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Substance Abuse Treatment Stage and Personal Networks of Women in Substance Abuse Treatment

Elizabeth M. Tracy

Mandel School of Applied Social Sciences, Case Western Reserve University, ext@case.edu

HyunSoo Kim

Mandel School of Applied Social Sciences, Case Western Reserve University, hyunsoo.kim@case.edu

Suzanne Brown

Mandel School of Applied Social Sciences, Case Western Reserve University, suzanne.brown@wayne.edu

Meeyoung Oh Min

Mandel School of Applied Social Sciences, Case Western Reserve University, meeyoung.min@case.edu

Min Kyoung Jun

Mandel School of Applied Social Sciences, Case Western Reserve University, min-kyoung.jun@case.edu

See next page for additional authors

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Authors

Elizabeth M. Tracy, HyunSoo Kim, Suzanne Brown, Meeyoung Oh Min, Min Kyoung Jun, and Christopher McCarty

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Elizabeth M. Tracy
HyunSoo Kim
Suzanne Brown
Meeyoung O. Min
Min Kyoung Jun

Case Western Reserve University

Christopher McCarty
University of Florida

This study examines the relationship among 4 treatment stages (i.e., engagement, persuasion, active treatment, relapse prevention) and the composition, social support, and structural characteristics of personal networks. The study sample includes 242 women diagnosed with substance dependence who were interviewed within their first month of intensive outpatient treatment. Using EgoNet software, the women reported on their 25 alter personal networks and the characteristics of each alter. With one exception, few differences were found in the network compositions at different stages of substance abuse treatment. The exception was the network composition of women in the active treatment stage, which included more network members from treatment programs or 12-Step meetings. Although neither the type nor amount of social support differed across treatment stages, reciprocity differed between women in active treatment and those in the engagement stage. Networks of women in active treatment were less connected, as indicated by a higher number of components, whereas networks of women in the persuasion stage had a higher degree of centralization, as indicated by networks dominated by people with the most ties. Overall, we find social network structural variables to relate to the stage of treatment, whereas network composition, type of social support, and sociodemographic variables (with a few exceptions) do not relate to treatment stage. Results suggest that social context, particularly how social contacts are arranged around clients, should be incorporated into treatment programs, regardless of demographic background.

Keywords: women, substance dependence, social networks, treatment stage

An examination of a client's personal network is a useful adjunct to the assessment and treatment of substance use disorders because social context often plays a key role in an individual's initiating and maintaining substance use, accessing treatment, staying in treatment, and participating in post-treatment recovery. In particular, as compared with men, women with substance use disorders often enter substance use treatment with greater exposure to trauma and have higher levels of family and psychological stress. In addition, these women may have fewer social resources than their male counterparts, such as limited social support networks, and have more network members who also have substance-use problems (Grella, 2008; Savage & Russell, 2005). Women are also more likely than men to have been introduced to alcohol and drug use through their networks of family and friends (Center for Substance Abuse Treatment, 2009). Moreover, women's relationships with substance-using spouses or partners are likely to have ongoing, adverse effects on their physical and psychological health (Dawson, Grant, Chou, & Stinson, 2007), and such relationships are more likely to offer a woman inconsistent support for recovery from sub-

stance use (Laudet, Magura, Furst, Kumar, & Whitney, 1999). Thus, although relationship issues and establishing positive network resources are often a priority for women in substance abuse treatment (Covington, 2002), these resources can also represent important challenges.

With limited support systems, many women in substance abuse treatment may not derive the maximum benefits that they could derive from treatment if they had a social network to help them engage with and maintain participation in treatment services. The term *social network* refers to a set of individuals and the ties among them (Wasserman & Faust, 1994). Tracy and Johnson (2007) found receiving sobriety support was especially problematic for women with substance use and co-occurring mental disorders. On average, about half (48%) of the total network used alcohol or drugs (or both) and did not support sobriety. In addition, approximately one third of network members were *sometimes* or *almost always* critical of the woman or her lifestyle. As compared with women who had a substance-use disorder only, women who had co-occurring substance use and mental disorders reported less support and less reci-

procity within their households (Tracy & Johnson, 2007)

Social Networks, Women, and Substance Abuse Treatment

The study of social networks includes two broad subfields. The first subfield consists of the study of whole networks through examination of the pattern of interactions within a group that is bounded socially or geographically, such as the residents of a village or the members of an organization. In this approach, data are collected from members of a group about their ties to other group members.

The second subfield consists of the study of personal networks through the examination of the social context of a focal person. A commonly used method in assessing personal networks is to have the focal person or respondent (i.e., the *ego*) first list names of personal network members, and then the ego answers a set of detailed questions about each network member (referred to as an *alter*; Marsden, 1990; McCallister & Fischer, 1983). The current study used this approach. In many cases, the respondent is also asked to evaluate ties among his or her alters, such as the likelihood that a pair of alters might interact (Scott, 2000). In this manner, personal network data can operationalize a respondent's social context into a set of variables that are used to explain his or her attitudes, behaviors, and conditions. In this study, we use personal network variables to explain the variability in the women's stage of treatment.

Thus, personal network analysis focuses on an individual's connections with other people; in this case, people who know and interact with a woman in substance abuse treatment. Not all social networks provide social support or support positive healthy behaviors. As defined in this study, social support follows the empirically derived definition of Gottlieb (1983) and Barrera and Ainley (1983): Supportive behaviors include advice and information, emotional support and encouragement, and concrete assistance or tangible help provided by network members (alters) or perceived to be available that has beneficial emotional or behavioral outcomes on the recipient. As a multidimensional construct, a personal network consists of several dimensions (Marsella & Snyder, 1981), including (a) compositional network features that focus on the characteristics (e.g., drug or alcohol user) of alters and their relationship to the focal person (e.g., family, professional, friend), (b) types of social support perceived to be available within the network and the nature of interactions within network relationships (e.g., frequency of contacts, length of time known, reciprocity in giving and receiving help), and (c) structural network features, which focus on the

way the alters are arranged around ego. These include measures such as density (i.e., the proportion of ties between alters that exist out of all possible ties that could exist) and centralization (i.e., the degree to which a network is organized around one or a few people; McCarty, Killworth, & Rennell, 2007).

A number of studies have examined how compositional characteristics of social networks, within and outside of treatment programs, can contribute to substance use (Davey-Rothwell, Chander, Hester, & Latkin, 2011; Manuel, McCrady, Epstein, Cook, & Tonigan, 2007); support or undermine participation in treatment (Joe, Broome, Rowan-Szal, & Simpson, 2002); maintenance of sobriety (Walton, Blow, Bingham, & Chermack, 2003; Weisner, Delucchi, Matzger, & Schmidt, 2003); and prevention of relapse (Bond, Kaskutas, & Weisner, 2003; Dobkin, Civita, Paraherakis, & Gill, 2002; Zywiak, Longabaugh, & Wirtz, 2002). Having a large number of network members who are in drug treatment has been associated with the likelihood of treatment entry (Davey, Latkin, Hua, Tobin, & Strathdee, 2007); on the other hand, having a large number of active substance users in social networks, as well as having a "street-based" social network, has been associated both with a lower likelihood of entering enter treatment (Tucker, Wenzel, Golinelli, Zhou, & Green, 2011; Wasserman, Stewart, & Delucchi, 2001) and with an increased risk of engaging in high-risk sexual behaviors (Pilowsky et al., 2007). A large daily social network (i.e., people in daily contact) has been shown to be predictive of less substance use and less severity of substance problems posttreatment (Zywiak et al., 2009). In addition, Gregoire and Snively (2001) found that women whose networks contained greater numbers of substance users had poorer treatment outcomes than women whose networks contained fewer numbers of substance abusers. In their study of patients with co-occurring substance dependence and bipolar disorder, McDonald, Griffin, Kolodziej, Fitzmaurice, and Weiss (2011) reported that patients whose networks included two or more drug users had significantly more days of drug use during the 15-month posttreatment follow-up period.

A growing body of literature has demonstrated that among clients with co-occurring substance use and mental disorders, the availability of social support plays an important role in their treatment participation, treatment outcomes, and the recovery process (Tracy & Biegel, 2006). Studies have documented the usefulness of social support, especially early in post-treatment recovery (Humphreys, Moos, & Cohen, 1997; Laudet, Cleland, Magura, Vogel, & Knight, 2004; Laudet, Morgen, & White, 2006). Greater support for sobriety has been associated with less sub-

stance use posttreatment (Warren, Stein, & Grella, 2007; Wenzel et al., 2009). Social support and social relationships for women have a greater effect on women's drinking and depression than on men's drinking and depression (Skaff, Finney, & Moos, 1999). For example, living with a partner who used substances has been shown to predict relapse post-treatment for women; however, this relationship was not observed for men because, as compared with women, men tend to receive more family support for entry into treatment (Grella, 2008). In terms of treatment participation, women with supportive social networks were more likely to engage in substance abuse treatment services (Coughney, Feighan, Cheney, & Klein, 1998).

Few studies have examined social network structural variables in relation to substance abuse treatment engagement. Tucker et al. (2011) found that among homeless women, greater network density (i.e., the percentage of connections, or ties, among alters in the network out of all possible connections) was predictive of receiving substance abuse treatment services. A highly connected network may increase communication among alters and work in a more coordinated fashion to encourage treatment participation for the client (i.e., ego).

However, it may be that a closely knit or highly connected network is not necessarily beneficial (Lincorn, 2000; Rook, 1984). Sun (2007) reported that interpersonal conflicts with intimate partners, family members, and service systems could trigger substance use relapse for women; a contributing factor to such conflict was often undiagnosed mental disorders that interfered with interpersonal relationships.

Social Networks and Treatment Stage

Stage of change is an organizing construct of the transtheoretical model of change (Prochaska & DiClemente, 1983) that regards changes in maladaptive behaviors as progressing through a series of distinct stages, with each stage characterized by different motivational states, distinct orientation toward change, and varying goals and interventions that are most likely to be effective. Stage of change represents a temporal dimension and includes precontemplation, contemplation, preparation, action, and maintenance. *Stage of treatment* is a related construct based on the observation that people who recover from dual disorders progress through a series of four stages in treatment: (a) *engagement*, which focuses on relationship building; (b) *persuasion*, which helps clients consider discrepancies between their substance use and their goals; (c) *active treatment*, which supports goal attainment; and (d) *relapse prevention*, which helps clients learn skills to prevent or recover from a relapse

(Mueser, Noordsy, Drake, & Fox, 2003; Osher & Kofoed, 1989).

Attending to a client's stage of treatment helps to ensure that interventions are appropriate to the client's motivational state and are delivered when the client is ready to change. A few studies have suggested a relationship between social networks and stage of treatment. For example, in a sample of persons with dual disorders, social networks that included few substance users were found to predict treatment stage of recovery from substance abuse (Trumbetta, Mueser, Quimby, Rebut, & Teague, 1999). However, MacDonald et al. (2004) did not find this relationship; these researchers found the presence or absence of substance users in social networks did not differ among dual diagnosed clients who were in either early or late stages of treatment, with 65% of the sample reporting network members who abused substances. Clients who were engaged in treatment and showed a reduction in substance use for at least a month reported perceiving more social support from network members who did not use substances, but those social network members were more likely to be treatment professionals.

Aims of This Study

Our study examined the role of social networks in treatment stage by exploring the relationship between the stage of treatment and characteristics of three aspects of personal networks: the composition of personal networks, the social support available through a personal network, and the structure of a personal network. Understanding stage of treatment and personal networks at intake could inform interventions targeted to different network changes (e.g., increasing network size or increasing types of support) specific to stage of treatment. Therefore, the following research question was examined in this study: How do compositional, social support, and structural characteristics of personal networks among women in intensive outpatient abuse treatment vary by stage of treatment?

Method

Participants and Setting

The study sample included 242 adult women (18 years or older) with a diagnosis of substance use dependence who were enrolled in one of two intensive outpatient treatment programs (IOP) in Cleveland, Ohio. The treatment programs were gender-specific interventions for women and were funded by the county to provide treatment for low-income consumers with little or no insurance. Participants' appropriateness for IOP had been determined through the county-level assessment and placement process. The Ohio Department of Alcohol and Drug Addiction Services defines IOP as individual and group counseling

for a minimum of 8 hours completed over at least 3 days during the week. Treatment services included assessment, individual counseling, group counseling, crisis intervention, and case management.

The women had been in treatment for one continuous week immediately following intake before they were invited to participate in the research study. All women had a diagnosis of substance dependence (alcohol, drug, or both). All study participants had a diagnosis of a current (i.e., within the past 12 months of entry into the study) substance dependence (alcohol, drug, or both) based on criteria for substance dependence as set forth in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*; American Psychiatric Association, 2000). Diagnosis of substance dependence occurred as part of the county intake and assessment process. Women with a known diagnosis of schizophrenia or those who were taking medication prescribed for a major thought disorder were not eligible for the study because this study was designed to examine social networks among those women with less severe mental disorders in addition to a substance use disorder (Quadrant II as conceptualized by Singer, Kennedy, & Kola, 1998).

One staff person at each of the two agency sites served as liaison with the research staff to distribute flyers to prospective participants about the research study. If a woman indicated interest in learning more about the study, then the agency staff person scheduled an appointment for her to meet with a research interviewer.

Study Design and Procedures

Data were collected in face-to-face interviews between October 1 2009, and June 30 2011. Interviews were conducted by trained interviewers at the two treatment sites in private interview rooms using a computerized-assisted personal interview and a structured interview format consisting of the measures indicated below. Respondents required an average of 2 hours to complete the interview. Interviewer training consisted of a minimum of 3 hours of didactic training in the research protocol and informed consent procedures, followed by individual role-play practice and observation during an interview with a study participant. A competency checklist was used to document that the interviewer demonstrated the requisite interpersonal skills (e.g., had a nonjudgmental attitude), technical skills (e.g., read questions as written), and interview skills (e.g., responded appropriately to difficult participant behaviors). The protection of participants was approved by the Case Western Reserve University Internal Review Board.

In addition to assurance of confidentiality in the informed consent document, the National Institutes of

Health issued a Certificate of Confidentiality, protecting participant information from subpoena by state or federal authorities. For their involvement in the study, participants were each given a \$35 gift card to a local store plus travel reimbursement, as needed.

Measures

The Individual Assessment Profile (IAP; Flynn et al., 1995; Flynn, Craddock, Hubbard, Anderson, & Etheridge, 1997) was used to capture demographic information and background characteristics. The IAP assesses a variety of behaviors and characteristics of persons entering substance abuse treatment. Test-retest reliability coefficients for key individual items have been reported to exceed .80. In addition, satisfactory measures of internal consistency and concordance between biological measures and self-reports of recent drug use have been demonstrated (Flynn et al., 1997).

The following variables were derived from the IAP for this study: age; ethnic/racial identity (recoded as a dichotomous variable, *African American/ non-African American*); education level (collapsed into three categories of *elementary/junior high, high-school/equivalent, and vocational/associate/bachelor degree*); marital status (recoded into two categories of *married, and widowed/separated/divorced*); sources of income (coded as three categories of *employment, welfare/government assistance, or other*); number of children responsible for raising; residence type (recoded as a dichotomous variable *living alone/not alone*); living arrangements (recoded into three categories of *living in own house, shared housing/doubling up, and institutional living/living on the street*); any legal involvement (coded as a dichotomous *yes/no* variable); and any lifetime experience of homelessness (coded as dichotomous *yes/no* variable).

The presence of co-occurring mental disorders (i.e., generalized anxiety disorder, mania/hypomania, major depression/dysthymia and posttraumatic stress disorder) was assessed using the Computerized Diagnostic Interview Schedule, Version IV (C-DIS-IV; Helzer et al., 1985; Robins, Helzer, Croughan, & Ratcliff, 1981). The C-DIS has demonstrated reliability and validity, is based upon *DSM* criteria, and provides diagnostic information without requiring clinical personnel for interviewing or scoring (Robins, Pattison, & Wasserman, 1999). Based on the past 12-month presence of mental disorders as determined by the C-DIS-IV, each participant was categorized as either *dual disorder* or *substance-use disorder only*.

In addition to the above variables that were asked via the computerized-assisted personal interview, a separate social network software program, EgoNet (Source Forge, 2011) was used for gathering and

assessing personal network data (McCarty, 2002; McCarty, Molina, Aguilar, & Rota, 2007). Respondents were initially asked to “list 25 people you know,” and instructed to think of people with whom they had any type of contact in the past 6 months (i.e., alters), including “people who made them feel good, people who made them feel bad, and others who played a part in their life.” Once the 25 alters were listed, respondents were asked to indicate how they knew each alter; response options were *partner/ex-partner, spouse/ex-spouse, family member/relative, my child or child I am raising, from work or school, from religious group or organization, professional helper, from treatment program or AA/NA* [Alcoholics Anonymous/ Narcotics Anonymous], or *other*. Next, respondents were asked questions regarding the type and level of support from each alter. Respondents were asked to identify whether each alter would provide concrete, emotional, informational, and sobriety support; response options included *hardly ever, sometimes, or almost always*. Respondents were also asked to rate the extent of closeness between themselves and each alter (*not very, somewhat, or very close*) and to identify how often each alter was critical of the respondent (*hardly ever, somewhat, or almost always*). Each alter was rated in terms of the direction of help (*help goes both ways* [reciprocal], *mostly my helping alter, or mostly alter helping me*). Respondents also indicated whether each alter used alcohol and/or drugs and whether each alter was someone they had “used with.”

The final module in EgoNet asked about connections between each unique pair of relationships: “What is the likelihood that Alter 1 and Alter 2 talk to each other independently of you?” This question was repeated for each unique alter pair. Respondents rated the likelihood of each unique alter pair interacting using three response options: *not at all likely, somewhat likely, or very likely*. Reliability of scoring as measured by test-retest of social network members and percentage agreement of ratings has been demonstrated (.70 and .76), although some relational aspects of social networks were less stable than others (Tracy, Catalano, Whittaker, & Fine, 1990).

Social network composition variables derived from this personal network assessment included relationship of alters (e.g., partner, relative, professional); number of alters who used substances (i.e., alcohol, drugs, or both); and number of alters the woman reported as having “used with.” Based on the alter list and responses generated in EgoNet, social support characteristics were measured as the number of alters perceived as *almost always* available for informa-

tional, concrete, emotional, and sobriety support. Negativity in relationships was assessed using the number of alters rated as *almost always* negative in their interactions. In addition, respondents rated the closeness and reciprocity of network relationships: closeness was assessed through the number of alters rated as being *very close*, and reciprocity was assessed through the number of relationships in which giving help was rated as *mutual*.

Social network structure variables calculated by EgoNet included the following: (a) components, the number of groups of at least three alters who are connected directly or indirectly; (b) isolates, the number of alters not connected to anyone else in the network; (c) density, a measure of cohesiveness (score between 0 and 1, indicating the proportion of ties in a network relative to the total of all possible ties); and (d) measures of centralization, the extent to which a network is dominated by one or a few alters in terms of the number of ties (i.e., *degree centralization*) and of bridging the most connections (i.e., *betweenness centralization*). These structural variables were based on the matrix of alters rated *very likely* to interact. A centralized network concentrates links on one or on a few people who assume a strategic role, whereas a decentralized network has links evenly distributed. Network values can range from 0 to 100, with a perfectly centralized network scoring a centralization value of 100 (see McCarty, 2002, for a review of centrality in social networks).

Stage of treatment was assessed using the Substance Abuse Treatment Scale (SATS), an 8-point clinician-rated scale, developed as part of the New Hampshire Dual Disorders Study (Mueser et al., 1995; Mueser, Drake, & Wallach, 1998) and based on a stage model for integrated dual disorder treatment (Osher & Kofoed, 1989). The SATS has demonstrated high interrater and test-retest reliability, and its validity has been supported in research with community-based populations with dual disorders (McHugo, Drake, Burton, & Ackerson, 1995). The behaviorally anchored scale indicates progression from treatment engagement toward recovery. Each stage of treatment is defined by motivation to change, treatment engagement (e.g., contacts and engagement with services), and explicit changes in substance use over a 6-month period (see Table 1). In this study, the stages were collapsed into three treatment stages: *engagement*, which consisted of the preengagement and engagement stages; *persuasion*, which consisted of early and late persuasion stages; and *active treatment*, which consisted of early, late, and relapse prevention.

Table 1

Defining Stages of Treatment

| Treatment Stage | Definition |
|------------------------|--|
| Preengagement | Does not have contact with a case manager, mental health counselor, or substance abuse counselor; meets criteria for substance abuse or dependence |
| Engagement | Has had only irregular contact with a case manager or counselor; meets criteria for substance abuse or dependence |
| Early Persuasion | Has regular contact with a case manager or counselor; continues to use the same amount of substances or has reduced substance use for less than 2 weeks; meets criteria for substance abuse or dependence |
| Late Persuasion | Has regular contact with a case manager or counselor; shows evidence of reduction in use for the past 2 to 4 weeks (e.g., fewer substances, smaller quantities, or both); still meets criteria for substance abuse or dependence |
| Early Active Treatment | Engaged in treatment and has reduced substance use for more than the past month; still meets criteria for substance abuse or dependence during this period of reduction |
| Late Active Treatment | Engaged in treatment and has not met criteria for substance abuse or dependence for the past 1 to 5 months |
| Relapse Prevention | Engaged in treatment and has not met criteria for substance abuse or dependence for the past 6 to 12 months |
| Remission or Recovery | Has not met criteria for substance abuse or dependence for more than the past year |

Note. Adapted from McHugo, Drake, Burton, and Ackerson, 1995, p. 763.

Data Analysis

Data analysis began by computing descriptive statistics for sample characteristics and social network variables; these univariate data were reviewed for dispersion, variation, and normalcy of the distribution of the data. Chi-square analysis or Fisher's Exact test on categorical variables and analysis of variance (ANOVA) on continuous variables were used to compare differences in sociodemographic and clinical characteristics and social network variables (i.e., compositional, social support, and structural) by three treatment-stage groups: engagement ($n = 83$); persuasion ($n = 111$); and active treatment ($n = 48$). When the overall test yielded significant group differences, follow-up pairwise tests were conducted using either Tukey's HSD (honest significant difference) test (for F test) or the Bonferroni correction (for chi-square).

Results

Sample Characteristics

Overall, the study participants ($N = 242$) had an average age of 36.6 years ($SD = 10.4$, $R = 19-62$), and a majority of the participants (60%; $n = 145$) were African American. Lower education attainment levels of either elementary-only or junior high-only were reported by 44% ($n = 106$) of the sample participants.

Two thirds (66%; $n = 160$) of the women had never married. Nearly three fourths of the women (72%; $n = 167$) reported having low income and receiving Food Stamps or welfare assistance. In terms of housing status at the time of the interview, 41% ($n = 98$) of the women were in temporary housing or were living in shared housing (i.e., "doubling up"), 50% ($n = 121$) lived in their own housing, and 9% ($n = 44$) of the women lived in other situations such as institutions, group homes, or were living on the streets. Only 17% ($n = 40$) of the sampled participants lived alone, whereas the majority (83%) lived with a spouse, partner, or other family relative. Forty-two percent of the participants ($n = 101$) reported a history of having been homeless. At the time of the intake interview, nearly half of the women (46%, $n = 110$) were involved with the legal system (i.e., on probation, on parole, or awaiting sentencing). Of those, 65.7% had spent time in jail or prison for drug related or property related offenses. On average, the women had given birth to three children ($SD = 2.2$, $R = 0-11$). At the time of the study interviews, the 242 women in the study sample were responsible for raising 202 children. Table 2 shows sociodemographic characteristics across the three treatment-stage groups.

TREATMENT STAGE AND SOCIAL NETWORKS

Table 2
Sociodemographic Characteristics by Treatment Stage Group (N = 242)

| | Engagement (n= 83) | Persuasion (n= 111) | Active Treatment (n = 48) | χ^2 or F | P |
|--------------------------------|-----------------------|------------------------|---------------------------------|---------------|-------|
| | n (%) | | | | |
| Race | | | | .897 | .638 |
| Non-Black | 33(39.8) | 42(37.8) | 22(45.8) | | |
| Black | 50(60.2) | 69(62.2) | 26(54.2) | | |
| Education | | | | 1.283 | .864 |
| Elementary/Junior high | 37(44.6) | 48(43.2) | 21(43.8) | | |
| GED/High school | 37(44.6) | 45(40.5) | 21(43.8) | | |
| Vocational/Associate/Bachelor | 9(10.8) | 18(16.2) | 6(12.5) | | |
| Marital status | | | | | .539† |
| Married | 6(7.2) | 8(7.2) | 5(10.4) | | |
| Widowed/Separated/Divorced | 24(28.9) | 31(27.9) | 8(16.6) | | |
| Never married | 53(63.9) | 72(64.9) | 35(72.9) | | |
| Age M(SD) | 37.1(10.1) | 36.1(11.2) | 36.5(9.3) | .208 | .812 |
| Employment | | | | | .318† |
| On jobs | 6(7.4) | 12(11.4) | 5(11.1) | | |
| Welfare/gov. assistance | 64(79.1) | 69(65.7) | 34(75.6) | | |
| Other | 11(13.6) | 24(22.8) | 6(13.3) | | |
| Housing | | | | | .360† |
| Own house | 45(54.2) | 56(50.9) | 20(41.7) | | |
| Shared/Double-up/Temporary | 34(41.0) | 42(38.2) | 22(45.8) | | |
| Institute/Group home/Street | 4(4.8) | 12(10.9) | 6(12.5) | | |
| Living with | | | | .474 | .789 |
| Alone | 12(14.5) | 20(18.2) | 8(16.7) | | |
| Not alone | 71(85.5) | 90(81.8) | 40(83.3) | | |
| Homeless (yes) | 33(39.8) | 43(39.1) | 25(52.1) | 2.557 | .278 |
| Legal involvement | 31(37.7) | 53(47.7) | 26(54.2) | 3.904 | .142 |
| No. of children M(SD) | 3.1(2.2) | 3.0(2.1) | 3.0(2.5) | .072 | .931 |
| Responsible for children (yes) | 70(84.3) | 93(84.5) | 39(81.2) | .293 | .864 |

Note: Employment has 11 missing cases; Housing, Living with, Homeless, and No. of Children each had one missing case.

† Fisher's Exact Test

Substance Use and Treatment History

More than half of the women in this study were diagnosed with cocaine dependence (55%, n = 132); other diagnoses among the sample included alcohol dependence (44%; n = 107), marijuana dependence (39%; n = 95), and dependence on more than one substance (53%; n = 127). Nearly three fourths (74%; n = 179) of the women were dually diagnosed with mental disorders, with almost half the sample having two or more mental disorders. The most frequently

assessed mental disorder was major depressive episode. Nearly three fourths of the sample (72%; n = 174) had been in substance abuse treatment before this admission.

Table 3 shows clinical characteristics across the three treatment-stage groups. We found no statistically significant differences in either the sociodemographic variables (Table 2) or in the clinical variables (Table 3) across the treatment stages.

Table 3
Clinical Characteristics by Treatment Stage Group (N = 242)

| | Engagement (n = 83) | Persuasion (n = 111) | Active Treatment (n = 48) | χ^2 | P |
|-------------------------------|------------------------|-------------------------|------------------------------|----------|-------|
| | n (%) | | | | |
| Substance Use Disorder | | | | | |
| Marijuana | 32(38.6) | 50(45.0) | 13(27.1) | 4.560 | .102 |
| Amphetamine | 0 | 1(0.9) | 0 | | >.99† |
| Sedatives | 3(3.6) | 6(5.4) | 5(10.4) | | .274† |
| Cocaine | 48(57.8) | 59(53.2) | 25(52.1) | .566 | .754 |
| Opiates | 14(16.9) | 20(18.0) | 15(31.2) | 4.527 | .104 |
| Hallucinogens | 2(2.4) | 3(2.7) | 3(6.3) | | .565† |
| Inhalants | 0 | 0 | 1(2.1) | | .198† |
| Phencyclidine | 3(3.6) | 2(1.8) | 4(8.3) | | .116† |
| Alcohol | 33(39.8) | 50(45.0) | 24(50.0) | 1.350 | .506 |
| Multiple SUD | 41(49.4) | 57(51.8) | 29(60.4) | 1.544 | .462 |
| Mental Disorder | | | | | |
| Generalized anxiety | 18(21.7) | 36(32.2) | 14(29.2) | 2.748 | .253 |
| Posttraumatic | 31(37.3) | 53(47.7) | 22(45.8) | 2.186 | .335 |
| Major depressive episode | 48(57.8) | 70(63.1) | 27(56.2) | .877 | .645 |
| Dysthymia | 3(3.6) | 3(2.7) | 0 | | .420† |
| Manic episode | 29(34.9) | 41(36.9) | 16(33.3) | .210 | .900 |
| Hypomanic episode | 9(10.8) | 13(11.7) | 6(12.5) | .086 | .958 |
| Dual diagnosis | 63(76.8) | 85(76.6) | 31(64.6) | 2.947 | .229 |
| Previous treatment | 54(65.1) | 76(68.5) | 36(75.0) | 1.396 | .498 |

† Fisher’s Exact Test

Stage of Treatment and Social Networks

Network Composition. Table 4 shows one-way ANOVA results on network composition by three treatment stage groups. Network composition did not differ significantly across the treatment stage groups, with one exception. Significant group differences were found in the number of peers and friends from treatment programs or 12-Step programs such as AA or NA ($F = 4.453, p = .013$). The engagement treatment group had fewer people from treatment and 12-Step programs in their networks as compared with

those in the active treatment group ($F [2,239] = 4.453, p = .013$). In all other respects, network composition did not differ significantly across the treatment stage groups. For example, the number of partners, family members, and treatment professionals did not differ by treatment stage. In addition, no differences were found across the three treatment stages in the number of alters who used alcohol or drugs and the number of alters with whom the women had engaged in using alcohol or drugs (“used with”).

Table 4

Network Composition and Treatment Stage Group

| | Engagement (<i>n</i> = 83) | Persuasion (<i>n</i> = 111) | Active Treatment (<i>n</i> = 48) | <i>F</i> | <i>P</i> |
|------------------------------|--------------------------------|---------------------------------|---|----------|----------|
| Partner | 0.9(0.8) | 0.8(0.8) | 0.9(0.8) | 1.126 | .326 |
| Family | 9.9(5.6) | 9.8(5.2) | 9.4(4.6) | .178 | .837 |
| Children | 1.8(1.7) | 2.0(1.9) | 1.5(1.8) | 1.215 | .299 |
| Treatment | 1.9(3.1) ^a | 2.4(3.4) | 3.7(4.1) ^a | 4.453 | .013 |
| Professional | 1.3(1.8) | 1.4(1.8) | 1.4(2.0) | .033 | .967 |
| Alcohol and other drug users | 3.5(3.7) | 3.9(3.7) | 3.6(3.8) | .217 | .805 |
| Used with | 5.2(4.5) | 5.8(4.2) | 5.7(4.5) | .558 | .573 |

Note: Data are presented as mean (*SD*), *df* = 2/239.

^a Post-hoc test with Tukey's honest significant difference; significant difference at .05 level

Social Support. Table 5 shows one-way ANOVA results on social support by the three treatment-stage groups. A statistically significant difference was found across treatment stage groups in reciprocal relationships ($F = 3.029$, $p = .050$), with women in active treatment reporting a greater number of reciprocal relationships than their counterparts in the engagement stage group (18.8 vs. 17.0). Correspondingly, a significant difference was found across treatment stage groups in the mean number of alters viewed as pri-

marily receiving help from women ($F = 3.208$, $p = .042$). Post hoc comparisons indicated that those in the engagement stage group had a greater number of alters who received (vs. provided) help than those in the active treatment stage group (3.4 vs. 2.2). No significant differences were observed across treatment stage groups in concrete support, emotional support, informational support, sobriety support, negative (e.g., critical) relationships, and relationships described as *very close*.

Table 5

Social Support and Treatment Stage Group

| | Engagement (<i>n</i> = 83) | Persuasion (<i>n</i> = 111) | Active Treatment (<i>n</i> = 48) | <i>F</i> | <i>P</i> |
|---------------|--------------------------------|---------------------------------|---|----------|----------|
| Concrete | 12.3(7.1) | 12.5(6.0) | 13.4(6.9) | .471 | .625 |
| Emotional | 15.3(6.3) | 15.6(5.4) | 16.6(5.9) | .733 | .481 |
| Informational | 15.2(6.6) | 15.0(6.0) | 16.3(5.8) | .853 | .427 |
| Sobriety | 19.2(5.5) | 20.1(4.4) | 20.8(4.4) | 1.808 | .166 |
| Reciprocal | 17.0(4.5) ^a | 17.4(4.0) | 18.8(4.0) ^a | 3.029 | .050 |
| Helping other | 3.4(2.8) ^a | 3.2(2.6) | 2.2(2.6) ^a | 3.208 | .042 |
| Negative | 3.0(3.9) | 3.6(4.7) | 3.5(4.1) | .491 | .613 |
| Very close | 11.6(5.8) | 11.7(5.2) | 11.3(6.0) | .111 | .895 |

Note: Data are presented as mean (*SD*), *df* = 2/239.

^a Post-hoc test with Tukey's honest significant difference; significant difference at .05 level

Network Structure. In terms of network structure (i.e., the way in which network members were or were not connected to each other), one-way ANOVA indicated significant differences in the mean number of components and in one centralization measure (see Table 6), but it did not indicate significant differences

in network density nor in number of isolates. A significant difference was found in the number of components among the three treatment-stage groups ($F = 5.787$, $p = .004$). Post hoc comparisons using Tukey's HSD test indicated a significantly higher number of components for women in the active treatment stage

group than for women in the engagement stage group (1.8 vs. 1.3), suggesting more disconnected groups among women in active treatment. In addition, significant differences were found across treatment stage groups in degree centralization ($F = 4.755, p =$

.009). Women in persuasion stage groups, as compared with those in engagement, reported networks that were dominated by one or a few people with the most ties (29.8 vs. 22.7).

Table 6
Network Structure and Treatment Stage Group

| | Engagement (<i>n</i> = 83) | Persuasion (<i>n</i> = 111) | Active Treatment (<i>n</i> = 48) | <i>F</i> | <i>P</i> |
|-----------------|--------------------------------|---------------------------------|---|----------|----------|
| Density | 0.3(0.3) | 0.2(0.2) | 0.3(0.2) | 1.052 | .351 |
| Degree Ct | 22.7(13.9) ^a | 29.8(16.9) ^a | 27.2(16.1) | 4.755 | .009 |
| Between Ct | 11.5(13.5) | 14.3(14.6) | 11.2(12.5) | 1.359 | .259 |
| # of isolates | 6.2(6.6) | 4.9(5.1) | 4.8(5.3) | 1.606 | .203 |
| # of components | 1.3(.8) ^a | 1.5(.8) | 1.8(.9) ^a | 5.787 | .004 |

Note. Data are presented as mean (SD), *df* = 2/239.

^a Post-hoc test with Tukey’s honest significant difference; significant difference at .05 level

Ct = Centralization

Discussion

Findings Related to Treatment Stage

This study examined relationships between stage of treatment and personal networks of women enrolled in substance abuse treatment. Forty-six percent of the women began this treatment episode in the persuasion stage, even though many had previous treatment episodes. As found in this study, clients at intake to treatment represent a variety of treatment stages; this variety should serve as a reminder to practitioners to assess and to gear interventions to the individual’s stage of treatment. In addition, practitioners should strive to remain aware that even though women might enter a treatment program at the same time, they may be in very different treatment stages. Consistent with the transtheoretical model (Prochaska & DiClemente, 1983), progress through treatment stages may not always take a linear form, from one stage to the next: the client might skip a stage or return to a stage.

In this study, structural social network variables, rather than the composition or type of support exchanged in the network, were predominant in differentiating the stages of treatment. As compared with women in the engagement stage, women in the active treatment stage had a less connected network, which was indicated by a higher number of components. More components may indicate involvement in more diverse parts of the community. This diverse involvement could represent a woman’s attempt to compartmentalize her life to support a healthy lifestyle. A higher number of components could result in a more diverse network with access to new information or resources. In contrast, as compared with women in the

engagement stage, women in the persuasion stage had more centralized networks. A centralized network in the persuasion stage may be supportive toward helping a woman gather information from one or more key people in order to learn about substance use and ways to change substance use patterns.

Few differences in network composition or availability of social support were observed among the treatment stage groups. Even though practitioners might want to see women in active treatment surrounded by fewer people who use substances or surrounded by more supportive people, in this study, few significant compositional or social support availability differences were observed for women in the active treatment group. It is interesting that sobriety support did not show any significant differences across the stages of treatment. Women in active treatment reported more reciprocal relationships in their social networks and fewer people to whom they provided help. This finding seems consistent with being actively engaged in treatment and interacting perhaps more frequently with service providers.

Considering that such a large proportion of the network for all women in this sample consists of family and partners, there may be an upper limit to the types of compositional or social support differences that could occur in different treatment stages. For example, it could be expected that the number of family members or relatives would be similar across treatment stages. It may be useful for practitioners to help women with substance use disorders manage change in their addiction in the context of a social network that remains largely the same and may con-

tinue substance use. As suggested by previous research (MacDonald et al., 2004), the number of substance users per se in a women's network may not be the best indicator of treatment stage given that women often initiate or engage in substance use with family members and relatives who make up a large proportion of their social networks and whose network connections are unlikely to be severed.

Findings from this study suggest that providers might consider women's entering personal networks in light of the fact that so much of substance abuse treatment is delivered in a group format; women may not have experienced a positive, reciprocal social environment or may not have developed connected networks and may need time to negotiate the social skills involved in accessing social support from others in a group setting. The finding concerning structural network differences for women in the active treatment stage suggests that social network interventions which build connections among network members and help women to manage a diverse, less centralized network, may be relevant for women in treatment for substance use disorders. In addition, women in this study who were in the active treatment stage reported more reciprocal relationships; this finding suggests that social skills training and family- or group-based approaches might be applicable as part of social network interventions. In general, however, little is known about specific social network interventions and their effects; that is, whether network interventions should target network size, composition, support availability, or connections (see Valente, Gallaher, & Mouttapa, 2004, and Copello, Orford, Hodgson, & Tober, 2009, for the application of social network interventions to substance use). A remaining clinical question is whether social networks are consistent over time, or if treatment programming or some other factor influences one or more aspects of social networks. We will address this in a later report with analysis of our longitudinal data.

Strengths and Limitations

In terms of strengths, this study collected detailed information about personal networks, including composition, social support availability, and network structure. The sample size was large and included an understudied population of low-income women with dual disorders. Because the data were cross-sectional, we could not determine how these networks contribute to stage of treatment—as a cause or as an effect. For example, perhaps women who are actively engaged in treatment also have more energy or resources to engage in reciprocal relationships within their network. Further, this analysis did not combine compositional and structural variables by examining, for example, the relationships of those alters with whom

the women used (e.g., family vs. friends) or the relationships of those alters who maintained a central role in network structure. In terms of generalizability, study findings are limited to low-income women served by county outpatient service systems in an inner-city setting. However, the nature of the polydrug use in this sample—alcohol, marijuana, and cocaine—mirrors the types of substances for which treatment is reported to be most commonly sought (Substance Abuse and Mental Health Services Administration, 2010).

Future Research

Future research using prospective designs should examine whether particular network characteristics predict treatment stage, movement from one stage to another, and posttreatment outcomes in order to inform network interventions most beneficial for women in substance abuse treatment. Using longitudinal personal network and treatment outcomes data, we need to develop a better understanding of the specific network structures that are supportive of positive treatment involvement and recovery at particular stages of treatment. For example, although connected networks are able to communicate more effectively, a network structure of this type might not always reinforce behavior changes. Likewise, having a greater number of components within a social network may or may not facilitate positive treatment outcomes. In addition, examining combinations of structural and social support characteristics with network composition may yield more detailed information for clinical applications; it may well be that an important determinant of treatment stage includes *who* is providing *what* type of support or *who* holds a central network role. In addition, researchers need to determine if women in residential treatment services show similar relationships between treatment stage and social networks.

Traditionally, substance abuse treatment has been conceptualized as changing people, places, and things. The findings of this study suggest that in addition to changing people, improving reciprocity, and facilitating network structure in terms of building connections and components hold potential as an adjunct to treatment services.

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Authors Note

Elizabeth M. Tracy is the Grace Longwell Coyle Professor in Social Work at the Mandel School of Applied Social Sciences of Case Western Reserve University.

HyunSoo Kim (hyunsoo.kim@case.edu) and Suzanne Brown (sxb283@case.edu) are both doctoral candidates at the Mandel School of Applied Social Sciences of Case Western Reserve University.

Meeyoung O. Min (meeyoung.min@case.edu) is a research assistant professor in the Mandel School of Applied Social Sciences of Case Western Reserve University.

Min Kyoung Jun (Min-kyoung.jun@case.edu) is a doctoral student at the Mandel School of Applied Social Sciences of Case Western Reserve University.

Christopher McCarty is an associate professor in the College of Public Health and Health Professions at the University of Florida (UF), and director of the UF Survey Research Center: chrism@bebr.ufl.edu

Correspondence regarding this article should be sent to Dr. Elizabeth Tracy via ext@cwru.edu or by mail to the Mandel School of Applied Social Sciences Case Western Reserve University 10900 Euclid Avenue Cleveland, OH 44106-7164.

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