Network Support as a Prognostic Indicator of Drinking Outcomes: The COMBINE Study*

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ABSTRACT. Objective: To increase understanding of the interrelationship between a patient's social network and patient drinking, the Important People and Activities (IPA) instrument was developed. To meet the aims of the COMBINE (Combining Medications and Behavioral Interventions) Study, the IPA was modified to create the Important People Inventory (IPI), which was used to measure the contextual influence of the patient's social network on patient outcomes and treatment effects. The aims of the present article were to describe the IPI and its differences from the IPA and to test the relationship of network support as measured by the IPI in predicting drinking during and following treatment. **Method:** Alcohol-dependent patients (N = 1,373) seeking outpatient treatment in the COMBINE randomized clinical trial were administered the IPI before treatment. Six network constructs were tested for predicting patient drinking. **Results:** As unique effects, alcohol-specific support, as measured by network drinking and opposition to patient drinking, is predictive of patient abstinent days during and following treatment and heavy drinking days following treatment. Other measures of network support have variable relationships to patient drinking at different phases: Some are predictive of patient drinking during treatment but diminish, whereas others are unrelated to drinking during treatment but become increasingly predictive of drinking as time from treatment increases. **Conclusions:** The IPI is a useful instrument for describing network support of alcohol-use disorder patients entering treatment. Measures of alcohol-specific support are prognostic of drinking outcomes. The patient's network support should be systematically assessed prior to tailored treatment planning. (*J. Stud. Alcohol Drugs, 71,* 837-846, 2010)

WHEN THE CONSTRUCT OF SOCIAL SUPPORT was initially introduced into alcohol treatment research, it was globally defined, somewhat ambiguously, and often limited to a question or two in a pretreatment assessment battery. Not surprisingly, its relationship to patient outcome was unpredictably variable (Gibbs and Flanagan, 1977). To help understand its relationship to drinking outcomes, Longabaugh and Beattie (1985, 1986) differentiated social support into two distinct constructs: (a) alcohol-specific support and (b) general or global social support. Whereas general support promotes overall well-being, alcohol-specific support is directly tied to alcohol use (Beattie and Longabaugh, 1997, 1999; Beattie et al., 1993; Longabaugh and Beattie, 1986). The Important People and Activities (IPA) instrument was developed to measure structural and functional dimensions of alcohol-specific support in a patient's social network (Longabaugh et al., 1993a, 1995). A later version of the IPA was used in Project MATCH (Matching Alcoholism Treatments to Client Heterogeneity; 1997). In Project MATCH, it was found that alcohol-specific support was prognostic of 1- and 3-year drinking outcomes and also moderated the treatment effects of 12-step treatment versus motivational enhancement treatment at 1- and 3-year follow-ups (Longabaugh et al., 1998, 2001; Wu and Witkiewitz, 2008). Because of the prominence of the Project MATCH Study, this version of the IPA (Clifford et al., 1992) has subsequently been put to use by others (e.g., Flynn et al., 2006; Jason et al., 2007; Knapp-Manuel et al., 2007; Litt et al., 2009; Majer et al., 2002; The UKATT Research Team, 2001).

A recently completed, large, multisite randomized clinical trial—the COMBINE (Combining Medications and Behavioral Interventions) Study (Anton et al., 2006)—used a modified version of the IPA: the Important People Inventory (IPI; Longabaugh and Zywiak, 2002). The IPI was included solely for assessing whether network variables, as part of the context that the patient brought to treatment, might moderate treatment effects. This provided the opportunity to develop multiple measures of network structure, function, and quality that prior research and/or theory has suggested would influence drinking outcomes and/or moderate treatment effects. To test the contextual effects of the person's network on treatment outcomes, two questions were addressed: (a) whether network variables are predictive of subsequent patient drinking and (b) whether network variables moderate

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treatment effects. The current report focused on the first of these questions.

Although prior research on the association of support with patient drinking has uncovered a variety of measures that have been predictive of patient drinking (McCrady, 2004), these have varied across studies. This has left treatment researchers with an unmet need for parsimonious measurement of network support. The COMBINE Study provides an excellent opportunity to test the extent to which alcohol-specific support, as measured through the conceptual framework of the IPI, can parsimoniously account for the interrelationship between a patient's pretreatment network support and drinking outcomes. Our general hypothesis is that alcohol-specific support will be the sole prognostic indicator of drinking outcomes and that other measures of support will not uniquely affect drinking outcomes. The scope of the present article was limited to an examination of functional and qualitative measures of the network: alcohol-specific support and other functional measures of social network.

Social network constructs and variables

Each of the measures is derived from a confirmatory factor analysis of indices describing multiple dimensions of the network. Because of space limitations, neither the full set of indices nor the confirmatory factor analysis has been presented in the present article. However, they can be obtained in electronic form in an unpublished appendix (Longabaugh and Wirtz, 2010) by contacting the corresponding author. Variables used in the present study are shown in Table 1.

Alcohol-specific support. Prior research has repeatedly found that alcohol-specific support is predictive of subsequent drinking (e.g., Falkin and Strauss, 2003; Havassy et al., 1991; Longabaugh et al., 1993a, 1998; Project MATCH Research Group, 1997, 1998; Wu and Witkiewitz, 2008). Although we hypothesized that alcohol-specific support would be uniquely related to drinking, it is less clear which specific measures of alcohol-specific support best capture this relationship. Alcohol-specific support has been differentiated into network drinking and network member's response to patient's drinking (Havassy et al., 1991; Longabaugh et al., 1993a; Zywiak et al., 2002). We tested the relative influence of these two kinds of alcohol-specific support. The first, network drinking, has been measured in various ways. Based on prior work (Groh et al., 2007a; Havassy et al., 1991; Longabaugh et al., 1998; Zywiak et al., 2002, 2009), we compared three variables that characterize network drinking: (a) percentage of heavy drinkers, (b) percentage of abstainers, and (c) the frequency of drinking in the network. In the second type of alcohol-specific support tested, perceived network member's response to patient drinking, the patient's perception of network response to his or her drinking was viewed from two perspectives: (a) support for patient drinking and (b) opposition to patient drinking.

Network general support. We defined general support for study participants as "the extent to which a person is generally supportive of you, by being sensitive to your personal needs, helping you to think about things, solve problems, and by giving you the moral support you need." Prior research has shown that general support is predictive only of

Table 1. Important People Inventory constructs: Factors and factor indices

	Median	*M*	*SE*
I.[a] Network drinking			
1.[b] Heavy drinkers, % (IP601[c])	0	10.35	0.47
2. Abstainers/recovering alcoholics, % (IP602)	33.33	34.35	0.82
3. No. network members who drink daily (IP702)	0	0.59	0.03
3. Total frequency of drinking in the network (IP704)	123	165.51	4.44
II. Network response to patient drinking			
4. No. who accept/encourage patient drinking (IP801)	1	1.61	0.06
5. No. who oppose patient drinking (IP803)	2	2.04	0.06
III. Network general support			
6. Average general support from a network member (IP501)	3.9	3.79	0.02
7. Daily support (IP504)	1	1.44	0.04
7. Daily support from valued network (IP505)	1	1.41	0.04
7. No. of members with daily contact (IP301)	1	1.64	0.04
IV. Support for treatment			
8. No. who support treatment (IP901)	3	3.62	0.08
9. No. who oppose treatment (IP903)	0	0.18	0.02
V. Contact with network			
10. Average amount of contact with network (IP302)	192	200.67	2.48
VI. Social Investment			
11. Total no. in network (IP101)	5	5.53	0.08
11. Total importance of network members (IP401)	20	22.04	0.32
11. No. of supportive network members (IP502)	4	4.54	0.07
11. No. of valued members from whom support received (IP503)	4	4.27	0.07

[a]Roman numerals refer to social network constructs. [b]Arabic numbers refer to indices that measure the confirmatory factor analysis variables. [c]Three-digit numbers (e.g., IP601) are the identification numbers of the variables listed in the unpublished appendix where they are operationally defined.

short-term drinking outcomes (Beattie and Longabaugh, 1999). We included two measures of general support: average general support and daily support. Support for treatment specifically may also be predictive (Zywiak et al., 2009). We included measures of support for treatment and opposition to treatment.

Social investment. Social investment refers to a person's dependence on other people for differential reinforcement or rewards (Longabaugh et al., 1993a). In an early study, it was hypothesized and observed that social investment was a moderator of the relationship between alcohol-specific support and drinking—the more socially invested the patient, the stronger the relationship of alcohol-specific support to drinking (Longabaugh et al., 1993a). Project MATCH indices included to measure social investment were not empirically homogeneous (Zywiak et al., 2002). Groh et al. (2007a) and Zywiak et al. (2009) have confirmed this lack of internal consistency. Therefore, in the COMBINE Study, this construct was operationalized by using four indices from the confirmatory factor analysis: network size, importance, number of supportive members, and valued supportive members.

Contact with the network. Amount of contact with the network has generally been predictive of better drinking outcomes (e.g., Zywiak et al., 2002). Network investment is not intrinsically related to amount of contact with the network (Zywiak et al., 2002). Some people may have considerable contact with members in a network in which they are not highly invested, and others may be highly invested in a network though their contacts may be infrequent.

In summary, we hypothesized that, although other aspects of a patient's network may be predictive of subsequent patient drinking, once alcohol-specific support is partialed out from these relationships, they will no longer be statistically significant.

Does the relationship between network predictors and drinking vary over time?

A secondary question we addressed was whether the relationship between pretreatment support and subsequent drinking varies over time—within treatment and at increasing intervals after treatment. Rationales for three scenarios are offered. (a) As time from pretreatment network assessment increases, the relationship between network support and subsequent drinking will decrease. Here, it is assumed that time between measurements is a proxy for intervening events (including treatment itself) that will affect drinking in various ways so as to attenuate the relationship with increasing time. (b) As time from pretreatment assessment of support increases, the relationship between support and subsequent drinking will increase. Here, it is assumed that treatment suppresses the relationship between support and drinking, so that potential proximate network effects are nullified but reemerge with increasing time from treatment completion. (c) Network support is independent of time. Here, it is assumed that network influence is a constant, irrespective of treatment effects and increasing intervals between network support and drinking measures.

Method

Design and study participants

The COMBINE Study (Anton et al., 2006; Pettinati et al., 2005; The COMBINE Study Research Group, 2003)—a large, multisite, randomized clinical trial supported by the National Institute on Alcohol Abuse and Alcoholism—compared the efficacy of oral naltrexone (Revia) and acamprosate (Campral), alone and in combination, in the context of brief medical management with or without a more intensive combined behavioral intervention. The study examined both the short- and long-term effects of treatment, focusing not only on the active phase of treatment delivery, during which the effects of medications would be expected to be most prominent, but also on the posttreatment phase, during which the effects of psychosocial treatments might emerge (Donovan et al., 2008; Miller et al., 2005).

The COMBINE Study rationale, design, and methods have been previously detailed (Pettinati et al., 2005; The COMBINE Study Research Group, 2003). In brief, after baseline assessment and attainment of 4 days of abstinence, 1,383 (428 women and 955 men) eligible alcohol-dependent individuals were randomly assigned to one of nine groups for 16 weeks of nine combinations of medication and behavioral outpatient treatments. Participants were assessed during the 16 weeks of treatment and at 26, 52, and 68 weeks after randomization (i.e., up to 1 year after treatment ended). All participants signed written forms of consent. The institutional review boards of all of the participating institutions approved the study. For a summary of study results, see Anton et al. (2006).

Eligibility criteria, described in detail elsewhere (Anton et al., 2006), are summarized here: (a) alcohol dependence, determined by Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) criteria, using the Structured Clinical Interview for DSM-IV (Spitzer et al., 1990); (b) 4-21 days of abstinence; and (c) more than 14 drinks (women) or 21 drinks (men) per week, with at least 2 heavy drinking days (defined as ≥4 drinks/day for women and ≥5 drinks/day for men) during a consecutive 30-day period within the 90 days before baseline evaluation. Exclusion criteria included a history of other substance abuse (other than nicotine or cannabis) by DSM-IV criteria. Eligible participants were randomly assigned to treatments using a permuted block design, using blocks of nine, stratified by site.

Participants' median age was 44 years, 71% had at least 12 years of education, and 42% were married. Ethnic mi-

norities comprised 23% (n = 321) of the sample. In the 30 days before randomization, 2.3% of patients were medically detoxified and 7.7% received inpatient treatment.

Measures

Drinking measures. Drinking parameters were obtained from structured interviews during the 16-week treatment period using the Timeline Followback (Sobell and Sobell, 1992) and for the 3 months before treatment and in the 1-year period following treatment using Form 90 (Miller, 1996; Tonigan et al., 1997). (See Anton and Randall, 2005, for the rationale underlying the use of these instruments.) Research assistants (not blinded to or providing psychosocial treatment) assessed alcohol consumption (Sobell and Sobell, 1992). Two-hour assessments were completed at Weeks 8 and 16 during treatment and again after randomization at Weeks 26, 52, and 68 (1 year after treatment) during follow-up.

We divided the trial into four 4-month periods: the 4-month treatment period and three 4-month posttreatment periods. Percentage days abstinent (PDA) and percentage heavy drinking days (PHDD) were derived from the daily alcohol consumption data (Miller, 1996; Miller and Del Boca, 1994). PDA and PHDD were computed for each consecutive 4-month period: the 4-month treatment period and the three consecutive 4-month periods following treatment. A standard drink was defined as 0.5 oz. of absolute alcohol, equivalent to 10 oz. of beer, 4 oz. of wine, or 1 oz. of 100-proof distilled spirits. A heavy drinking day was defined as four or more drinks for women and five or more drinks for men.

Important People Inventory

The IPI is a structured interview, administered by a research assistant before treatment assignment; on average, it requires 12 minutes to administer. Before use in the main trial, COMBINE Study coordinators and research assistants were convened at a central location and trained on administering the IPI. The interview involves nine questions pertaining to the patient's perception of people who are important and with whom he or she has had contact within the past 4 months: (a) network member's name, (b) relationship to patient (e.g., spouse, friend), (c) frequency of contact ("daily" to "once in past 4 months"), (d) importance of the person to the patient ("extremely important" to "not at all important"), (e) general supportiveness of the patient ("extremely supportive" to "not at all supportive"), (f) their drinking status ("heavy drinker" to "abstainer/recovering alcoholic"), (g) frequency of their drinking ("daily" to "not at all in the past 4 months"), (h) how they would react to the patient's drinking ("encourage" to "would leave or make you leave when you're drinking"), and (i) how they felt about the patient's coming to treatment ("strongly supports" to "strongly opposes"). The response options to these questions are identical to those used in the IPA. Templates are provided to assist the patient in choosing the most appropriate response for each of these questions. Electronic copies of the instrument, instructions for administering it, and the variables derived from it—along with their operational definitions—are in the unpublished appendix (Longabaugh and Wirtz, 2010). The COMBINE Web site (www.cscc.unc.edu/combine) provides instructions on how to obtain copies of the COMBINE data set for research purposes.

The IPI differs from the IPA administered in Project MATCH in five ways. First, the number of people listed as part of the network is limited to 10 (whereas, in Project MATCH, the number was 12). Second, the Important Activities section of the IPA was not administered. Third, several questions in the Important People section of the IPA were omitted in the IPI: "years known," "most drinks consumed on a single day," "how much the person is liked," and "how has this person reacted to your not drinking." Fourth, the IPI adds one question not asked in the IPA: "To what extent is this person generally supportive of you, by being sensitive to your personal needs, helping you to think about things, solve problems, and by giving you the moral support you need?" Last, the IPI asks for all members listed (rather than just the four most important), "How has this person reacted to your drinking?"

Variable operational definitions also differed somewhat from those used in Project MATCH (see Longabaugh and Wirtz, 2010). Fully SAS-programmed operational variables (SAS Institute Inc., Cary, NC) can be obtained from the second author (pww@gwu.edu). Raw data from which these variables were constructed are available from the COMBINE public database.

Derivation of the summary social network variables

An initial exploratory factor analysis using principal components with a varimax rotation revealed a robust Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Kaiser, 1970) of .72, exceeding the minimally accepted level of .5 (Tabachnick and Fidell, 1997). Based on our own and others' prior research on network variables related to drinking and a preliminary confirmatory factor analysis (results not included here for the purposes of conserving space), we specified 11 network components (identified in column 1 of Table 1) measuring 6 network constructs that have been shown or postulated to relate to drinking. The fit of this 11-factor model was found to be adequate: The standardized root mean square residual was .05 (less than the .08 upper bound conventionally thought to characterize a well-fitting model; Heck and Thomas, 2000), and the Bentler-Bonett normed fit index was .84 (Bentler and Bonnet, 1980).

Prognostic analyses of patient drinking

Because of the potential discontinuity in the trajectory and the potentially different error variance of the in-treat-

ment period versus the posttreatment period, relationships between each of the 11 support components and the two drinking outcome measures were assessed separately for the 4-month treatment period (using standard ordinary least squares regression) and for the three consecutive 4-month periods immediately following treatment using latent growth curve (LGC) analysis (e.g., Curran, 2000). All analyses were conducted using SAS, Version 9. To reduce potential confounding effects, age and gender were entered as control variables in all analyses.

Separate analyses of covariance for each baseline network component were used to evaluate the effects of each network component on drinking during treatment, and separate conditional LGC models were used to evaluate the effects of each network component on both the initial posttreatment period and the progression over time following treatment. For the during-treatment analyses, a significant exogenous network component predicted drinking behavior; for the posttreatment analyses, a significant network component predicted drinking behavior at the initial 4-month posttreatment period and/or in the rate of progression of drinking behavior over time. A unified analysis of covariance for the set of baseline network components was used to evaluate the unique effects of each network component on drinking behavior during treatment, and a unified conditional LGC model was used to evaluate the unique effect of each network component on the initial posttreatment period and on the progression over time following treatment.

Results

Changes in patient drinking over time

The average PDA decreased, and PHDD increased throughout the study period. Average PDA decreased from 74.5 during treatment to 62.3 in the third trimester following treatment. Average PHDD increased from 17.2 during treatment to 28.4 in the third trimester following treatment.

Relationship of network support to patient drinking

Because a primary aim of the analysis is to determine the most parsimonious description of the relationship between network support and patient drinking, results are reported only for the multivariate analyses presented in Table 2. Bivariate results are included in the table to show how single network variables would be related to drinking if other network variables are not taken into account. In the Discussion section, references are made about the comparison of univariate to multivariate analyses.

Network drinking

One measure of network drinking, frequency of network drinking, was consistently and significantly negatively related to PDA within and following treatment. However, it was not significantly related to PHDD. Both percentage abstainers and percentage heavy drinkers were unrelated to either measure of drinking.

Response to patient drinking

The number of people who opposed patient drinking was directionally positively related to PDA during treatment. In the 4 months following treatment, the relationship was statistically significant. This relationship grew stronger with increasing time from treatment. Although opposition to drinking was unrelated to PHDD during and immediately following treatment, as time from treatment completion increased, opposition to drinking was increasingly associated with less PHDD. Acceptance of patient drinking was unrelated to either PDA or PHDD.

General support

Although it was hypothesized that general support would be unrelated to either PDA or PHDD, both measures of general support were observed to have unique relationships to drinking at different time points. Average general support was negatively related to PDA during treatment and positively related to PHDD: The more support the patient reported, the lower his or her PDA was and the greater the PHDD became. These relationships did not persist beyond treatment.

Unlike average support, daily support was unrelated to either measure of drinking during or immediately following treatment. But, as time from treatment completion increased, those who had reported daily support before treatment increasingly had more heavy drinking days and fewer abstinent days.

Support of treatment. As expected, neither support nor opposition to treatment was uniquely related to drinking at any time point on either drinking measure.

Amount of contact. As expected, contact with the network also was unrelated to drinking over the course of follow-up.

Social investment. As hypothesized, social investment generally had no unique main effect on PDA either during or following treatment. Contrary to expectation, patients with greater network investment before treatment had fewer heavy drinking days during treatment. This relationship diminished with increasing time from treatment completion.

Does the relationship between network predictors and drinking vary over time?

Only one network support measure had a constant relationship to drinking throughout the period of observation: frequency of network drinking was consistently negatively related to PDA. Average general support and network investment were related to drinking during treatment (in opposite ways) but not afterward. Opposition to drinking and daily

Table 2. Bivariate and multivariable results

Variable	Percentage days abstinent			Percentage heavy drinking days		
	Slope: First 4 months	Slope: Initial post-treatment	Slope: Post-treatment trend	Slope: First 4 months	Slope: Initial post-treatment	Slope: Post-treatment trend
Network drinking						
Percentage who are heavy drinkers						
Bivariate	-0.61	-1.95	-0.14	0.75	2.15*	-0.22
Multivariable	1.33	0.58	0.41	-0.04	1.57	-0.85*
Percentage who are abstainers/ recovering alcoholics						
Bivariate	2.37**	2.72**	0.66	-0.97	-0.27	-0.53
Multivariable	0.86	0.26	0.37	-0.23	0.97	-0.32
No. who drink daily, frequency of drinking						
Bivariate	-1.70*	-3.31**	-0.63	0.52	1.09	0.64
Multivariable	-3.35*	-4.62**	0.02	1.64	1.40	0.21
Network response to patient drinking						
No. who accept/encourage drinking						
Bivariate[a]	-1.17	-2.47*	-1.29***	0.16	0.99	1.31***
Multivariable	0.16	0.03	-0.78	0.13	0.81	0.97
No. who oppose drinking						
Bivariate	3.48***	4.24***	1.58***	-1.15	-1.04	-1.37***
Multivariable	1.99	2.94*	1.32**	0.10	0.21	-1.00*
Network general support						
Average general support						
Bivariate	-0.71	-0.15	0.70	0.36	-0.65	-0.40
Multivariable	-2.03*	-1.62	0.89*	1.65*	0.42	-0.55
Daily support						
Bivariate	0.94	1.05	-0.47	-0.99	-0.99	0.59
Multivariable	-1.34	-0.79	-1.13*	0.82	-0.13	1.18*
Support for treatment						
No. supportive of treatment						
Bivariate	2.76***	2.15*	0.68	-1.34*	-0.88	-0.66
Multivariable	1.48	0.73	0.77	-0.20	-0.08	-0.95
No. who oppose treatment						
Bivariate	-1.31	-1.56	-0.20	0.91	0.76	0.29
Multivariable	-1.00	-0.78	0.16	0.83	0.22	-0.03
Contact with network						
Amount of contact w/network						
Bivariate	0.28	0.41	-0.07	-0.51	-0.23	0.06
Multivariable	1.83	1.08	0.23	-1.75	-0.35	-0.33
Social investment						
Network investment						
Bivariate	1.79*	1.25	0.03	-1.54*	-1.19	0.15
Multivariable	3.06	2.79	-0.38	-3.47*	-2.37	0.24

[a]Only results of the multivariable analyses are reported in the Results section. Results of bivariate analyses are assessed in the Discussion section.
*$p < .05$; **$p < .01$; ***$p < .001$.

support were unrelated to drinking during treatment but were related to both measures of drinking as time from treatment completion increased: Daily support was increasingly associated with less PDA and more PHDD, whereas opposition to drinking was increasingly associated with more PDA and fewer heavy drinking days.

Discussion

As hypothesized, alcohol-specific support is uniquely predictive of PDA. Among the indices of network support for drinking, frequency of network drinking and opposition to drinking were each uniquely related to drinking measures. This suggests that measurement of network context includes these two measures. Contrary to our expectations, general support uniquely was predictive of drinking after the effects of other network variables were partialed out. Average general support before treatment was predictive of less abstinence and more frequent heavy drinking during treatment, whereas daily support predicted less abstinence and more heavy drinking after treatment. Social investment was predictive of less heavy drinking during treatment. Social investment has been previously found to relate to drinking (Longabaugh et al., 1993a), although this relationship may be complex (Longabaugh et al., 1995) or inconsistent (Groh et al., 2007a; Zywiak et al., 2002).

The relationships of measures of general support to drinking are understandable, perhaps in the context of an alcohol-dependent patient who is entering treatment. Those who are experiencing a generally supportive network despite their drinking are less likely to reduce their drinking during treatment and are more likely to increase their heavy drinking as time from treatment completion increases. This finding is consistent with an earlier interpretation (Beattie and Longabaugh, 1997, 1999) that a person who has general network support despite the evident need for treatment, may be less motivated to change his or her drinking. When treatment is completed, the network the patient returns to may be the same as the one from which he or she came from, with continuing general support despite the patient's return to heavy drinking.

Implications for future use of the Important People Inventory

Groh et al. (2007a) administered the Project MATCH version of the IPA in a large population of residents living in a recovery community (n = 897) and in a smaller (n = 150) sample of inpatient alcoholics. They conducted principal components analyses and varimax rotations of these data and obtained a replicated three-factor solution: (a) support for drinking by network members, (b) drinking behavior of network members, and (c) general social support. They found predictive validity for only one of these three factors: the drinking behavior of network members. There is more convergence than divergence with our findings. While employing 11 confirmatory factors of network support, we found network drinking and opposition to patient drinking by network members to have unique predictive validity. Our measures of general support had fewer unique relationships to drinking. Social investment, as measured by the IPI confirmatory factor analysis, also appeared to affect drinking at least during treatment. Therefore, we cannot conclude, as hypothesized, that alcohol-specific support is the only network factor that affects patient drinking. Thus, despite the general similarity of results, we believe that it is premature to rely on an overly parsimonious representation of the information available in the IPI. The heterogeneity of relationships of network drinking measures to drinking outcomes suggests that they are not interchangeable. The bivariate relationships between network variables and drinking in Table 2 are also informative. If the effects of the other network variables were not partialed out (as they were in the multivariate analyses), the researcher would be at risk for inferring that these other variables were uniquely related to patient drinking. This may be one explanation for the heterogeneous and sometimes inconsistent findings by researchers investigating the relationship of social network to patient drinking. Clearly, considerable thought must be used to select measures most pertinent to study aims.

From the Important People and Activities instrument to the Important People Inventory

The modifications made in the IPI for the COMBINE Study appear, in balance, to have been beneficial. Reducing the number of questions asked to just nine questions did not appear to diminish predictive validity. The tradeoff of limiting identification of network members to a maximum of 10, but asking all questions regarding these 10, has resulted in a stronger network support for drinking measure. Although administration time was reduced to 12 minutes, it is recommended that the IPI be computer administered to further reduce assessment time, particularly for the instrument administrator.

Prognostic significance of the social network

A finding very consistent with our general understanding of treatment effects is that the effect of network drinking on patient frequency of drinking is enduring long after treatment has been completed. Selden Bacon (1973) noted almost 4 decades ago that the patient's social setting and relationships during and after treatment were more important forces in the recovery process than alcohol treatment. However, some network measures influence was inconsistent over time: Social investment and average support were predictive of drinking during treatment but not afterward; daily support before treatment and opposition to drinking were unrelated to drinking during treatment but were predictive of posttreatment drinking. These novel findings indicate that the relationship between network support and subsequent drinking is more complex than we had anticipated. Our theories are not sufficiently developed to account for these patterns.

Study limitations

As employed in this study, the IPI has limitations. Although the interview and response formats are sufficiently structured to approach a self-report questionnaire, formal cross-site training of IPI administrators was limited to a single training session. Although the cost burden to the study in instrument administration has been appreciably reduced, an average administration time of 12 minutes remains a significant amount. Although computerization of test administration would decrease interviewer time, the burden for the patient would be only slightly reduced.

Although the large population studied provides a good normative sample of the social networks for treatment-seeking patients, these patients were involved in a medication study and might conceivably differ from patients seeking other alcohol treatments. Furthermore, the exclusion criteria of the study reduced heterogeneity of drug use and the presence of many concurrent Axis I disorders.

Future research directions

The IPI is based on theoretical constructs hypothesized to be related to drinking and treatment-related drinking outcomes. Measurement of these constructs is based on a small number of questions, averaging one and a half questions per construct. This must yield considerable measurement error. Further work on development of the instrument itself is likely to be useful.

Much more research on the relationship between social network and drinking in the COMBINE data set is needed. The present study focus was limited to a first-cut examination of the effects of network support on drinking outcomes for the entire sample. Yet to be undertaken are analyses of the inter-relationship of other social network variables, network structural variables such as network composition to drinking and how network composition relates to alcohol-specific support. Network composition measures have received considerable attention in the field (e.g., Barrera et al., 1993; Beattie et al., 1992; Groh et al., 2007b; Havassy et al., 1991; Mason and Windle, 2001; Mohr et al., 2001; Wills et al.,1993).

Nor have we examined how the influence of network support to drinking outcomes may be moderated by individual characteristics as basic as gender (Knapp-Manuel et al., 2007) and age (Mohr et al., 2001), let alone co-occurring diagnoses or personality variables that might be expected to moderate these relationships (e.g., Longabaugh et al, 1993b). A further important question that requires examination is whether network changes mediate treatment/drinking outcome relationships (Longabaugh et al., 1998). Now that the COMBINE data set is publicly available, secondary analyses of such questions by independent investigators can be pursued.

Although the contextual influence of network support on drinking outcomes is small, at least at this level of analysis with a large and heterogeneous population, it is one factor among many that contribute to affect drinking outcomes (Hunter-Reel et al., 2009). Alcohol dependence is a bio-psycho-social condition. Research needs to use social network findings to fine tune treatment interventions to enhance their effectiveness. There are now several treatments that affect patient social networks, and their effectiveness is predicated on this assumption (for reviews, see Longabaugh, 2003; McCrady, 2004). There is also the notable influence of Alcoholics Anonymous and other mutual-help groups, such as SMART (Self-Management And Recovery Training) Recovery and Women for Sobriety. Thus, it is important when planning treatment to systematically assess the patient's social network to evaluate how it may be helpful or not in achieving treatment goals. To our knowledge, only one such treatment—Broad Spectrum Therapy (Davidson et al., 2007; Gulliver and Longabaugh, 2001; Gulliver et al., 2005)—uses decision trees based on systematic measurement of the social network to tailor treatment to the patient's social context. Systematic assessment of the patient's social network should be a standardized component in planning tailored treatments for alcohol-dependent patients. The IPI, an instrument for measuring network support, can be used for this purpose.

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