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Social Networks and Their Influence on Drinking Behaviors: Differences Related to Cognitive Impairment in Clients Receiving Alcoholism Treatment

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Abstract

Objective—Mechanisms of behavioral change that support positive addiction treatment outcomes in individuals with co-occurring alcohol-use disorders and cognitive impairment remain largely unknown. This article combines person- and variable-centered approaches to examine the interrelated influence of cognitive impairment and social support on stability of and changes in drinking behaviors of Project MATCH (Matching Alcoholism Treatments to Client Heterogeneity) outpatients and aftercare clients (N= 1, 726) during the first year after their entry into treatment.

Method—Latent class analysis identified homogeneous groups of clients based on the nature and extent of social support for abstinence or drinking at treatment entry. Cognitive impairment and drinking outcomes were compared across latent classes, and the interaction between impairment and social support on drinking outcomes was examined using mixture probit regression.

Results—Three independent social support classes (frequent positive, limited positive, and negative) were identified. In the outpatient sample, the frequent positive support class had greater cognitive impairment at treatment entry versus other classes, and extent of impairment significantly predicted improved drinking outcomes in this class. In the aftercare sample, the frequent positive and negative support classes had heightened impairment, yet cognitive impairment significantly predicted relatively poorer drinking outcomes in the negative support class only.

Conclusions—Cognitive impairment may increase the influence of the social network on the drinking outcomes of persons receiving treatment for alcohol-use disorders, but more research is needed to understand client characteristics that determine whether this influence is more likely to be manifest as increased salience of helping agents or of hindering agents in the social network.

A current goal of addiction research is to better understand mechanisms of change that promote and sustain recovery in persons with alcohol-use disorders (AUDs). Co-occurring neurocognitive impairment can reduce addiction treatment compliance (Aharonovich et al., 2003; Donovan et al., 2001; Fals-Stewart and Schafer, 1992), diminish increases in self-

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efficacy during treatment, and dissociate the typical predictive relationship between drinking outcomes and change processes that operate during and following treatment (Bates et al., 2006; Morgenstern and Bates, 1999). Nonetheless, many cognitively impaired persons manage to achieve abstinence or greatly reduced levels of drinking (Knight and Longmore, 1994) despite these apparent disruptions in treatment process. It may be that the mechanisms that support positive outcomes are different, or operate with different potency, in the context of cognitive impairment or that additional processes are at play outside the context of treatment that importantly contribute to the drinking outcomes of cognitively impaired persons. The present study used data from the two Project MATCH (Matching Alcoholism Treatments to Client Heterogeneity) samples (outpatient and aftercare) to characterize the social support network that was in place when persons entered alcoholism treatment, to examine whether cognitive impairment is related to differences in pre-existing social network support, and to assess the interrelated influence of cognitive impairment and social support on change and stability in drinking behaviors during the year following treatment.

Some degree of cognitive impairment is routinely observed in persons with AUDs and drug-use disorders (Nixon, 1995; Rourke and Loberg, 1996). These impairments range from mild to severe, with more severe impairments sharing similarity with the neurocognitive, emotional, and behavioral sequelae of brain damage seen in persons with traumatic brain injury (TBI; Adams et al., 1980; Giancola and Moss, 1998; Levin et al., 1993). Individuals with TBI frequently exhibit marked social impairments because of their diminished ability to organize new information, adjust behavior, and adapt to novel social situations. Moreover, environmental and contextual variables take on increased salience in determining the behavioral outcomes of TBI patients within the context of diminished cognitive control (Dombovy, 1998; Prigatano et al., 1996; Ylvisaker and Feeney, 1998) and affect the extent to which cognitive deficits interfere with psychosocial adaptation (Tomberg et al., 2005; Winkler et al., 2006). TBI patients often place amplified importance on their social network to support positive emotional and vocational outcomes (Kaplan, 1990; Webb et al., 1995; also see Ylvisaker et al., 2003), yet the social disruptions they experience can culminate in their inability to assimilate into normal social situations, thereby decreasing the availability of generalized social support (Spence et al., 1993; Tate et al., 1989; Zencius and Wesolowski, 1999) and increasing reliance on a smaller, denser, and more family-centered social network (Finset et al., 1995; Kozloff, 1987; Prigatano and Gupta, 2006). Clients affected with both an AUD and cognitive deficits may similarly demonstrate social impairments that limit their social network, yet little research attention has been dedicated to understanding the impact of helping agents outside the context of treatment in these persons.

For AUD clients in general, treatment retention (Siddall and Conway, 1988) and recovery (Knight and Simpson, 1996; Richter et al., 1991) are facilitated by abstinence-supporting social influences, whereas risk for relapse is enhanced by negative social influences (e.g., see Marlatt, 1985; McCrady, 2004). Empirical studies that use a variable-centered approach to studying social support networks have identified abstinence role models, larger social networks, and the number of supportive relationships as most predictive of positive outcomes (Zywiak et al., 2002). Yet, persons who do not interact with their social network routinely, or do not rely on others for support and reinforcement, do not appear to benefit from models of abstinence as much as individuals who do (Longabaugh et al., 1993; Longabaugh and Beattie, 1986). This suggests that social support characteristics, both within and across network members, may dynamically contribute to behavioral outcomes of an individual (e.g., Bergman, 1998; Radke-Yarrow, 1998).

We used latent class analysis (LCA) to capture the integrated behavioral operation of the social network of individuals entering alcoholism treatment by classifying unobserved heterogeneity in constellations of support variables at the level of the person. This approach may be

particularly informative in a situation, for example, in which the most salient influence on a client's abstinence is the amount of contact he or she has with one particular network member who is abstinent and supports the abstinence of the client. In contrast, the interdependent action of these facets of support from a single network member may not be well modeled by three independent variables that are averaged across all members of the client's social network.

Project MATCH data provided the opportunity to examine invariance of latent social support classes across two samples that differed significantly in alcohol involvement and alcohol-related problems (Randall et al., 2003) as well as average level of cognitive impairment (Bates et al., 2006). One sample comprised outpatients (OPs), who were actively seeking treatment for an ongoing use disorder, and the other comprised aftercare clients (ACs), who were enrolled in the study after completion of an inpatient or intensive day treatment. Two categorical variables that integrate quantity of drinking with drinking-related problems (Cisler and Zweben, 1999) and with stability of remission status during an extended follow-up period (Zweben and Cisler, 2003) were used to assess multidimensional drinking-related outcomes.

Persons entering addiction treatment with social networks that tend to support drinking are expected to have poorer drinking outcomes, and those with abstinence-supporting social environments are expected to fare better. The heightened salience of environmental influence in persons with TBI supports the hypothesis that cognitive impairment will heighten the influence of social support in AUD clients such that, as impairment increases, so will the relationship between support for drinking and poor drinking outcomes and between support for abstinence and positive drinking outcomes. The TBI literature (Kozloff, 1987; Prigatano et al., 1996; Ylvisaker and Feeney, 1998) further supports the hypothesis that higher levels of cognitive impairment would be associated with family-centered social networks. Understanding how helping agents and abstinence-versus-drinking support differentially influence the drinking behaviors of cognitively impaired and unimpaired persons with AUDs may help to characterize mechanisms that support changes in drinking behaviors that are available outside the context of treatment and can be used to complement existing treatment designs..

Methods

Participants

This study was a secondary analysis of data from Project MATCH, a multisite clinical trial that examined client-treatment matching hypotheses. Clients were randomly assigned to one of three relatively equally effective AUD treatments (Miller and Longabaugh, 2003), thus treatment assignment was not included in the present study. Participants were from one of two samples: OPs ($n = 952$), who averaged (SD) 38.9 (10.7) years of age and were mostly male (72%), single (64%), and employed (51%), and ACs ($n = 774$), who averaged 41.9 (11.1) years of age and were mostly male (80%), single (66%), and unemployed (52%) (Project MATCH Research Group, 1997a). The AC sample differed from the OP sample in that the former participants were enrolled in the study after completion of an inpatient or intensive day treatment (Project MATCH Research Group, 1997a). Participants had a primary diagnosis of an AUD (and, if necessary, were detoxified before treatment entry), but they had no other current drug-dependence diagnosis, intravenous drug use for 6 months before the study, or symptoms of acute psychosis and severe organic impairment (for details, see Project MATCH Research Group, 1997a). Attrition from the study was low, with 92.6% of clients having usable drinking outcome data at the 15-month follow-up (also see Zweben et al., 2003).

Measures

Demographic variables—Binary variables assessing relationship and employment status (1 = married/cohabitating, permanent employment/current student), as well as the age and gender of the clients, were used as covariates.

Neuropsychological tests—Cognitive functioning of participants was assessed at intake using accuracy scores from the vocabulary and abstraction subtests of the Shipley Institute of Living Scales (Zachary, 1986) and the Symbol Digit Modalities Test (SDMT; Smith, 1982) and time to completion from Parts A and B of the Trail Making Test (Reitan and Wolfson, 1985). These sensitive neuropsychological tests reliably measure deficits in verbal ability, abstraction, cognitive flexibility, working memory, and psychomotor processing speed (Lezak, 1995; Spreen and Strauss, 1998). Participants with test scores 1.5 SDs or more below the mean of age-stratified normative data (Spreen and Strauss, 1998; Zachary, 1986) were considered impaired. SDMT normative data were also education-stratified (Smith, 1982). An overall impairment score that summed the number of tests (0-5) on which performance was impaired indicated that a substantial minority of Project MATCH clients had an impairment level of potential clinical significance (Bates et al., 2006). The AC sample was more impaired than the OP sample ($\chi^2 = 45.8$, $p < .0001$), with 22% of AC clients in the impaired range on one of the five tests, 9% on two tests, and 6% on three to five tests (vs 15%, 4%, and 4%, respectively of OPs) (Bates et al., 2006).

Social support variables—Social network support was characterized at intake using the Important People and Activities (IPA) instrument (Clifford and Longabaugh, 1991). Clients listed up to 12 individuals in their social network during the past 6 months and reported the type (e.g., family, friend) and length of relationship, frequency of interaction, members' drinking habits, how well liked and important the client considered each person, and the attitudes of the four most important people toward the patient's drinking, abstinence, and treatment.

In line with the aims of the present study, nine variables were derived from the raw IPA data and dichotomized (0, 1) for the LCA based on prior research (Zywiak et al., 2002), conceptual meaningfulness (i.e., to maximize distinctions between networks that support abstinence vs drinking, and between high and low levels of patient contact), and our aim to represent constellations of positive and negative network characteristics within the same person. These considerations were balanced by the data distribution to ensure that an adequate proportion of clients was represented at both levels of the variable. The nine variables were coded 1 if (1) at least one network member was abstinent or a light drinker, supported the client's abstinence, and interacted three or more times per week with the client; (2) at least one network member was a heavy drinker, supported the client's drinking, and interacted three or more times per week with the client; (3) all members of the network supported abstinence; (4) all members of the network encouraged drinking; (5) two or more nondrinkers were within the social network; (6) three or more heavy drinkers were within the network; (7) three or more frequent drinkers were within the network; (8) daily contact was maintained with at least four network members; and (9) daily contact was maintained with at least half of the members in the social network. The two contact measures differed in that one (8) assessed whether a client had multiple alternative sources of support, whereas the other (9) took into account network size and assessed a client's likelihood of using available support.

Outcome measures—Categorical outcome variables were created using data from 3-, 6-, 9-, 12-, and 15-month follow-ups. The Form 90 Interview assessed the amount of alcohol consumed each day for the 90 days before interview (Miller, 1996; Miller and Del Boca, 1994). Participants were classified as abstinent, moderate drinkers (no more than two instances

of four or more [women] or six or more [men] drinks per day), or heavy drinkers (three or more instances of four or more [women] or six or more [men] drinks per day). The Drinker Inventory of Consequences (DrInC) assessed the frequency and magnitude of alcohol-related problems (Miller et al., 1995). Participants were deemed “without problems” if they reported few negative consequences from drinking to be nonrecurrent (none, once, or twice) or “with problems” if they reported negative consequences that recurred three or more times. Consistent with Cisler and Zweben (1999), these measures were used to classify participants into four composite outcome index categories (from the 3- and 12-month follow-ups): (1) abstinent, (2) moderate drinking without problems, (3) heavy drinking or problems, and (4) heavy drinking and problems. Data were then collapsed into a two-category composite index variable: remitted (Categories 1 and 2) or unremitted (Categories 3 and 4) (Zweben and Cisler, 2003). Finally, stability in remission status was determined as: (1) stably remitted (reporting remitted status at the 6- to 15-month follow-ups), (2) unstable (fluctuating between reports of remitted and unremitted status at the 6- to 15-month follow-ups), or (3) stably unremitted (reporting heavy and/or problem drinking at all 6- to 15-month follow-ups) (Zweben and Cisler, 2003).

Procedure

In the Project MATCH study, participants completed informed consent and were scheduled for three intake assessments, in which demographic, neuropsychological ability, social support, and drinking history data were collected (Project MATCH Research Group, 1997a). All assessments were conducted during treatment entry. The Form 90 and DrInC were also administered at five follow-up assessments.

Data Analysis

LCA, a statistical approach that identifies the fewest number of mutually exclusive, homogeneous groups (classes) of individuals based on the pattern of their characteristics (McCutcheon, 1987), was performed using MPlus (Muthén and Muthén, 1998). Characteristic profiles of each unobserved class, unique (statistically independent) patterns of endorsement probabilities that are stable among all members, and the probabilities of a given individual endorsing a given variable and of belonging to a specific latent class (based on the similarity of an individual's support profile to the class profile) were generated.

Latent class models were fitted to the nine binary indices of social support using a maximum likelihood approach, with missing data assumed to be missing at random (Little and Rubin, 1987). An initial model with one social support class was specified, classes were added in a stepwise fashion, and the goodness of fit of model solutions was compared. Changes in the Bayesian information criteria (BIC), in addition to entropy, class sizes, and interpretability of classes, were used to establish the best-fitting and most stable model (Muthén and Muthén, 1998). Demographic variables were added to the model to improve classification accuracy (i.e., in predicting class membership). Models were estimated simultaneously in the two Project MATCH samples so that the equivalence of the identified classes in each sample could be tested.

For each of six dependent variables (cognitive impairment and five drinking outcome variables, including two-category composite outcome index at 3 and 12 months, four-category composite index at 3 and 12 months, and drinking stability), overall model tests were conducted using chi-square statistics that compared the log-likelihood from (1) a model in which the means (cognitive impairment) or thresholds (drinking outcomes) within a sample were held to be equal across the three latent classes and (2) a model in which the means or thresholds were allowed to freely vary across the three latent classes. If significant differences were found between the fully constrained and free models, tests of partial invariance were performed by con-straining individual means or thresholds across classes in a hierarchical and hypothesis-

driven manner and identifying significant decrements in model fit compared with the free model.

To test whether neuropsychological impairment altered the overall relationship between probability of social support class membership and drinking outcome, the stability and 12-month composite outcome index variables were regressed on impairment within each class (3-month data were included in the composite index models to control for treatment entry drinking). Probit regressions were performed within the MPlus mixture model framework. A statistically significant regression coefficient within one or more, but not all, social support classes provided evidence for a moderation relationship between social support and cognitive impairment in affecting outcomes

Results

The average network size was equivalent across the OP (mean [SD] = 6.7 [2.9]) and AC (mean = 6.8 [2.83]) samples, as was the average level of contact (several times per week, OP mean = 5.6 [0.7] and AC mean = 5.5 [0.8]; range: 1-7). The samples were also very similar in the proportion of clients who were coded ("1" vs "0") as positively endorsing the nine binary social support features based on their IPA responses. The majority of clients (OP = 82.4%; AC = 83.2%) reported having one or more abstinent/light-drinking network members who supported the client's abstinence and had frequent contact with the client, whereas relatively few (OP = 13.6%; AC = 10.5%) endorsed having one or more heavy-drinking network members who supported the client's drinking and had frequent contact with the client. The AC clients, however, were more likely to have two or more nondrinkers in their social network ($\chi^2 = 25.2$, 1 df, $p < .001$) and to report that all network members supported their abstinence ($\chi^2 = 8$, 1 df, $p < .01$).

Latent Classes of Social Support at Treatment Entry

Fit statistics were compared between models that contained one to five classes (data available on request), and a three-class solution was determined to be optimal based on improvements in model fit, as well as on reasonably sized, well-distributed classes, adequacy of fit to the data from both samples, and entropy values indicating well-differentiated classes that captured theoretically meaningful structures of social support. Constraining the model to be invariant across the OP and AC samples did not result in a significant decrement in model fit ($\chi^2 = 27.1$, 27 df, NS); thus, a model of three parallel classes of social network support best fit the data from both samples. Classification accuracies were at least .82 before adding demographic variables, and greater than .90 after their addition, suggesting that the probability of clients belonging to a specific support class was quite high and improved when age, gender, employment, and marital status were taken into account. Based on the pattern of network support endorsement probabilities, the classes included clients with a high likelihood of (1) support for abstinence and frequent contact with network members (frequent positive support); (2) support for abstinence and limited contact with network members (limited positive support); and (3) support for drinking and some contact with network members (negative support). The OP limited positive class was significantly older than the other OP classes, whereas the AC drinking support class was significantly younger than the other AC classes; the AC frequent positive class contained significantly fewer men than the other AC classes; the OP frequent positive support class was significantly less likely to be working; and the OP drinking class was significantly less likely to be married (all p 's $< .05$).

Figure 1 shows the probabilities of network support variable endorsement for each class (i.e., the probability that an individual in a given class will exhibit a given network support feature). The frequent and limited positive support classes were similar in their endorsement probabilities, with the exception of the two contact variables. The negative support class was

considerably different from the other two classes, particularly in relation to endorsement probabilities for two or more nondrinkers (0%), three or more heavy drinkers (75%), and three or more frequent drinkers (47%). Interestingly, the negative support class also involved a high likelihood of endorsing at least one abstinence role model (75%), with a relatively lower probability of endorsing a drinking role model (27%) with whom they had frequent contact. Thus, membership in this class, which would appear a priori at highest risk for a negative drinking outcome, was nonetheless associated with a potentially off-setting probability of frequent contact with at least one abstinent or light-drinking network member who encouraged the client's abstinence.

Differences in the composition of clients' social networks were estimated by assigning individuals to a latent class based on their most probable membership. Members of the frequent positive support classes reported that a larger percent their network consisted of family (spouse, parent, child) members (OP = 57%; AC = 55%) as compared with the limited positive (OP = 45%; AC = 47%) and negative (OP = 40%; AC = 34%; $F = 18.6, 5/1, 691$ df, $p < .0001$) support classes. The limited positive support classes, on the other hand, reported significantly more Alcoholics Anonymous members in their network than the other support classes ($F = 4.4, 5/1, 691$ df, $p < .001$).

Cognitive Impairment and Drinking Outcomes in the Latent Social Support Classes

A significant reduction in model fit when mean levels of cognitive impairment were constrained across classes, compared with a fully unconstrained model, indicated that the probability of latent class membership was differentially related to cognitive impairment at treatment entry in both the OP ($\chi^2 = 8.2, 2$ df, $p < .05$) and AC ($\chi^2 = 24.7, 2$ df, $p < .001$) samples. In the OP sample, analyses of partially invariant models indicated that cognitive impairment was associated with a higher probability (.56) of frequent positive support class membership, compared with limited positive support class (.31, $\chi^2 = 8.2, 1$ df, $p < .05$) and negative support class (.36, $\chi^2 = 4.3, 1$ df, $p < .05$) membership. In the AC sample, however, probability of membership in both the frequent positive (0.93, $\chi^2 = 20.0, 1$ df, $p < .001$) and negative (0.76, $\chi^2 = 12.1, 1$ df, $p < .001$) support classes was associated with significantly more impairment than membership in the limited positive (.46) class.

The composite outcome index variables were characterized within the latent classes using data from the 3- and 12-month follow-ups. Analysis of the 3-month data suggested little difference in the drinking behaviors and problems across classes at the end of treatment, whereas the 12-month data revealed substantial differences. Analysis of the two-category (relapse/remission) and four-category (abstinent, moderate drinking without problems, heavy drinking or problem, or heavy drinking and problems) composite outcome index variables revealed parallel results. Thus, for brevity, we present results focused on the 12-month, four-category variable (results from the two-category outcome analysis are available from the authors on request).

In the OP sample, the 12-month, four-category composite outcome index model with all thresholds freed across classes fit the data significantly better than the model with all thresholds constrained ($\chi^2 = 18.7, 6$ df, $p < .01$), indicating that this index of drinking outcome varied across classes. Partially constrained model analysis revealed that membership in the two positive support groups was associated with a similar composite outcome index during the first year ($\chi^2 = 1.8, 3$ df, NS) but that constraining the negative support class threshold between the abstinent and moderate drinking categories to equal the threshold of the positive support groups produced a significant increment in model misfit ($\chi^2 = 12.3, 4$ df, $p < .05$). Additional threshold constraints between the negative and positive support classes further decreased model fit (p 's $< .05$). Thus, as illustrated in Figure 2, probability of membership in the negative support class appears to predict a lower likelihood of maintaining moderate drinking and a higher likelihood of heavy and/or problem drinking at the 12-month follow-up as compared with the two positive

support classes. In contrast, in the AC sample, models with thresholds fully constrained and free were not significantly different ($\chi^2 = 4.8$, 6 df, NS), indicating that this index of drinking outcome did not vary directly with the probability of class membership in this more severely impaired sample.

Examination of the three-level drinking stability index during the 12 months of posttreatment was conducted in the same manner. Figure 3A shows that membership in the OP negative support class was associated with a higher probability of being categorized as stably unremitted (.46) compared with membership in the frequent (.31, $\chi^2 = 7.6$, 1 df, $p < .01$), but not the limited (.38), positive support classes. Figure 3B shows that membership in the AC negative support class was associated with a higher probability of being categorized as stably unremitted (.38) compared with membership in both the frequent (.24, $\chi^2 = 5.6$, 1 df, $p < .05$) and limited (.25, $\chi^2 = 7.2$, 1 df, $p < .01$) positive support classes, which did not differ from one another.

Interrelated Influence of Cognitive Impairment and Social Support

Cognitive impairment significantly predicted drinking outcomes in only a subset of the support classes, suggesting that the influence of social support on outcome varied with impairment level. In the OP sample, the influence of impairment at treatment entry on the 12-month composite outcome index was significant in the frequent positive support class ($\beta = -.32$, $p < .05$) but not the limited positive and negative classes ($\beta = .12$ and $-.06$, respectively, NS). In the AC sample, the influence of cognitive impairment on the 12-month composite outcome index was significant in the negative support class ($\beta = .31$, $p < .05$) but not in the frequent and limited positive classes ($\beta = .26$ and $.17$, respectively, NS). In the AC sample, cognitive impairment also significantly predicted the relationship between social support and drinking stability in the negative support class ($\beta = .31$, $p < .05$) but not the frequent or limited positive classes ($\beta = .23$ and $.04$, respectively, NS). Thus, more severe impairment predicted a better composite drinking outcome at 12 months in OPs with a high probability of strong support for abstinence but compounded the risk for poor drinking outcomes (as measured by the composite index and stability variables) in AC clients with a high probability of belonging to a social support network that promoted drinking..

Discussion

In clients with AUDs, social network can influence the likelihood of maintaining abstinence, as well as the overall quality of life following addiction treatment (Beattie and Longabaugh, 1997; Longabaugh et al., 1993; Longabaugh and Beattie, 1986; Zywiak et al., 2002). In the present study, clients seeking treatment for an AUD were classified based on unobserved patterning of their pretreatment social network. Three independent social support classes were identified, two with support for abstinence at treatment entry (that differed in amount of contact) and one with support for drinking. The fact that three parallel latent classes were identified across two samples (OP and AC) that varied in addiction severity, age, and other distinctive features (Project MATCH Research Group, 1997b) supports the reliability of the three identified classes. Despite the inherent differences that were present in helping agent support systems within the natural environment of individuals entering addiction treatment, the majority of support networks had a high likelihood of including at least one strong abstinence role model with whom the client had consistent contact. The finding that even social networks associated with many drinking role models and support for drinking are often not uniformly risky suggests that there may be clinical utility in identifying and bolstering what may be a sole, yet pervasive (high contact), source of abstinence support outside of treatment.

Frequent contact with an abstinence-supporting network was associated with having more family members as part of the social network, suggesting that the type of relationships, the nature of the social support received, and the frequency of contact shape the overall support

structure of an individual's social environment. As hypothesized, Project MATCH clients with a high probability of social networks that supported drinking were drinking more heavily and/or problematically and stably during the first year and appeared unable to maintain a "moderate" drinking status over time compared with clients with a high probability of more pervasive abstinence support. This suggests that an individual's social environment can reinforce, counteract, or perhaps even substitute for the change processes being promoted during treatment.

Interestingly, although clients were classified based on the characteristics of their social network, the frequent positive support class (in both samples) demonstrated the greatest degree of cognitive impairment, reported more family members in their network, and appeared to be at an advantage, in terms of drinking outcomes, over the negative support class. Although this may suggest that cognitively impaired clients are more likely to enter treatment if they have a strong, family-centered social structure encouraging their abstinence, this should be explored further because cognitively impaired clients, whether they seek treatment or not, may be more likely than others to maintain frequent contacts with family members. Nonetheless, a positive social support structure may offset the disadvantages (e.g., inability to learn and retain strategies for abstinence) that impaired individuals often experience during treatment by promoting positive drinking outcomes through alternative non-treatment-based mechanisms of change. This may help explain why, although apparently benefiting less from change processes taught during treatment (Bates et al., 2006; Morgenstern and Bates, 1999), cognitively impaired and unimpaired clients often show similar outcomes during the first year after treatment (e.g., Donovan et al., 2001). Thus, at least for the subset of cognitively impaired clients, treatment outcomes may in some cases be less dependent on cognitive effort than is often assumed.

The results further indicated that different types of social support do not affect drinking outcomes equally in individuals with and without serious neuropsychological impairment. This finding is consistent with the TBI literature indicating that persons with diminished internal controls as a result of their injuries draw more heavily on external sources for support (Dombovy, 1998; Prigatano et al., 1996; Ylvisaker and Feeney, 1998). In this study, AC clients with a high probability of support for drinking fared significantly worse if they exhibited impairment at intake; they were more likely to have a poorer composite outcome status and maintain an unremitted status during the full year after treatment. Conversely, OP clients who were impaired at treatment entry and had a high probability of frequent contact with an abstinence-supporting network demonstrated a significantly better composite outcome status compared with unimpaired clients with an equivalent probability of abstinence support. Although unexpected, this difference between samples may represent a difference in the salience of social support in those who are seeking to become abstinent (OP) versus those with a higher severity of drinking problems who are attempting to maintain abstinence (AC). Overall, the results suggest that cognitive impairment magnified the disruptive influence of negative social support on drinking outcomes in the more severe AC sample, whereas it promoted the influence of positive social support in the higher functioning OP sample. Replication and further study are needed to confirm and more fully understand the implications of these sample differences.

The present findings must be considered in relation to limitations in the neuropsychological battery, which although reliable and valid, did not assess memory functions that may importantly contribute to the ability to benefit from different types of social support. Although our secondary analysis approach was efficient in deriving further knowledge from the substantial resources and effort dedicated to collection of Project MATCH data, it was also limited by the same conceptual and methodological concerns that apply to the project as a

whole (e.g., Glaser et al., 1999). In addition, the present data do not speak to potentially important changes in social support that may occur over time.

Prior studies found that individuals with family members who are abstinent or who support the client's abstinence had a greater likelihood of demonstrating positive drinking outcomes, whereas those with substance-using spouses or partners were more likely to relapse (McAweeney et al., 2005; Tracy et al., 2005). This relationship is extended in the Project MATCH samples to include additional influential members of the social network, as well as factors such as cognitive impairment that influence the relationship between informal helping agents and treatment outcome. Findings suggest that impaired clients tend to enter treatment with more supportive and integrated social networks, and that relying more heavily on family and friends who strongly promote the maintenance of sobriety may be one way in which they can compensate for a diminished capacity to use more cognitively demanding treatment processes. The influence and role of a client's network members on later drinking profiles may be substantively influenced by the presence of cognitive impairment at intake, with supporters of change in the natural environment of cognitively impaired persons with AUD exerting greater influence over drinking behaviors, having heightened capacity to instigate, encourage, or hamper behavioral change outside the structure of treatment. Future research aimed at exploring the client characteristics that determine whether this influence will be manifest as increased salience of helping agents versus hindering agents is necessary.

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Figure 1.

The latent class analysis probability of a given individual endorsing each of nine binary variables derived from the Important People and Activities instrument. Three unique (statistically independent) classes of social support endorsement probabilities were identified: two with support for abstinence that differed in the amount of contact the client had with their network members (frequent positive and limited positive support) and one with support for drinking (negative support).

Figure 2.

Four-category composite outcome index of outpatients at the 12-month follow-up. Outpatients with support for drinking (negative support) had a lower probability of maintaining moderate drinking at the 12-month follow-up as compared with the two positive support classes, as well as a higher probability of heavy and/or problem drinking outcomes.

A. Outpatients

B. Aftercare Clients

Figure 3.

Stability of drinking between the 6- and 15-month follow-up. (A) Outpatients with a high probability of membership in the negative support class had a significantly higher likelihood of being categorized as stably unremitting than the frequent positive support class. (3) Aftercare clients with a high probability of membership in the negative support class were more likely to be stably unremitting than both positive support classes.