming that AA participation was not interacting with treatment and support to enhance the outcomes of TSF clients with networks supportive of drinking. With AA participation excluded from the analysis, the negative effect of network support for drinking on MET clients was slightly but nonsignificantly greater than for TSF clients. When AA participation was factored in, both MET and TSF clients with networks supportive of drinking did equally well when AA participation was high. When AA participation was low, both treatment groups did increasingly poorer with increasing network support for drinking. Thus, the higher order product term had no mediating effect.

Aftercare 1-Year Posttreatment

These analyses were repeated for the aftercare sample. As above, we found no evidence that PDA during months 13–15 was affected by matching network support for drinking to TSF versus MET treatment. When the product term factoring in AA participation was entered, those with high AA participation in both treatments did equally well and better than those with low AA participation. MET clients tended to have better PDA than TSF clients when network support for drinking was high.

Discussion

The failure of the CBT versus MET matching hypothesis is consistent with the breakdown in its underlying causal chain. While clients reporting greater drink refusal coping skills in social situations had better drinking outcomes, assignment to CBT did not result in a reported greater utilization of these pertinent skills at 6 months after treatment completion. It would thus appear that increased social coping skills is not a unique contribution of CBT. This finding is consistent with that recently reported by Finney and colleagues (1998). These investigators conducted a naturalistic study of Veterans Administration treatment programs that had either a 12-step orientation, a CBT orientation, or were eclectic. Results showed that TSF and eclectically treated clients were as likely to report increased coping skills as those treated in CBT. It then follows that clients especially in need of such skills will not incrementally benefit from CBT therapy. This conclusion is consistent with a review of CBT's putative active ingredients as mediators of CBT effectiveness with alcohol-dependent clients (Morgenstern and Longabaugh 2000). These investigators found that increased social skills did not mediate the effectiveness of CBT versus treatments against which it has been compared.

In contrast, a TSF by network support for drinking matching effect was observed to emerge over an extended period of followup for outpatients. Even though TSF clients did not show a differential change in their everyday social network's support of their drinking, they did participate in AA to a greater extent than did their MET and CBT counterparts. For clients with pretreatment networks supportive of drinking, participation in AA eventually reduced the influence of this network on their drinking. Thus, AA participation was implicated as at least one of the active ingredients mediating this matching effect. Therefore, to

the extent that a treatment is successful in getting outpatient clients with high network support for drinking involved in AA, their drinking outcomes should be improved.

AA participation is an important correlate of successful drinking outcomes of clients with pretreatment networks supportive of drinking across all three treatment conditions but is less influential in producing good drinking outcomes for those with social networks unsupportive of drinking prior to treatment. Here, AA participation is positively associated with good drinking outcomes but much less strongly so.

Further Research Questions

While a host of further research questions arise from these findings, five are especially pressing.

1. Methodological review. In order to test the a priori matching hypothesis, it was necessary to combine a multidimensional construct of support for drinking into a single measure. The indices which go into making up this overall index are only moderately correlated, and it is possible that some dimensions of support for drinking are more important than others for measuring support and its influence on drinking outcomes.

   While two indices of drinking have served to measure treatment outcome, it is important to assess whether any of the matching effects reported for these two drinking measures generalize to other dimensions of outcome.

   In measuring AA involvement, we confined this report to a measure of AA attendance summed over the initial 15 months. We have elsewhere reported (Longabaugh et al. 1998) the results of using a more sophisticated measure of AA involvement developed by Tonigan and colleagues (1996). Much to our surprise, the effect of this more elegant measure of AA involvement, while also observed to be a partial mediator of the matching effect, was not as robust. AA involvement measured by the AAI scale incorporates two dimensions of AA affiliation, working the program and participation in the Fellowship. AA attendance may be a purer measure of social support than AA involvement, which confounds affiliation and working the Twelve Steps. As the AAI scale measures both of these dimensions, further analysis should discern whether these two components contribute differentially to mediating this matching effect.

2. Within the present analysis, AA participation was measured as a single variable covering the entire period of followup. It will be important to separate participation into different blocks of time in order to isolate which periods of participation have the largest impact on outcome and whether incremental gains are made by the addition of other time blocks. While the effects of AA involvement were apparent 3 years after treatment, AA participation itself did not differ for the three treatment groups at 3 years (Tonigan et al. in press). An important question to address therefore is how long AA participation must continue in order to reap these beneficial effects, especially for those clients with networks supportive of drinking. As Tonigan has reported elsewhere (in press), AA participation is highest during treatment and diminishes as time from treatment completion increases. Our matching finding would suggest that while AA participation is diminishing as time from treatment completion increases, the benefit to be gained by clients with networks supportive of drinking is nevertheless increasing for those who have participated in AA.

3. Still another question to be addressed is that of gaining a more comprehensive understanding of clients affected by the matching process. What other client characteristics increase the likelihood of those with networks supportive of their drinking becoming involved in AA? We have observed that clients assigned to TSF were most likely to participate in AA. Drinking outcomes were best for those who did participate, but those who did not participate in AA, despite the TSF push, had the poorest outcomes. In contrast, clients who were assigned to MET and CBT had much less likelihood of participat-

ing in AA, but the drinking outcomes for those who did not participate were not as bad as those observed among the high network support for drinking/low AA participants in TSF.

If we can identify other characteristics besides network support for drinking that reduce the likelihood of clients utilizing AA, we could plan treatments particularly suited to these types of clients. This would improve overall treatment effectiveness by triaging AA-aversive clients with networks supportive of drinking to other kinds of treatment interventions.

4. We also need to examine the causal chain in greater detail in order to identify what in the experience of the client leads to the emergence of this matching effect 3 years after treatment. It is tantalizing that a matching effect observed during the first month of treatment disappears only to reemerge 3 years later. This suggests that some kind of dynamic process is active which unfolds over time. Our initial hypothesis is that clients with networks supportive of drinking are thrown into great conflict when assigned to TSF with its goal of AA client involvement. Perhaps they do so during the first month of treatment, but then the everyday influence of their preexisting network pulls them away from this support group. They may subsequently relapse or gradually increase their alcohol involvement over time. After sufficient adverse effects from drinking recur, some of these clients may return to AA as a posttreatment resource to assist them in regaining a more trouble-free lifestyle.

5. Finally, as differential AA participation does not fully explain the observed TSF versus MET matching effect for clients with high network support for drinking, what other factors are involved? What other causal chains may be identified?

Conclusions

The TSF versus MET by network support for drinking matching hypothesis was confirmed at 3 years posttreatment. This matching effect accounted for a 17-percent difference in PDA between clients with networks supportive of drinking who were assigned to TSF and MET. Not hypothesized but evident in the results, CBT compared as unfavorably for clients with networks supportive of drinking as did MET.

Causal chain analyses revealed that this matching effect did not emerge earlier during the posttreatment period because TSF clients with networks unsupportive of drinking were as helped by AA attendance as those with networks supportive of drinking. Additionally, in aftercare, MET clients participated in AA to nearly the same extent as did TSF clients, no doubt because of the influence of the preceding inpatient or day hospital treatments that had already exhorted the client to become involved in AA.

Because AA is a partial mediator of this matching effect, it can be incorporated as an active ingredient into treatments other than TSF, with the likelihood that client outcomes in these other treatments will be enhanced.

It is notable that this matching effect was one of the few observed in Project MATCH. Because the present matching hypothesis was also one of the few that were predicated on a causal chain that involved variables outside of the therapy itself, this suggests that if matching effects are to be observed, they need to take into account the social context in which treatments occur.

In contrast, the CBT matching hypothesis relied upon changes that were to occur within the treatment itself which were anticipated to be generalized to in vivo experience. However, evidence for this matching effect was only a trend and limited to the within-treatment period in the outpatient arm, which reinforces the belief that to be successful, treatment must go beyond changes that may take place only in treatment.

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Prior Alcoholics Anonymous Involvement and Treatment Outcome

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ABSTRACT

This chapter addresses the relationship between clients' prior exposure to Alcoholics Anonymous (AA) and their response to three psychosocial treatments for alcoholism: Cognitive-Behavioral Coping Skills Therapy (CBT), Motivational Enhancement Therapy (MET), or Twelve-Step Facilitation Therapy (TSF). It was predicted that clients with higher levels of previous AA involvement would have better outcomes in the TSF treatment condition because of that treatment's AA orientation. Weaker relationships between prior AA involvement and outcome were predicted for the CBT and MET treatments. Preliminary analyses showed that AA involvement prior to treatment overall was not systematically related to posttreatment percentage of days abstinent or drinks per drinking day among either the outpatient or aftercare populations sampled. Tests of the matching hypothesis provided no support for the predicted match among either the outpatient or aftercare clients. Analyses exploring the causal chain presumed to underlie the hypothesized matching effect provided little support for the proposed causal chain links. These findings suggest that the efficacy of these three treatments is not significantly altered by clients' prior exposure to AA.

Alcoholics Anonymous (AA) is the most popular mutual-help program for people experiencing alcohol problems, and estimates of current 12-step meeting attendance rates in North America range from 1.7 million (Alcoholics Anonymous 1990) to 3.5 million (Room 1993) per year. Historically, AA has influenced the conduct and goals of professional treatment of alcoholism in the United States and, in turn, AA membership has increased because of professional referral to AA (Makela 1996). The extent of interplay between AA and professionals is probably best evidenced in the current and lively discussion about whether AA is an adjunct to formal treatment wherein gains made in formal treatment are sustained by continued AA affiliation or, instead, AA should be regarded as offering unique benefits essential to recovery from alcoholism (Freimuth 1996).

In the context of the mutually beneficial albeit sometimes tense relationship between professionals and AA, it is surprising (and disappointing) that so little effort has been made to understand how, if at all, congruity in therapeutic orientation and prior exposure to AA principles may influence drinking outcome. Emrick and colleagues (1993), for example, found virtually no relationship between prior AA attendance and drinking outcome after formal treatment (r weighted=0.05), but their combining of findings from 12 studies ignored the nature of the professional treatment clients received in each study. Congruity between client expectations about what treatment ought to be (or ought not to be) may influence client treatment satisfaction and outcome. The extent to which clients received what they wanted (at intake) has been found to predict better alcoholism

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treatment outcomes, whereas the delivery of unwanted services may have little or no impact.

Pragmatically, treatment providers encounter individuals with prior AA exposure. Here, exposure refers most immediately to AA attendance, although the term is inclusive and may involve such activities as reading AA literature. While exact estimates of the percentage of clients with AA exposure immediately before treatment are problematic to derive, the percentage of clients with prior *lifetime* AA exposure is certainly high (estimated at 77 percent by the Project MATCH Research Group 1997). Thus, the importance of AA for professionals is not restricted to referral and encouragement to meetings. The AA membership survey, for example, reported that 62 percent of AA members (sampled) reported seeking formal therapy after becoming members of AA and achieving sobriety (AA Membership Survey 1997).

One matching hypothesis in Project MATCH (1993, 1997) specifically addressed the congruity of professional treatment approaches with clients' prior AA exposure. *We predicted that clients with higher levels of previous AA involvement would fare better in a Twelve Step Facilitation (TSF; Nowinski et al. 1992) treatment condition because of its AA orientation. In terms of the two primary dependent measures in the Project MATCH trial, we predicted that posttreatment percentage of days abstinent (PDA) and prior AA involvement would be positively related for those clients assigned to the TSF condition, and that drinks per drinking day (DDD) would be negatively related with prior AA involvement for TSF clients. Within the other two treatments of the Project MATCH trial—Cognitive-Behavioral Coping Skills Therapy (CBT; Kadden et al. 1992) and Motivational Enhancement Therapy (MET; Miller et al. 1992)—we predicted that a weaker relationship would be found between prior AA involvement and drinking outcomes.*

Causal Chain

Our predictions were based on the following assumptions:

- Higher prior AA engagement would be associated with more positive client attitudes about the goals and tasks in the TSF treatment condition.
- Increased acceptability of the TSF modality would also be reflected in stronger client-therapist relationship bonding.
- Greater commitment to the TSF therapeutic process would, in turn, result in higher rates of both treatment session completion and AA attendance during treatment.
- Heightened compliance with the TSF protocol and AA would translate into higher rates of posttreatment AA attendance, which, in turn, would result in more favorable drinking outcomes.

Operationalization of the Matching Variable

Central to the formulation of our hypothesis was the development of a conceptual framework to define AA involvement, followed by selection of a measure with known psychometric characteristics. Our intent was to measure the extent of prior commitment to AA, rather than just AA attendance. The core literature of AA (Alcoholics Anonymous 1976, 1981) specifies two domains of AA experience. On the one hand, the *program* of AA, compactly summarized in the 12 Steps and Traditions of AA, includes prescriptions for achieving sobriety and for conducting one's life. On the other hand, the practice of AA, often described as the AA *fellowship*, includes the ways in which AA members relate to one another as well as how AA group interactions are perceived by members. Montgomery and associates (1993) found that AA groups differ significantly in perceived group dynamics (fellowship), and Tonigan et al. (1995) reported that differences in AA group dynamics were predictive of the extent to which the 12 Steps of AA were discussed in meetings (program).

Composite measures of AA involvement seem to have more utility than single-item measures but often have sampled a small range of behaviors. Snow and colleagues (1994) emphasized social relationships as a measure of AA commitment and largely ignored progress in working the AA steps, a central element of the AA program. On the other hand, Gilbert (1991) ignored

social support within AA and measured progress in AA step work, thus excluding consideration of the AA fellowship. It seems sensible to sample involvement in both the AA program and fellowship when measuring the construct of AA involvement.

Instrumentation

The AA Involvement (AAI) scale developed for Project MATCH consists of 13 items designed to measure lifetime and more recent participation in AA. The inventory includes some items pertaining to the AA program (e.g., step work) and others reflecting commitment to the AA fellowship. In a test-retest substudy of the Project MATCH trial, the AAI was found to have good internal consistency and test-retest reliability (Tonigan et al. 1996) and, based upon the intake Project MATCH sample (N=1,726), support was found for the multidimensional nature of engagement in AA.

As a validity check of our composite AAI measure, we plotted by study arm lifetime and recent AA involvement (based on intake AAI data) against reported attendance at AA meetings in the 90 days prior to study recruitment, as reported in the Form 90 interview (Miller 1996). Figure 1 shows the nature of the relationship between these measures at intake for the aftercare and outpatient samples. Recent AA attendance was a reasonable proxy of more general AA involvement under conditions of low to moderate involvement, but AA involvement plateaued at higher levels of attendance—above 40 percent of days (or about 3 meetings a week). Not shown, this same significant quadratic relationship was found at each followup point in both study arms of Project MATCH, although with time, the nature of the quadratic relationship became somewhat shallower.

Results

About 7 percent (n=69) of Project MATCH outpatients did not provide sufficient information to compute a composite intake AAI score, with a somewhat lower percentage of missing cases (5 percent, n=33) in the aftercare arm. No between-treatment mean differences were found in intake AAI scores within either arm

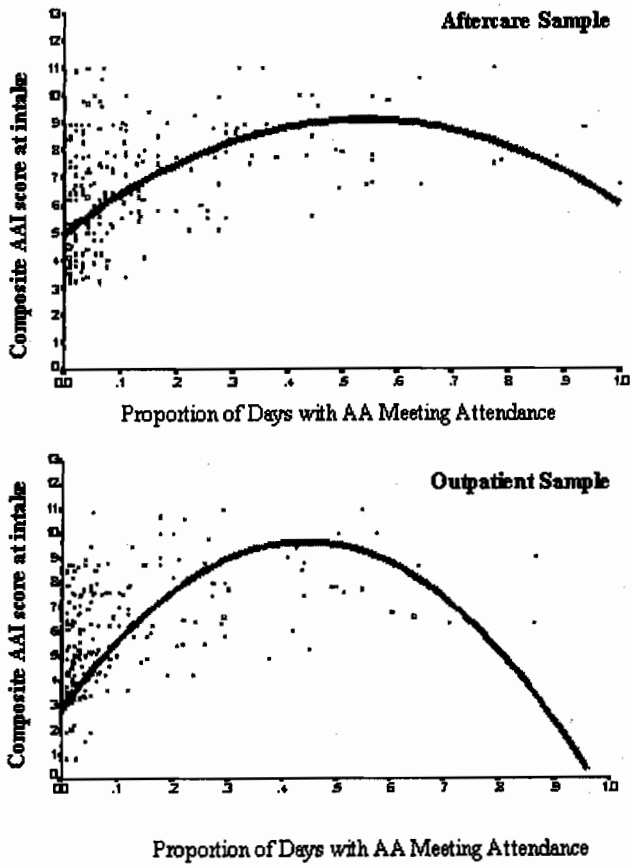

Figure 1: Relationship between self-reported AA attendance and involvement at intake: Project MATCH aftercare and outpatient samples

but, on average, aftercare clients reported significantly higher prior AA involvement (M=5.37, SD=2.33) than outpatient clients (M=3.38, SD=2.48), p<.001. At least some lifetime AA attendance was reported by 64 percent of the outpatient and 91 percent of aftercare clients.

Aftercare Sample

Prognostic Effects

The prognostic effects of the AAI secondary matching variable were also assessed in a hierarchical linear modeling (HLM) context that controlled for study site, treatment condition, and linear and quadratic time main effects as well as their interactions with each other and with AAI. Four analyses were conducted, one for each primary dependent measure (transformed PDA and DDD) and separately within study arm (outpatient and aftercare). A more

detailed description of the analytic strategy is provided by the Project MATCH Research Group (1997) and Longabaugh and Wirtz (this volume, pp. 4–17).

For aftercare clients, AA involvement prior to treatment was unrelated to abstinence (PDA) during 12 months of followup, with some variation in the relationship between AAI and PDA across the five aftercare sites ($p<.06$). Examination of scatter plots indicated that in two aftercare sites the relationship between intake AAI and followup PDA was positive ($r=0.19$ and 0.10), whereas at the other three sites it was negligible or negative ($r=-0.05$, -0.08, and -0.11). The prognostic effect of prior AA involvement on intensity of drinking (DDD) during the 12 months of followup approached statistical significance ($p<.06$) in the direction opposite to our prediction. Specifically, clients with more prior AA involvement reported *higher* levels of drinking intensity during early followup. Variability across aftercare sites ($p<.054$) and time ($p<.01$) was again observed. At three aftercare sites, for example, the relationship between prior AA involvement and intensity of drinking during the first 6 months of followup was significant and positive, ranging from r's=0.29 to 0.19, while at the remaining aftercare sites the relationship was negligible, r's ranging from 0.03 to 0.01.

Matching Hypothesis

The analytic strategy for testing of the matching hypotheses and protection of type-1 error rate are described elsewhere in this volume (Longabaugh and Wirtz, pp. 4–17). Succinctly, HLM models similar to those for testing the prognostic effect of matching variables were applied, and three statistical tests of slopes were evaluated in possible rejection of the null hypothesis. These were: (1) an overall matching effect collapsing across time, (2) a matching effect by linear time interaction, and (3) a matching effect by quadratic time interaction. We predicted a more positive slope for AAI and outcome during the 12 months of followup within the TSF condition than within the combined CBT and MET conditions.

Inspection of table 1 shows that the a priori overall matching effect was not supported either during treatment or across the 12 months of followup (all p's >.10). During the 12 weeks of treatment, however, an AAI by treatment by linear time interaction was found on both dependent measures (PDA and DDD), but this effect was opposite to the prediction: clients assigned to TSF with higher AAI scores tended to have increasingly fewer abstinent days per week and drank more heavily as treatment continued than comparable clients assigned to CBT and MET conditions. This finding did not persist into the posttreatment phase of the study. Inspection of the unplanned pairwise contrasts in table 1 likewise indicated no presence of an AAI moderating effect on treatment response.

Table 1. Summary of aftercare HLM of Alcoholics Anonymous Inventory tests: Probability values associated with tests during and after treatment

	Predicted match TSF vs. MET/ CBT	Unplanned matching contrasts		
		TSF–CBT	TSF–MET	CBT–MET
During treatment				
PDA	.63	.47	.90	.56
PDA linear	**.03***	.06	**.05**	.87
PDA quadratic	.65	.36	.91	.30
DDD	.13	.09	.37	.43
DDD linear	**.01***	**.04**	**.03**	.78
DDD quadratic	.21	.27	.29	.99
After treatment				
PDA	.65	.82	.58	.74
PDA linear	.18	.29	.21	.83
PDA quadratic	.34	.12	.90	.16
DDD	.81	.96	.65	.61
DDD linear	.15	.17	.26	.83
DDD quadratic	.90	.60	.76	.40

* opposite direction

Causal Chain Analyses

Where did our predictions fail? To explore this question we examined the causal chain underlying our hypothesis. Figure 2 shows the path analysis testing our causal model for the two aftercare groups contrasted in the AAI matching hypothesis. Partial correlation

coefficients are provided beside each arrow, and each coefficient controls for relationships of equal or prior temporal order (left to right).

Hierarchical multiple regression analyses were conducted to determine whether parallel links (slopes) in the two models in figure 2 were different from one another. These analyses controlled for site variation as well as for the main effect of treatment and the matching variable. None of the three therapeutic alliance measures (goal compatibility, task compatibility, relationship bonding) supported our prediction of a differential relationship (all interaction p values >.05). For clients assigned to TSF and the combined CBT and MET conditions alike, there was an equivalent negative relationship between prior AA involvement and client agreement on therapeutic tasks. Extent of prior AA involvement was virtually unrelated to therapist bonding in both groups, and agreement with therapeutic goals was modestly and positively related to prior AA exposure in both groups.

Six interactions were tested in determining whether the slopes between the three therapeutic measures and AA meeting attendance and percentage of therapy attended variables were different between the TSF and combined CBT and MET path models. While substantial variability was found in parallel links (e.g., 0.13 versus -0.10), none of these slope contrasts exceeded chance variation (smallest obtained p value=.28). As predicted, AA meeting attendance during treatment was a strong predictor of posttreatment AA attendance which, in turn, predicted both primary dependent measures at both proximal and distal followup periods. Not anticipated, this prediction was manifest in about the same magnitude in both the aftercare TSF and combined CBT and MET conditions (nonsignificant slope contrast).

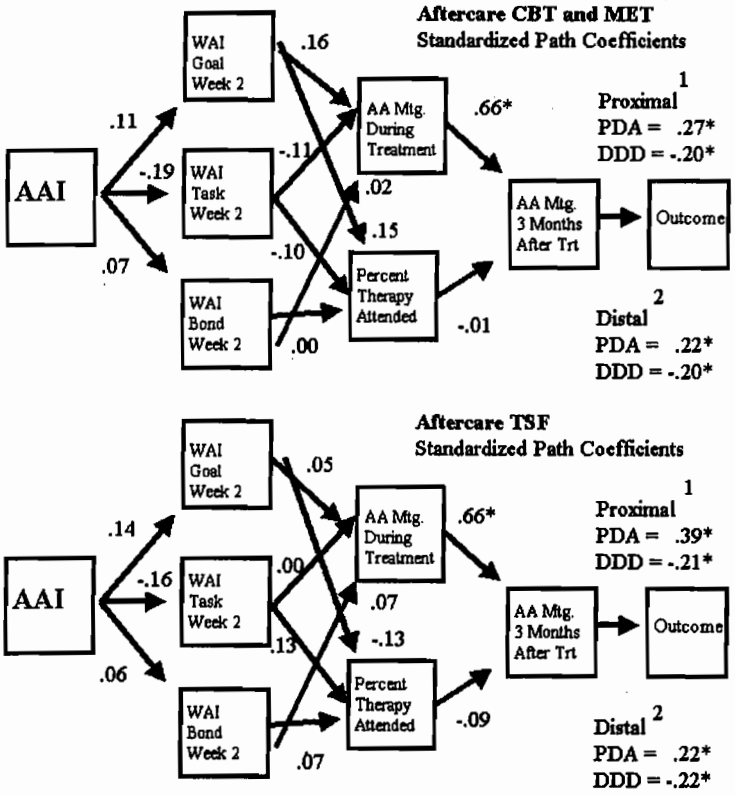

Figure 2: AAI causal model for aftercare TSF and combined CBT and MET conditions

[1]Proximal outcome defined as months 4–9 (first 6 months after end of treatment).

[2]Distal outcome defined as months 10–15 (second 6 months after end of treatment).

Outpatient Sample

Prognostic Effects

Among outpatients, no support was found for a prognostic main effect of the AAI on posttreatment outcome. Considering the frequency-of-drinking measure (PDA), there was no overall main prognostic effect (p<.23). Possible variation by quadratic time (p<.09) and the interaction of quadratic time with sites (p<.02) suggested complex relationships associated with site-specific factors. Inspection of bivariate relationships by site indicated a positive and significant relationship (r=0.16) between prior AA and PDA (months 1–6) at one site while this relationship was not present at the other outpatient sites. For the drinking intensity measure (DDD), prior AA involvement was unrelated to posttreatment drinking (p<.48), with little evidence that site or time factors confounded the relationship of interest (all p values >.05).

Matching Hypothesis

Table 2 presents the probability values associated with HLM tests of the prospective AAI matching hypothesis.

None of the overall tests of the AAI matching hypothesis reached Bonferroni-protected statistical significance on either PDA or DDD during or after formal treatment. During the 12 weeks of treatment, there was a trend in the linear time effect in the predicted direction using the frequency of drinking measure (PDA, $p<.08$) such that prior AA engagement and PDA were positively related for clients assigned to TSF while prior AA and PDA were unrelated in the combined CBT and MET conditions. After treatment, a linear time trend was found on the drinking intensity measure (DDD, $p<.09$) such that clients assigned to the combined CBT and MET conditions drank more heavily with greater extent of prior AA exposure, while no relationship was present between prior AA and drinking intensity for TSF clients.

Unplanned pairwise matching contrasts indicated that prior AA involvement moderated treatment outcome in the context of contrasting CBT with MET. Post hoc analyses showed that PDA and prior AA were positively related both during and after treatment for clients assigned to the MET condition. Oppositely, prior AA was modestly and negatively related with PDA during treatment, and prior AA was positively related with DDD during treatment for CBT clients. These overall matching effects were unplanned and hence should be interpreted cautiously. Nevertheless, several of these overall MET versus CBT matching contrasts exceeded Bonferroni-corrected probability values used to test a priori contrasts. Future work should examine the potential moderating effects of prior AA when outpatient treatments paralleling CBT and MET are offered and evaluated.

Table 2. Summary of outpatient HLM of Alcoholics Anonymous Inventory tests: Probability values associated with tests during and after treatment

	Predicted match TSF vs MET/CBT	Unplanned matching contrasts		
		TSF–CBT	TSF–MET	CBT–MET
During treatment				
PDA	.99	.27	.26	**.02**
PDA linear	.08	.18	.09	.69
PDA quadratic	.76	.66	.32	.13
DDD	.70	.15	.45	**.02**
DDD linear	.50	.63	.48	.82
DDD quadratic	.97	.66	.71	.40
After treatment				
PDA	.69	.50	.17	**.03**
PDA linear	.83	.99	.70	.69
PDA quadratic	.12	.47	**.04**	.17
DDD	.53	.16	.76	.08
DDD linear	.09	.11	.16	.87
DDD quadratic	.56	.58	.64	.94

Causal Chain Analyses

The planned matching AAI hypothesis was not supported. Attention was thus directed to determining the reasons for the failure of our hypothesis. Figure 3 shows the proposed causal chain (and standardized path coefficients) for the AAI hypothesis separately for the two groups included in the AAI matching contrast. Parallel to causal chain analyses in the aftercare sample, multiple regression analyses were conducted to determine if corresponding slopes for the two diagrams in figure 3 differed beyond chance fluctuation. Similar to findings in the aftercare sample, the proposed mechanisms producing the matching effect failed at the first causal link of our model: prior AA involvement did not differentially predict a stronger therapeutic alliance in TSF and relatively weaker associations in the combined CBT and MET conditions (smallest obtained p value=.30).

Partial support was found for subsequent proposed mechanisms in the AAI causal chain in the outpatient sample. In particular, client agreement with therapeutic tasks was positively predictive of AA meeting attendance during treatment and therapy attendance in TSF. These relationships were either nonexistent or negative in the combined CBT and MET conditions (slope contrasts all $p<.01$). Further, it was predicted that during treatment AA attendance would predict posttreatment AA attendance which, in turn, would predict more frequent abstinent days and fewer drinks per drinking day. This prediction was supported in *both* TSF and the combined CBT and MET conditions such that AA attendance for the first 3 months after treatment predicted positive outcomes on both

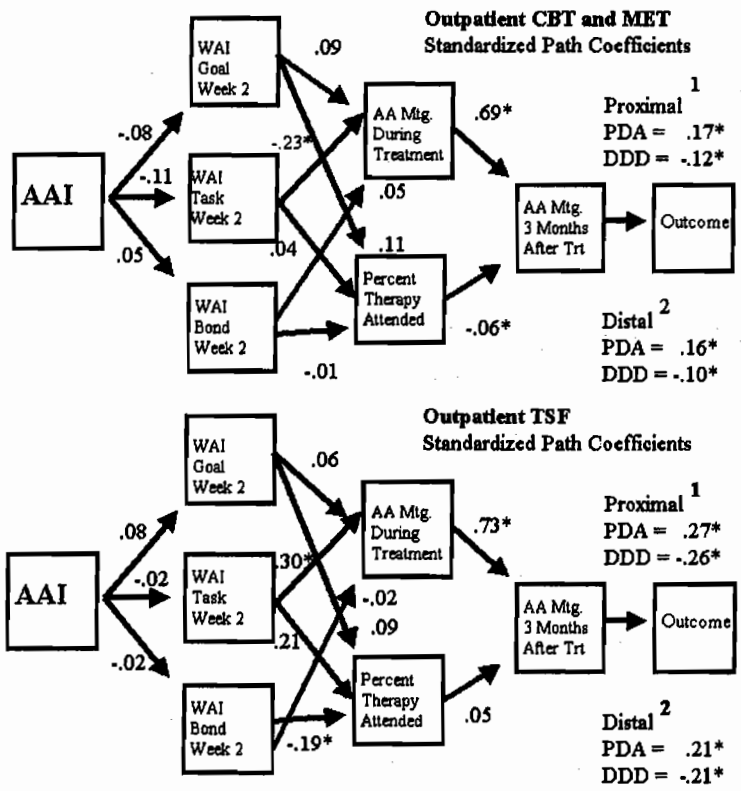

Figure 3: AAI causal model for outpatient TSF and combined CBT and MET condition

[1]Proximal outcome defined as months 4–9 (first 6 months after end of treatment).

[2]Distal outcome defined as months 10–15 (second 6 months after end of treatment).

primary dependent measures at proximal and distal followup periods.

Not specified in the causal model, prior involvement in AA was a significant and positive predictor of AA attendance of outpatients during treatment ($p<.001$), but the magnitude of this effect differed significantly between TSF and the combined CBT and MET groups. Once again contrary to our prediction, the positive relationship was stronger in the CBT and MET combined conditions.

Discussion

In sum, the prospective AAI matching hypothesis was not supported in either the aftercare or outpatient samples. In both samples, the predicted causal chain was weakest at the initial link of the causal model where prior AA was expected to be more closely related to the therapeutic alliance in TSF than in CBT and MET. Consistent with expectations, therapeutic alliances (task compatibility) among the outpatient clients were more positively associated with subsequent AA attendance and treatment compliance in the Twelve Step Facilitation condition than in CBT and MET. Yet this did not translate into differentially better outcomes. The expected prognostic effect of prior AA involvement appeared, if anywhere, in the two treatment groups not based on AA principles.

Prior AA involvement was differentially predictive of treatment response during treatment on both PDA and DDD (p's$<.02$) and, to a lesser extent, on both PDA ($p<.03$) and DDD ($p<.08$) during followup when contrasting CBT and MET, a contrast *not* specified in the AAI matching hypothesis. Exact reasons for prior AA engagement benefiting clients assigned to MET while not benefiting CBT clients are unclear. Certainly, this finding awaits prospective testing and possible replication.

We posited that prior AA involvement would prepare clients, through familiarity, for better outcomes in TSF. It could also be predicted plausibly that greater prior AA involvement would be associated with poorer outcomes in TSF, in that it represents "more of the same" for clients who in one sense could be considered AA failures. Neither assertion was supported by project MATCH findings, suggesting that a 12-step approach is neither indicated nor contraindicated by virtue of prior engagement with AA. The efficacy of the next round of treatment—be it with TSF, CBT, or MET—seems simply unrelated to the extent of clients' previous experience with AA. In contrast, involvement with AA during treatment modestly predicted better outcomes in all three treatment conditions.

Practical Implications

What practical implications can be drawn from the prospective matching findings? First, clients who have had greater AA exposure prior to presenting for treatment (and might be considered, in this sense, AA "failures") fare at least as well in treatment approaches that are not focused on AA principles. Said another way, higher prior AA involvement does not contraindicate or undermine the efficacy of cognitive-behavioral or motivational-enhancement approaches nor does it predict a better response to 12-step-oriented treatment. Although a Twelve Step Facilitation treatment may be initially more familiar and comfortable, this does not translate into differentially more (or less) favorable outcomes. This is reminiscent of the finding that although alcoholics may feel more bonded to and understood by a therapist who is in recovery, recovering therapists are neither more nor less effective than other therapists when it comes to treatment outcome (McLellan et al. 1988; Project MATCH Research Group 1997).

Second, the effect of AA involvement may vary depending upon the outcome measure used. We found that outpatients with greater prior AA exposure tended, after treatment, to consume somewhat more when drinking. Marlatt has cautioned against an abstinence violation effect inherent in the popular AA slogan, "One drink, one drunk," such that once an alcoholic slips there is no expectation of restraint. In another multisite study, we found that pretreatment endorsement of beliefs consistent with a disease model of alcoholism was predictive of a higher risk of relapse through a year of followup (Miller et al. 1996). Brandsma and his colleagues (1980) similarly found that offenders sentenced to attend AA meetings were more likely to show binge drinking during followup, relative to those assigned to cognitive-behavioral treatment. It is noteworthy, however, that the magnitude of such effects is generally small and might be compensated by higher rates of abstinence with a 12-step approach (Project MATCH Research Group 1997).

Third, different measures of AA engagement are not always linearly related. We found, for example, that AA involvement reached a peak around three meetings per week and did not increase further (even decreasing in some contexts) at higher levels of attendance.

Finally, the relationship between AA involvement and treatment outcome is complex. Across aftercare sites in this study, different sites showed positive, negative, or no relationship between outcomes and prior AA exposure. Montgomery and associates (1995) found that whereas AA attendance did not predict treatment outcome, there was a significant relationship between better outcomes and a higher level of actively "working the steps" of AA as reported on their General AA Tools of Recovery (GAATOR) scale. The AA involvement scale used in this study represents yet another way of conceptualizing AA engagement. It appears that the prognostic value of AA engagement depends heavily on how it is measured and may also vary substantially across different contexts.

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Social Functioning

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ABSTRACT

It was hypothesized that social functioning would be matched to Cognitive-Behavioral Coping Skills Therapy (CBT) versus Twelve Step Facilitation (TSF) and Motivational Enhancement Therapy (MET) such that clients with lower levels of social functioning would have incrementally better drinking outcomes when treated in CBT relative to TSF or MET. Results in the aftercare arm of treatment failed to support this hypothesis. In the outpatient arm of the study, the matching effect was opposite that hypothesized, that is, the lower the clients' level of social functioning, the worse their drinking outcomes in CBT relative to TSF and MET. Causal chain analyses were conducted to identify where the theory underlying the treatment broke down. Clients who reported greater drink refusal skills after treatment also reported drinking less often and less intensely on days in which they drank. However, CBT failed to increase coping skills of poorly functioning clients more than did MET or TSF. This suggests a failure in CBT implementation, or alternatively, that the other treatments also produced this change. The fact that poorly functioning clients did best in TSF suggests that this treatment has active ingredients, yet to be identified, that are especially helpful to these clients.

Social functioning has been found to be a fairly consistent prognostic indicator among clients treated for alcohol problems in that those with higher social functioning prior to treatment are more likely to have good treatment outcomes. Early reviews supported this relationship (e.g., Gibbs and Flanagan 1977). Subsequent individual studies have continued to support this finding (e.g., Miller et al. 1996). In the absence of treatment-matching effects, social functioning can be expected more often than not to be a variable prognostic of better drinking outcomes.

The challenge then becomes the development of interventions that can reduce the adverse prognostic effects of poor social functioning. If treatments can be devised that eliminate the disadvantage of poor social functioning, the average outcomes of such clients will be enhanced, thus increasing the overall effectiveness of alcohol treatments.

Cognitive-Behavioral Therapy

Social skills training was adapted to treat alcoholics (Monti et al. 1989). This precursor of cognitive-behavioral therapy (CBT) had two points of origin. In Australia, Oei and Jackson (1980) developed a general social skills training program for alcoholics. These investigators assumed that alcoholics had general social skills deficits and because of these used alcohol as an alternative behavior. The hypothesis was that the learning of skills to reduce these social deficits would reduce alcohol consumption.

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At the same time, Chaney and associates (1978) developed a treatment program that focused on teaching social skills for coping with situations in which the alcoholic was at risk to drink. The rationale for this approach was derived from the work of Marlatt (1978; Marlatt and Gordon 1985), who found that relapsing alcoholics identified certain situations that were highly likely precipitants of relapse to drinking. The social skills training program developed by Chaney et al. (1978) taught relapse prevention skills to be used in these situations.

These early studies demonstrated clinical effectiveness for these two variations of skills training. In the following 20 years, social skills training programs have mushroomed and have been modified to incorporate cognitive as well as behavioral coping skills. A body of clinical research has demonstrated that cognitive behavioral therapy is an effective treatment for alcohol dependence (Miller, Brown et al. 1995).

The question that arises from these studies is whether CBT is especially effective for clients with deficits in social coping skills. Client-treatment matching studies have been conducted to test this hypothesis. Kadden and colleagues (1992) found support for this hypothesized matching effect: clients treated in group-administered CBT who were rated as having less skill in a drink refusal role play situation prior to CBT were more likely to be abstinent at the end of treatment than were clients treated in a Yalom-based interactional group therapy.

Of interest, clients high in drink refusal skills prior to treatment did less well in CBT than when treated in the Yalom-based interactional group therapy. The implication from this study is that those who have deficits in relapse-related social skills will especially benefit from CBT, while those without such deficits may be mismatched to a CBT treatment that focuses primarily on these deficits. However, a study carried out by Rohsenow and associates (1991) failed to demonstrate the anticipated matching effect for clients with greater social skills deficits prior to treatment with social skills training versus mood management. Thus, it is not clear under what set of circumstances CBT will be matched to social skills deficits.

As implemented in Project MATCH, based on the work of Monti and associates (1989), CBT involved a menu of skills training modules from which to select. However, all clients were required to receive a core set of eight modules developed to teach skills for dealing with situations in which risk for relapse is normatively reported as high, as these core skills are believed to be most critical (Kadden et al. 1992; Monti et al. 1990, 1993; Rohsenow et al. 1991). Modules developed for dealing with more general skill deficits were optional.

As the modal CBT MATCH client attended about eight sessions, the core sessions were the only set of modules received by the average CBT client. From this information, it would be inferred that the CBT client most apt to be matched to this treatment would be one who had coping skill deficits in these high relapse situations, rather than clients who were generally deficient in social skills, because the average CBT client would not be exposed to these general skill deficit sessions.

Twelve Step Facilitation

Twelve Step Facilitation (TSF; Nowinski et al. 1992) is very much a socially focused treatment. A proximally successful outcome for TSF gets the client involved in AA. However, we assume that sustained participation in AA involves having sufficient social skills to be accepted within the AA Fellowship. The Fellowship is likely to have greater tolerance for deficient social skills, relative to a client's larger social network ("your problems are attributable to your disease of alcoholism, not to the fact that you're a bad person"). Nevertheless, if treatment success is predicated upon acceptance in AA, clients with social skills deficits would be less likely to succeed in TSF than in a therapy such as CBT that totally relies upon the sessions with the therapist, a person trained to have tolerance for, and able to effectively deal with, such clients. As the CBT therapy is assumed to be a sufficient active ingredient for change, its success is not expected to be contingent upon acceptance by AA.

This line of reasoning led us to expect that clients with poorer social functioning would do

worse in TSF than would clients with better social functioning.

Motivational Enhancement Therapy

Motivational Enhancement Therapy (MET; Miller et al. 1992) is intended to activate clients to use their own preexisting resources. The therapy neither provides the opportunity for training social skills to those with such deficits (as does CBT) nor does it focus especially on promoting the client's involvement in a support system that might reject the person because of social deficits (as would TSF). We would expect that the outcomes of MET clients would be consistent with the general prognosis for alcohol treatment-seeking clients. The better their social functioning prior to treatment, the better their drinking outcomes.

Matching Hypotheses

Given these considerations, we hypothesized the following matching effects:

- *The lower the social functioning of the client, the greater the incremental effect of being treated in CBT versus TSF or MET.*
- *The greater the social functioning of the client, the greater the incremental effect of being treated in TSF or MET versus CBT.*

Figure 1 portrays the anticipated effects. Overall, the greater the clients' social functioning, the better their drinking outcome. Assignment to CBT, however, will reverse this effect, such that those with poorer social functioning will have better drinking outcomes in CBT than those with better social functioning. This effect is hypothesized because of our assumption that CBT will be especially effective for clients with greater deficits in social functioning but will be irrelevant for clients who already had good social functioning prior to treatment.

The causal chain postulated to underlie these matching effects is that clients with poorer social functioning prior to treatment will incrementally improve in this domain when

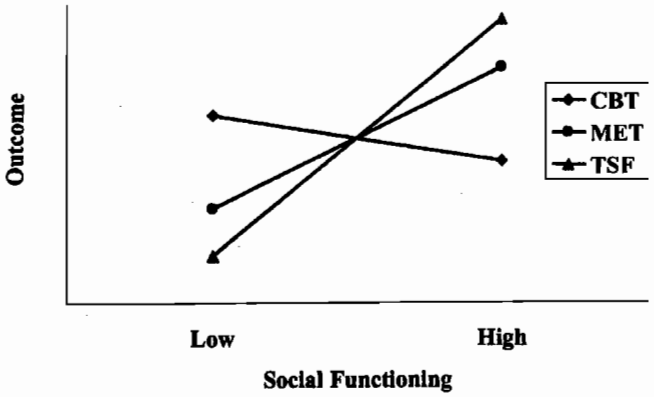

Figure 1. Hypothesized effects of matching social functioning to treatment

treated with CBT skills training. This pretreatment to posttreatment improvement in social functioning will be predictive of reduced drinking. Thus, when the effect of before to after improvement in social functioning is partialed out of the hypothesized interaction effect, this improvement will be shown to be the variable mediating this effect.

Clients assigned to TSF who are unable to sustain participation in AA because of their poor social skills will do as poorly as will MET clients with low social functioning.

Measurement of Social Functioning

Measurement of social skills deficits and functioning was not a high priority for the MATCH study. The development of matching hypotheses such as the present one followed after the selection of the assessment battery. This necessitated a post hoc review and selection from the assessment battery already in place. Two instruments were judged, in combination, to yield an adequate assessment of social functioning.

Social Behavior Scale

The Psychosocial Functioning Inventory (PFI) was developed to provide a brief but comprehensive measurement of clients' self-reported functioning and well-being (Feragne et al. 1983). One scale from this battery is self-reported social behavior, which involves 10

questions, each having 4-point scales measuring the relative frequency (almost daily, at least once a week, less than once a week, not at all) of potentially problematic social behaviors within the prior month (table 1). The items are aggregated to provide a single social-behavior score. This variable has been used in prior studies of psychiatric (Longabaugh et al. 1983*a*) and alcoholic populations (Cooney et al. 1991; Kadden et al. 1989; Fink et al. 1985; Longabaugh et al. 1983*b*; McCrady et al. 1986), where social behavior was found to significantly improve from before to after treatment. However, it has not been sensitive to matching effects (Cooney et al. 1991; Kadden et al. 1989).

Table 1. Items that comprised the Psychological Functioning Inventory

IN THE PAST MONTH	Almost daily	At least once a week	Less than once a week	Not at all
1. Did you avoid talking with family members or friends?	1	2	3	4
2. Did you have to rely on others to make your decisions for you?	1	2	3	4
3. Did your family or friends upset you?	1	2	3	4
4. Did you have heated arguments with other people?	1	2	3	4
5. How often were you upset, angry, or disappointed with the way people did things?	1	2	3	4
6. Did you feel your family or friends did not trust you?	1	2	3	4
7. Did you feel anxious or afraid when you were with other people?	1	2	3	4
8. Did you demand that others do things your way?	1	2	3	4
9. Did you do things that upset you family and friends?	1	2	3	4
10. Did you do things when you were in public that other people did not like? (belching, spitting, wearing inappropriate clothing, etc.)	1	2	3	4

Negative Consequences of Drinking

The Drinkers Inventory of Negative Consequences (DrInC) was developed by Miller, Tonigan, and Longabaugh (1995) to measure negative consequences that the client attributed to drinking alcohol. One of the five subscales of this self-report inventory measures the negative interpersonal consequences the client attributes to alcohol consumption. This 10-item scale is summed to yield an overall score of negative interpersonal consequences attributable to alcohol (table 2).

All clients were administered the DrInC prior to treatment initiation and reported on lifetime negative consequences they attributed to alcohol. Posttreatment, they were administered an alternate form which asked them to report on negative consequences experienced during the prior 3 months.

In order to equally weight both poor social functioning in general as well as poor social functioning that the client attributed to alcohol consumption, both the PFI and the DrInC scales were converted into indices that varied between 0 and 1 and then were averaged to yield an overall index that varied from 0 to 1, with higher scores indicating higher social functioning.

A contrast of outpatient and aftercare clients on this composite measure of social functioning indicated that, as might be expected, outpatients averaged a higher level of social functioning prior to treatment (M=0.51, SD=0.17) than did aftercare clients (M=0.44, SD=

0.17), $p<.001$. Within arms, there were no between-treatment differences in social functioning prior to treatment assignment.

Table 2. Drinker Inventory of Consequences

Instructions: Here are a number of events that drinkers sometimes experience. Read each one carefully and circle the number that indicates whether this has EVER happened to you (0 = No, 1 = Yes). If an item does not apply to you, circle zero (0).

Has this EVER happened to you? Circle one answer for each item.	No	Yes
1. My family or friends have worried or complained about my drinking.	0	1
2. My ability to be a good parent has been harmed by my drinking.	0	1
3. While drinking, I have said or done embarrassing things.	0	1
4. While drinking, I have said harsh or cruel things to someone.	0	1
5. My marriage or love relationship has been harmed by my drinking.	0	1
6. My family has been hurt by my drinking.	0	1
7. A friendship or close relationship has been damaged by my drinking.	0	1
8. My drinking has damaged my social life, popularity or reputation.	0	1
9. I have lost a marriage or a close love relationship because of my drinking.	0	1
10. I have lost a friend because of my drinking.	0	1

Source: Miller, Tonigan, and Longabaugh 1995

Results

Outpatient Arm

Tables 3 and 4 report the results of the overall testing of the matching hypothesis during the within-treatment and posttreatment periods. There were no in-treatment matching effects for either dependent variable, percentage of days abstinent (PDA) or drinks per drinking day (DDD). Within treatment, the overall F for PDA=0.95 and for DDD, F=0.88, both $p>.05$. Interpretation of these statistics is facilitated by figures 2 and 3, which present plots of the expected mean PDA and DDD for clients dichotomized into high (75th percentile) and low (25th percentile) social functioning groups over the entire 15-month period, including the 3 months during which treatment was delivered.

However, during the posttreatment period, strong interaction effects were observed for both PDA and DDD. Those low in social functioning did most poorly relative to those high in social functioning when treated in CBT. This relationship between social functioning and drinking was less pronounced in MET and was reversed in TSF, where low functioning clients had better

Table 3. Hierarchical linear modeling results for within-treatment drinking in the outpatient arm for social functioning

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	t	1.16	-1.32	0.20	-0.02	0.06	-0.11
	p	.25	.19	.84	.98	.95	.91
CBT–TSF	t	1.25	-0.73	0.18	-0.95	0.42	0.88
	p	.21	.47	.86	.34	.67	.38
MET–TSF	t	0.09	0.62	-0.03	-0.96	0.37	1.01
	p	.93	.54	.96	.34	.71	.31
Overall effect	F	0.95	0.88	0.02	0.61	0.11	0.61
	p	.39	.42	.98	.54	.90	.54

NOTE: MV=matching variable, Social Functioning; Tx=treatment; T=linear time; T^2=quadratic time. F tests were used for the overall effect, and t tests were used for pairwise treatment contrasts. Reported p values are based on nondirectional tests (i.e., two tailed).

Table 4. Hierarchical linear modeling results for posttreatment drinking in the outpatient arm for social functioning

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	*t*	2.19	-2.24	-0.06	0.84	-0.44	-0.82
	p	.03	.04	.95	.40	.66	.41
CBT–TSF	*t*	3.24	-3.20	-0.79	0.90	0.60	-0.56
	p	.002	.002	.43	.37	.51	.57
MET–TSF	*t*	1.08	-1.00	-0.74	0.05	1.13	0.27
	p	.28	.32	.46	.96	.26	.79
Overall effect	*F*	5.40	5.33	0.40	0.50	0.64	0.35
	p	.005	.005	.67	.61	.53	.70

NOTE: MV=matching variable, Social Functioning; Tx=treatment; T=linear time; T^2=quadratic time. *F* tests were used for the overall effect, and *t* tests were used for pairwise treatment contrasts. Reported *p* values are based on nondirectional tests (i.e., two tailed).

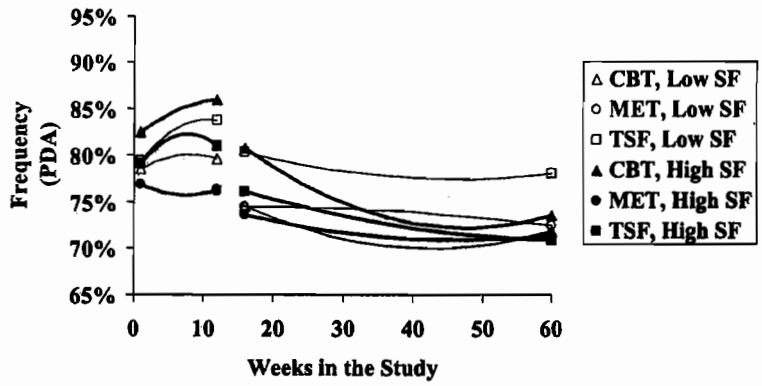

Figure 2. Percentage of days abstinent as a function of treatment modality and social functioning: Outpatient arm

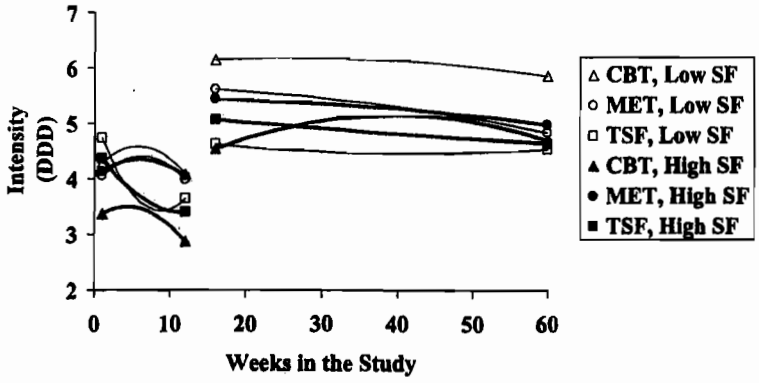

Figure 3. Drinks per drinking day as a function of treatment modality and social functioning: Outpatient arm

outcomes than those with high social functioning.

Further, as TSF clients with low functioning entered the posttreatment followup period, they started with a higher percentage of days abstinent than comparable MET and CBT clients, and they preserved this level of abstinence throughout the followup period. In contrast, both CBT and MET low functioning clients began and ended followup with a lower percentage of days abstinent. However, even MET low functioning clients had more abstinent days than comparable CBT clients for most of the followup period. For high functioning clients, CBT appeared to have a nonsignificant initial advantage during the treatment period, which lasted into the beginning weeks of the posttreatment phase but then rapidly diminished, so that by the end of followup, PDA was no different for this group than the other high functioning groups.

A comparable posttreatment interaction effect was present for the measure of drinking intensity. However, in this instance, the low functioning CBT clients were drinking significantly more drinks on a drinking day than high functioning clients in CBT and more than both high and low functioning clients in TSF and MET.

In summary, in the outpatient arm of the study, an unexpected matching effect was observed. Lower levels of social functioning were associated with particularly poor drinking outcomes for clients treated in CBT and particularly good outcomes for comparable clients treated in TSF. CBT clients with high social functioning had better drinking outcomes than those with a lower level of social functioning.

Aftercare Arm

In the aftercare arm, there was no strong evidence for an interaction effect that was independent of time, either in the direction predicted or opposite the direction predicted. During treatment, as is apparent in table 5, there was no suggestion of interaction effects. During

Table 5. Hierarchical linear modeling results for within-treatment drinking in the aftercare arm for social functioning

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	*t*	-0.41	1.46	-0.35	-0.50	1.26	-0.11
	p	.68	.14	.73	.62	.21	.91
CBT–TSF	*t*	-0.09	0.86	-1.34	0.71	1.52	-0.90
	p	.93	.39	.18	.48	.13	.37
MET–TSF	*t*	0.32	-0.57	-0.99	1.19	0.29	-0.79
	p	.75	.57	.32	.23	.78	.43
Overall effect	*F*	0.09	1.08	0.95	0.71	1.34	0.47
	p	.91	.34	.39	.49	.26	.62

NOTE: MV=matching variable, Social Functioning; Tx=treatment; T=linear time; T^2=quadratic time. *F* tests were used for the overall effect, and *t* tests were used for pairwise treatment contrasts. Reported *p* values are based on nondirectional tests (i.e., two tailed).

Table 6. Hierarchical linear modeling results for posttreatment drinking in the aftercare arm for social functioning

		MV × Tx		MV × Tx × T		MV × Tx × T^2	
		PDA	DDD	PDA	DDD	PDA	DDD
CBT–MET	*t*	0.63	0.24	1.21	0.18	-0.63	-0.50
	p	.53	.81	.23	.86	.53	.62
CBT–TSF	*t*	-1.21	1.19	2.72	-1.45	-2.22	1.52
	p	.22	.23	**.01**	.15	**.03**	.13
MET–TSF	*t*	-1.81	0.95	1.53	-1.62	-1.59	2.00
	p	.07	.34	.12	.10	.11	**.05**
Overall effect	*F*	1.69	0.79	3.72	1.57	2.59	2.16
	p	.19	.46	**.02**	.21	.08	.12

NOTE: MV=matching variable, Social Functioning; Tx=treatment; T=linear time; T^2=quadratic time. *F* tests were used for the overall effect, and *t* tests were used for pairwise treatment contrasts. Reported *p* values are based on nondirectional tests (i.e., two tailed).

the posttreatment period (table 6), the CBT–TSF contrast in slopes changed over time for PDA (p=.01) but not for DDD (p=.15). The percentage of days abstinent by high social functioning CBT clients remained high during the followup period, while those with low social functioning initially did well but then deteriorated, so that they were doing worse than the high functioning CBT clients for most of the followup (see figure 4).

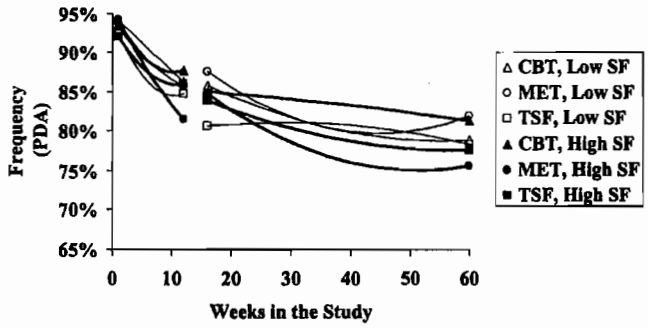

Figure 4. Percentage of days abstinent as a function of treatment modality and social functioning: Aftercare arm

Causal Chain Analyses

The A Priori Causal Chain

Our a priori matching hypothesis was that poor social functioning clients would have better drinking outcomes when treated in CBT, while those with high functioning would do poorly when treated in CBT. This hypothesis was predicated on the assumption that those with poor social functioning would benefit from the social skills training provided for high relapse situations in CBT. For those already having high social functioning, we assumed that such skills training would be superfluous, thus the focus of CBT treatment would be misguided.

Evidence to support this causal chain would be provided if it were found that CBT improved the social functioning of low functioning clients more than did either TSF or MET and that improved social functioning was associated with better drinking outcomes. If both of these conditions were true, then further analysis would be conducted to see whether the improved social functioning accounted for the hypothesized

CBT versus TSF by social functioning matching effect. However, the hypothesized matching effect was not observed.

To test the first part of the purported causal chain, a general linear models procedure was used to analyze the relationship between treatment assignment and social functioning immediately following treatment after controlling for social functioning at baseline, by arm. For both arms, the relationship was found to be nonsignificant.

To test the second part of the purported causal chain, a general linear models procedure was used to separately analyze drinking at each of three points in time as a function of social functioning at that time, controlling for baseline drinking and baseline social functioning scores, by arm. Three posttreatment observation points were used: end of treatment (3 months), 6 months after treatment completion (9 months), and 1 year after treatment completion (15 months). These data points were selected because they were the three in which posttreatment overall social functioning scores could be computed (data points at which both the DrInC and the PFI social behavior scale were administered). In every case (3-, 9-, and 15-month data points), posttreatment social functioning was strongly associated with posttreatment drinking (p's all $<.0001$) after controlling for baseline drinking and baseline social functioning in both the outpatient and aftercare arms

In summary, causal chain analysis revealed where the chain broke down. While the relationship between posttreatment social functioning and PDA was supported, the relationship between treatment assignment and posttreatment functioning was not.

Discussion

The results in the outpatient arm were opposite those hypothesized. The effect appears to be quite robust and unlikely to have been produced by chance alone. Causal chain analyses indicated where the initial theory broke down—CBT was not more effective than the other two treatments in increasing social functioning. So even though those who reported better social functioning had better drinking outcomes, CBT clients were not disproportionately represented in this group. Thus, CBT's failure to incrementally improve the drinking outcomes of clients with poor interpersonal skills is accounted for.

What is not accounted for is why low functioning clients should do significantly worse with CBT than with the other treatments, especially TSF. The theory underlying CBT is that alcohol clients lack coping skills, leading them to use drinking as a dysfunctional coping mechanism. Learning adaptive coping skills, taught in CBT, should address the problem. Why should clients with poor social functioning skills do worse than when treated with TSF or even MET?

One speculation offered to account for this poor showing is that, contrary to theory, to be helped by cognitive behavioral skills training, clients may need to have a modicum of skills already available in their repertoire in order to make use of further training. For those not having the prerequisite starting skills, the costs involved in learning and utilizing them may preclude practice, acquisition, mastery, or generalization of these behaviors to real (as opposed to role play) situations. Certainly, Project MATCH CBT did not include any provision for determining whether clients were actually using the skills that they rehearsed in therapy.

The nonenduring tendency for CBT clients with high social functioning to be doing better than their counterparts during the treatment phase and immediately following is consistent with this conception that those who are likely to benefit from CBT are those who already have good enough skills to make further acquisition easier. However, the dissipation of the initial gain suggests that use of these skills may have been discontinued not long after the end of therapy.

Future Research Directions

One question for further research is why clients with poor social functioning did best in TSF. One speculation that might be researched is that the involvement in AA that was a goal of TSF might have been of special help to clients with especially poor interpersonal functioning. As stated earlier, AA views the person's

dysfunctional lifestyle as being attributable to the disease of alcoholism. Thus, poor interpersonal functioning may be attributed to factors believed to be outside of the person's voluntary control, which only a long period of sobriety and working the 12 steps of AA can rectify. In such a circumstance, there may be a very broad tolerance for deviance among other AA members. The availability of unconditional regard, as long as the AA member seeks to stop drinking, may provide the opportunity for a person to regain the self-esteem that might otherwise not be forthcoming from the client's own social network. An increase in self-respect in turn might provide the client with the hope and motivation to remain sober and begin to deal with the negative consequences of alcohol consumption.

A priority for future investigation with these data is a causal chain analysis to identify the process that leads these TSF low functioning clients to fare better than would otherwise be predicted

Conclusion

Results from the outpatient arm of the study contradict the a priori hypothesis that CBT will be especially effective in improving the drinking outcomes of clients with the poorest interpersonal functioning. Causal chain analysis identifies the source of failure for CBT—such clients do not utilize coping skills more than do comparable clients in other treatments. However, unexplained is why such clients do best in TSF treatment.

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