Published in final edited form as:

Addict Res Theory. 2019 ; 27(4): 294–304. doi:10.1080/16066359.2018.1515350.

Maternal and Paternal Warmth Impact Recovery Support and Social Network Composition for Substance Dependent African American and Non-African American Women

Suzanne Brown, PhD, LMSW¹, Bryan G. Victor, PhD, LMSW², Carolyn J. Dayton, PhD, LMSW^{1,3}, Elizabeth M. Tracy, PhD⁴

¹Wayne State University School of Social Work

²School of Social Work, University of Michigan – Ann Arbor

³Merrill Palmer Skillman Institute

⁴Mandel School of Applied Social Sciences, Case Western Reserve University

Abstract

Poor early relationship experiences during the first 16 years of life may negatively impact adults' capacity to establish and utilize social support (Suchman, McMahon, Slade, & Luthar, 2005). This is especially of concern for women with substance use disorders (SUD) for whom social support is associated with recovery maintenance and treatment retention (Gregoire & Snively, 2001). The purpose of this study was to examine the influence of early relationship experiences, specifically paternal and maternal warmth, on recovery related social support and personal network characteristics among African American (AA) and non-AA women in treatment for SUD. Data were collected from 254 women in substance abuse treatment, 146 AA and 108 non-AA. Ordinal logistic, Poisson or multiple linear regressions were fitted to predict the impact of maternal and paternal warmth during childhood on adult social network composition and recovery support. Greater maternal warmth was associated with greater recovery-specific social support for both AA ($\beta = 0.12$) and non-AA ($\beta = 0.15$) women. Paternal, but not maternal, warmth significantly predicted the number of social network members who supported recovery for non-AA women (AOR = 1.04), and number of network members who used drugs and alcohol for AA women (IRR = 0.99). Developmental experiences associated with fathers appear to affect different domains of adult functioning than those associated with mothers, and those effects are different for AA versus non-AA women. Attention to these differences may inform culturally relevant substance abuse prevention and treatment efforts.

Keywords

Parental warmth; social support; women; addiction; fathers; mothers

Corresponding Author: Suzanne Brown, PhD. 5447 Woodward Ave, Detroit, MI, 48202; fb7139@wayne.edu; Phone: 313-577-4444; Fax: 313-577-4409.

Statement on Conflict of Interest

The authors have no conflict of interest to report

Introduction

The central role of social support in positive health outcomes has been clearly established (Gurung, Sarason, & Sarason, 1997). However, the role of social support in the maintenance of recovery for individuals with addictive disorders is a relatively new area of inquiry. Research has demonstrated that social support specific to recovery increases the potential for successful abstinence from drugs and alcohol (Ellis, Bernichon, Yu, Roberts, & Herrell, 2004; Gregoire & Snively, 2001). However, negative childhood attachment related developmental experiences have been found to limit adults' capacities to perceive and utilize social support in adulthood (Muller & Lemieux, 2000). One component of children's early attachment experiences, parental warmth, has emerged as an important determinant of adult social support (Mallinckrodt, 1992). However, research on the impact of early parental warmth on adult outcomes has focused primarily on maternal, and not paternal warmth. The purpose of this study was to examine the differential impact of paternal and maternal warmth during childhood on recovery support and social network recovery related characteristics among women in treatment for substance dependence.

Social Support, Social Networks, and Recovery

The concept of social support refers to the myriad of ways that people help each other. Gottlieb (1983) outlined types of support including: Concrete or instrumental support, that is tangible assistance such as offering money, goods, or assistance with transportation; emotional support-expressions of care and support that meet an individual's emotional needs; and informational support such as giving advice or useful and needed information. Specific to individuals with SUD, recovery support refers to support for remaining free of substance use, and for attending treatment or programs to assist with recovery maintenance (Laudet, Magura, Vogel, & Knight, 2000). One may receive social support from informal relationships such as friends or family, or through formal relationships such as professional helpers. Social networks are the set of interconnected relationships through which individuals may receive social support (Whittaker & Garbarino, 1983). Personal social networks refer to the relationships between and among individuals surrounding one focal person of interest, such as a research participant (Scott, 2000).

According to a stress and coping framework (Lazarus, 1966), social support is hypothesized to buffer (moderate) the effects of stress on health outcomes (Pearlin & Aneshensel, 1986; Heaney & Israel, 2008). Among individuals with substance use disorders (SUD), social support and social networks influence individuals' substance use behaviors, substance abuse treatment engagement, and recovery maintenance. Higher levels of social support have been found to predict better mental health (Warren, Stein & Grella, 2007) and less substance use post treatment (Tucker, et. al., 2015). The percentage of heavy drinkers and drug users in an individual's social network, have been found to predict abstinence and amount of substance use post treatment among substance dependent individuals (Eddie & Kelly, 2017; Tracy, et. al., 2016; Laudet, Cleland, Magura, Vogel, & Knight, 2004). Greater perceived social support, specifically emotional and instrumental support, was found to predict a greater amount of time between relapses in drug users (Havassy, Hall, and Tschann, 1987), and greater informational support from network members is associated with increased use of

treatment services for those with dual substance and mental health disorders (Sapra, et. al., 2013).

Women with SUD are an understudied population (Smith & Weisner, 2000) with gender specific recovery related concerns. The high prevalence of post-traumatic stress symptoms along with SUD among women has been found to compromise recovery attempts (Young-Wolff, Fromont, Delucchi, Hall & Prochaska, 2014), and women are more likely than their male peers to have experienced interpersonal violence (Weaver, Gilbert, El-Bassel, Resnick & Noursi, 2015; Westreich, Guedj, Galanter & Baird, 1997). Women with both trauma symptoms and SUD report lower levels of functional social support than their peers with SUD alone (Dobkin, Civita, Paraherakis, & Gill, 2002; Brown, Jun, Min, & Tracy, 2013), which is in turn linked to more severe substance use (Dodge & Potocky, 2000). Trauma exposure, especially interpersonal violence, may limit women's capacity to build protective personal networks in support of recovery (Charuvastra and Cloitre, 2008). This may have significant negative implications for women's recovery efforts.

Social networks and social support are especially important for women's recovery. Previous research (Greguire & Snively, 2001) suggests that women may be more influenced by their social relationships both in the initiation of drug/alcohol use or abuse, and in treatment seeking and recovery maintenance than are men with SUD. For women, likelihood of relapse has been found to correlate with the quality of their social network relationships (Ellis, Bernichon, Yu, Roberts, & Herrell, 2004). Previous research (El-Bassel, Chen, & Cooper, 1998; Manuel, McCrady, Epstein, Cook, & Tonigan, 2007) has found that women in substance abuse treatment have smaller social networks than their male counterparts, with a higher proportion of substance users unable or unwilling to provide support for recovery (Grella, 2008). Additionally, women in substance abuse treatment frequently have difficulties developing and maintaining positive social networks that support the recovery process (Savage & Russell, 2005).

Early Parent-Child Relationships

Theory and empirical research suggest that early experiences with primary caregivers, including the quality of parental warmth expressed and experienced within early relationships, have a significant effect on social support, including the amount and types of support received from social network members, and perceptions of social support. Although conceptually distinct, parental warmth derives from attachment theory. Attachment, as defined by Bowlby (1969) refers to the behavioral system by which infants and very young children engage in proximity seeking behaviors to gain proximity to a protective attachment figure when in need of protection and support. Through this system of behaviors, and the caregiver's response to them, the child develops what Bowlby (1969) termed "internal working models" of attachment relationships. These models are networks of memories of important interactions with early caregivers that remind individuals of what to expect in current and future close relationships. Internal working models of attachment developed in early childhood (Bowlby, 1969; Ainsworth, 1989) influence close adult relationships including the quality of social network relationships (Hazan & Shaver, 1994). Thus, positive

early relationship with caregivers that are sensitive, warm and supportive are essential to healthy development and critical for adult relational functioning.

Parker (1978), drawing from Bowlby's attachment concepts of secure base and independence developed the Parental Bonding Instrument to measure adults' experiences of parental warmth during childhood. Empirical studies have found associations between parental warmth and aspects of adult functioning, such as psychological functioning (Wark, Kruczek, & Boley, 2003), and quality of life (Datta, Marcoen, & Poortinga, 2005; Lung, Huang, Shu, & Lee, 2004). Exploring the links between early relationship quality and adult social support, Sarason et al (1990, 1991) and Moreira and colleagues (2003) found that attachment style and early relationship experiences are subsequently associated with both perceptions of the availability of social support and satisfaction with the support given in adulthood (Sarason et al, 1991). These early relationship experiences may also influence support-seeking behaviors, in that individuals with insecure attachment are less likely than those with secure attachment styles to draw on social support resources even when available (Wallace & Vaux, 1993).

The links between early relationship history and social support may be especially salient for women with SUD. Previous research examining early relationship experiences among women with SUD has consistently identified experiences of low parental warmth (Suchman, McMahon, Slade, & Luthar, 2005; Cosden & Cortez-Isin, 1999), which has been identified as a risk factor in the development of a substance use disorder in adolescence and early adulthood (Gerra, et. al., 2004; Khantzian, 2007). An additional risk may be the ways in which early relationship experiences inform the adult's ability to create, utilize, and perceive social support that is central to success in recovery, especially for women (Brown, Tracy, Jun, Park, & Min, 2015). This combination of deficits in early relationship experiences, such as low parental warmth, combined with the resultant weaknesses in social support may compromise women's success in the recovery process.

While little is understood about the impact of early relationship experiences on women's capacity to utilize recovery related support in adulthood, even less is known about the specific contributions of paternal warmth versus maternal warmth to adult functioning. A small number of studies have examined paternal warmth specifically, in non-substance abusing adolescents and adults. Close relationships with fathers contribute to life satisfaction and happiness among young adults (Amato, 1994). Paternal acceptance has been linked to psychological adjustment and substance use (Campo & Rohner, 1992) and academic performance among early adolescents (DuBois, Eitel, & Felner, 1994). Positive relationships with fathers also buffer the impact of stress on externalizing behaviors among low income urban youth (Grant, et. al., 2000). To date, no research has examined the influence of early relationships with fathers on the subsequent social support networks of women with SUD.

Nascent research is beginning to identify differences between African-American (AA) and non-African American (AA) individuals in the impact of parental warmth on adolescent functioning. A small number of studies have examined differences between AA and non-AA adolescents in the ways in which parental warmth affects school performance and substance use behaviors. In a study of college students, greater parental warmth was associated with

lower anxiety for AA students but not for European-American (EA) students (Carter, Sbrocco, Lewis, & Friedman, 2001); and Pallock and Lamborn (2006) found links between parental warmth and school adjustment for EA adolescents but not for AA adolescents. Additionally, family bonding was found to protect against early initiation of cigarette smoking among young AA adolescents but not non-AA adolescents (Mahabee-Gittens, et. al., 2011). Parental warmth among AA parents also buffered the impact of discrimination on substance use in AA adolescents (Gibbons, et. al., 2004). While some have called for more culturally specific research on the impact of parental warmth on behavioral and interpersonal functioning (Locke & Prinz, 2002), no research has examined differences between AA and non-AA adults in the associations between parental warmth and adult social functioning.

Aims and Hypotheses

The purpose of this study was to examine the contribution of maternal and paternal relationship history (parental warmth) to recovery support and recovery related social network variables among AA and non-AA women in treatment for substance dependence. Previous research (Min et al, 2014) established that trauma symptoms negatively impact social support and social network characteristics within this population. However, the influence of parental warmth on social support, distinct from the impact of trauma on social support, has not been examined. Additionally, the differential effects of paternal versus maternal warmth on recovery support and recovery related social network variables for AA versus non-AA women has not been examined.

The following aims and hypotheses guided our analyses. **Aim 1** was to explore the associations between parental warmth and recovery specific support and social network characteristics, while controlling for the influence of trauma symptoms on these variables. **Hypothesis 1:** Greater parental warmth will be associated with greater perceived recovery support and greater numbers of individuals within the woman's social network who provided recovery support. **Aim 2** was to examine whether or not paternal warmth and maternal warmth differed in their association with recovery specific support and social network characteristics. **Aim 3** was to examine differences between AA and non-AA women in the associations between maternal and paternal warmth on recovery specific support and social network characteristics. **Hypothesis:** Given that no previous research existed to inform our hypotheses for Aims 2 and 3, these aims remained exploratory.

Methods

Recruitment

Data for this study were collected during a three-year NIDA funded longitudinal study on the personal social networks of women in substance abuse treatment. Participants were recruited from three inner city women only treatment programs, two intensive out-patient (IOP) and one residential treatment (RT) program in a midwestern city in the United States. Interviews used computer assisted personal interviews on laptop computers, and required approximately two hours to complete. Participants were provided with a \$35 gift card to an area store as incentive for participation. University IRB approval was obtained prior to sample recruitment.

Eligibility criteria for study participation required that women be 18 years of age or older, currently meet DSM-IV criteria for current (within the previous 12-months of study participation) substance dependence, have been in treatment for at least one week following intake, and not carry a diagnosis of a major thought disorder. Women diagnosed with a major psychotic disorder or those on medication used to treat major thought disorders were excluded from the study.

Measures

Demographic information was gathered using the Computerized Diagnostic Interview Schedule (CDIS) a computerized structured diagnostic program that assesses for the current presence, lifetime occurrence, and age of onset of many of the DSM-IV defined psychiatric disorders (Helzer & Robins, 1988), and was utilized in this study as a screening tool to assess for the current and/or past presence of Major Depression, Dysthymia, Anxiety, Manic episode, and Post Traumatic Stress Disorder. A new variable was then created wherein respondents determined by the CDIS-IV to have any of the previous mental disorders were coded as “Dual Disordered” while those without a CDIS identified mental disorder were coded as SUD only or “Non-dual Disordered”.

Severity of trauma symptoms was measured using the Trauma Symptom Checklist (Briere & Runtz, 1989), a 40 item self-report measure that assesses the trauma related symptomatology in adults resulting from trauma in childhood or adulthood (Briere & Runtz, 1989; Elliott & Briere, 1992). The TSC-40 contains six subscales- anxiety, depression, dissociation, Sexual Abuse Trauma Index (SATI), sexual problems, and sleep disturbance, problems commonly experienced by traumatized individuals. Each item on the TSC-40 is a symptom, and response options describe the frequency of occurrence of each symptom over the past two months on a four point likert scale (0=Never and 3=Often), with a total scale score range of 0-120. The total scale score was used for this study, with Cronbach’s alpha (α) equal to .93 in this sample. The scale has no established clinical cut-off score. However, Neal & Nagle (2013), in their validation of the instrument identified mean total scale scores for individuals with a history of physical abuse ($M=25.36$; $SD=16.23$), sexual abuse ($M=32.39$; $SD=18.42$), combined physical and sexual abuse ($M=30.63$; $SD=13.35$), and those without a history of abuse ($M=17.87$; $SD=12.18$).

Recovery support was measured using the Social Support for Recovery Scale (Laudet, Magura, Vogel, & Knight, 2000). The Social Support for Recovery Scale is a 7-item scale designed to assess the degree to which people in the participant’s life support them in their recovery through items such as, “The people in my life understand that I am working on myself”, and “I’m on my own in recovery. I don’t get any support”. Participants are asked to rate the degree to which they agree or disagree with each statement on a 4-point Likert scale ranging from 1 (Strongly Agree) to 4 (Strongly Disagree), with a range of 9-36. Cronbach’s alpha for this sample was high at .87.

Personal network characteristics were measured using EgoNet, an open source computerized program used for gathering and assessing personal social network data (McCarty, 2002). Respondents were asked to identify 25 individuals with whom they had contact over the previous 6 months, from any area of their lives. Once listed, questions regarding types and

degree of support were asked of the respondent regarding each individual. Network variables include social support variables (the number of individuals who offer informational, emotional, concrete, or recovery support), composition variables (the number of individuals who are family members, professional, use alcohol or drugs, are described by the participant as very close, and the number of years the participant has known the individuals), and network structure including density (the number of ties that exist between all members of the network) and isolates (the number of network members who are not tied to anyone else in the network). The following personal network variables were used in this study: Number of network members who almost always support recovery, number of network members who use both alcohol and drugs, number who use either alcohol or drugs, number of treatment program professionals in the network, and number of family members in the network. Social network variables were chosen for regression analyses based on their theoretical relationship to recovery and their significant ($p < .05$) bivariate association with maternal and/or paternal warmth.

Early relationship history was measured using the publicly available Parental Bonding Instrument (Parker, Tupling, & Brown, 1979). The PBI is a 25 item self-report instrument with two subscales, warmth/care and control/overprotection, designed to measure the participant's experience of their early caregiving from their mother and their father over the first 16 years of life. The warmth/care subscale assesses the degree to which the child experienced warmth and affection from their parents versus coldness and indifference. The control/overprotection subscale assesses the extent to which the child is allowed to develop autonomy or is rigidly controlled or over-protected by their parents. Sample items include statements such as, "My mother spoke to me in a warm friendly voice", and "My mother invaded my privacy". Responses are measured on a 4 point Likert scale with the following response options: 0=Very Like, 1=Somewhat Like, 2=Somewhat Unlike, and 3=Very Unlike, with a range of 0-36 for the Warmth subscale and 0-39 for the Control subscale. The two subscales are inversely correlated, with high care and low overprotection representing optimal parental bonding scores (Manassis, Owens, Adam, West, & Sheldon-Keller, 1999). Only the Warmth subscale of the PBI was used in the current study as an examination of bivariate relationships yielded no associations between the control subscale and other variables of interest in this study. Cronbach's alpha for the Warmth subscale was high at .93 for this sample. Long term stability of the PBI has been established, as no significant differences have been found in adult PBI scores over a 20-year period; and PBI scores have been found to be stable across mood states and varying life experiences (Wilhelm, Niven, Parker, & Hadzi-Pavlovic, 2005).

Data Analysis

The analysis for this study was carried out on the subset of participants reporting paternal warmth scores for both mother and father. Among the 377 participants, 123 women did not provide paternal warmth scores, as they could not identify anyone who fulfilled the role of father for them during their childhood. Participants reporting both scores were compared to those with missing paternal warmth scores on key characteristics including age, race, education, dual diagnosis status and trauma symptoms using common bivariate tests of association. No significant differences were detected. Univariate analyses were first used to

describe our sample, and to identify differences between AA and non-AA women (Table 1). We then fit a series of regression models to test whether maternal and paternal warmth were associated with recovery support and network characteristics while controlling for trauma symptoms and key characteristics, for the entire sample. We then re-examined our regression models for AA and non-AA women separately. In models where both maternal and paternal warmth were found to be significant, advanced simulation procedures were conducted to visualize the effect of different levels of maternal and paternal warmth. This was done using the Zelig package for R, an open-source statistical language program (Imai, King & Lau, 2007). All analyses were conducted using R, Version 3.3.3 (R Core Team 2017).

Results

Univariate analysis.

Table 1 displays the characteristics of the 254 women included in this study, and Table 2 displays results of the bivariate correlation analyses. The average age among AA women meeting the inclusion criteria was 39.3 years old, and 34.4 for non-AA women (range = 18 – 63). More than half (52.3%) of non-AA women and 43.8% of AA women had completed high school, while 19.6% of non-AA and 11% of AA women had completed had achieved some form of higher education. A small percent of women were employed either full or part time (7%), and 72.5% of participants received some form of public assistance such as Medicaid, food stamps, Temporary Aid to Needy Families, or Social Security Disability Income. Among the 108 non-AA women, 95 were European American, 6 identified as multi-racial, 3 as Native American, 3 as Latino, and 1 as unspecified. Co-occurring mental health and SUD were observed among 81.3% of non-AA women and 69.2% of AA women. Non-AA women also reported greater trauma symptoms than AA women, with a mean score of 47.4 (sd= 20.8; range = 2-91) on the Trauma Symptoms Checklist.

Recovery Support.

A multivariate linear regression model was fit to determine associations between maternal and paternal warmth and level of recovery-specific social support among the entire sample (Table 3). When controlling for other covariates, both maternal warmth ($\beta = 0.15$) and paternal warmth ($\beta = 0.08$) were significantly associated with increases in recovery-specific social support.

To aid in interpreting these beta coefficients and better test our hypotheses regarding differential impacts of maternal and paternal warmth, advanced simulations (N=10,000) were run on the posterior probability distribution of the Social Support for Recovery model. Figure 1 shows predicted values of Social Support for Recovery scores given high and low levels of parental warmth (both maternal and paternal). Parker (1978) separated PBI Warmth scores into high and low warmth, with low warmth scores reflecting affectionless or neglectful parenting. In the current study, “High level” was operationalized as the third quartile value for a given variable, while “low level” was set at the first quartile value. High levels of warmth were associated with a Social Support for Recovery score four points greater than low levels of warmth. Differences between high maternal, low paternal warmth and high paternal; low maternal warmth are depicted in Figure 2. While there was some

overlap in the predicted value distributions, high maternal; low paternal warmth resulted in slightly greater recovery support scores.

Social network composition.

The composition of women's social networks was then assessed across four dimensions. Two types of distributions were observed among these network variables. Accordingly, ordinal logistic or Poisson regressions were fitted to predict the impact of maternal and paternal warmth on the composition of participants' social networks. The adjusted associations derived from these models are presented in Table 3. Paternal warmth but not maternal was found to significantly predict the number of social network members who almost always support recovery, in that participants who reported greater paternal warmth during childhood also reported greater numbers of network members who supported recovery. Greater paternal warmth was also associated with fewer network members who used both drugs and alcohol, or who used drugs solely and not alcohol. Maternal warmth was negatively associated with the number of members of a woman's network who are treatment professionals.

Comparison of AA and Non-AA women

Bivariate correlations and regression models were re-examined separately for AA and non-AA women. For AA women, both maternal and paternal warmth were correlated with recovery support and a greater number of social network variables than for non-AA women (Tables 4 and 5).

Regression analyses revealed that greater maternal warmth was associated with greater recovery-specific social support for both AA ($\beta = 0.12$) and non-AA ($\beta = 0.15$) women (Tables 6 and 7). Greater paternal, but not maternal, warmth was associated with a greater number of social network members who supported recovery for non-AA women (AOR = 1.04), while greater maternal, but not paternal, warmth was associated with greater numbers of network members who used alcohol (IRR=1.02). Greater trauma symptoms were associated with having greater numbers of network members who used alcohol (IRR=1.01) for non-AA, but not for AA women. For AA women, greater paternal, but not maternal, warmth was associated with having fewer network members who used drugs and alcohol (IRR=.99) or drugs alone (IRR=.98). For both AA and non-AA women, greater maternal warmth was associated with having fewer network members who were treatment professionals. For non-AA women, those with educational attainment beyond high school were more likely to have network members who used alcohol and drugs (IRR=1.44), and alcohol alone (IRR=2.11).

Discussion

Developmental experiences have a large impact on adult outcomes across physical and mental health domains, including substance abuse and recovery. Research such as the Adverse Childhood Experiences study (Felitti, V.J., et. al., 1998) and research on risk factors for substance misuse during childhood (Gerra, et. al., 2004) all confirm the importance of the parent child relationship in reducing risk for substance misuse. What has yet to be

understood are the mechanisms through which these developmental exposures to risk and protective factors determine adult functioning. This study is an initial step in that direction.

The results of this study suggest that parental warmth during childhood may assist individuals to identify and utilize social support in adulthood and to create social networks that are more supportive of recovery. Father's warmth toward children offers distinct and important contributions to adult functioning among women with SUD. Our original hypotheses were supported in that parental (both mother and father) warmth was associated with recovery support within the total sample of women with SUD. Additionally, maternal and paternal warmth appeared to impact different aspects of adult social network characteristics, and to have different effects on social network characteristics for African American versus non-African American women.

The current finding of differential effects of maternal and paternal warmth on subsequent adult outcomes is consistent with recent empirical and theoretical literature in the early fathering field that suggests that fathers may play a unique role in socializing their children for success in the world outside of the family home. Paquette (2004), for example, has developed a model of early fathering that emphasizes a father's role in supporting the young child's exploratory system. This model proposes that fathers provide behavioral and interpersonal stimulation to children in ways that encourage their engagement with and exploration of the outside world and discipline that provides children with limits designed to maintain their safety. Results from the current study, showing that paternal warmth is associated with increased social support for recovery, may be understood as related to the particular ways in which fathers promote the social engagement capacities of their children (Dayton, et. al., 2016).

Qualitative research on the qualities of social network structure that promote recovery (Brown, Tracy, Jun, Park, & Min, 2015) suggests that the ability to manage network relationships is central to maintaining recovery. Some ways that women in recovery manage network relationships is by isolating network members who use substances within the network, removing network members who use substances from the network, and utilizing interpersonal skills that limit substance centered engagement with network members while still maintaining the supportive aspects of that relationship. Research on the father's role in child development has found that interactions with fathers during early childhood are important in helping children develop social competence, social skills, and successful peer relationships (Paquette 2004; Parke et al. 2004). It is possible that for the women in this study who reported higher paternal warmth, their early relationships with fathers helped them develop the social skills necessary for managing these adult network relationships during recovery.

Research on parent-child relationship qualities within African American, lower income families has focused more on aspects of parental control, such as parental monitoring and discipline as protective factors (Spano, et. al., 2008; Matjasko, et. al., 2013). Very few studies have focused on parental warmth as a protective factor within African American families, and none have focused on paternal warmth specifically. In this study, we found that greater paternal warmth was associated with having fewer network members who used drugs

and alcohol or alcohol only, for AA women, but not for non-AA women. This supports the small amount of previous literature suggesting that parental warmth may be a protective factor for AA adolescents in ways that are unique to AA families (Carter, Sbrocco, Lewis, & Friedman, 2001; Gibbons, et. al., 2004; Mahabee-Gittens, et. al., 2011). Findings from the current study suggest that the parental warmth, and paternal warmth in particular, may offer unique protective effects for adult AA women navigating interpersonal relationships related to recovery from addiction.

For non-AA women, one surprising finding was the association between greater maternal warmth and greater number of network members who used alcohol. In a previous study, Daire and colleagues (2013) identified relationships between greater maternal warmth and engagement in risky behaviors such as early onset alcohol use and early sexual behavior. The authors suggested that maternal warmth may in some cases be associated with maternal permissiveness, leading to more risk behavior among adolescents rather than less. For adult women in recovery from SUD, maintaining network members who use substances may be considered a risk behavior, and may suggest a conflating of maternal warmth and permissiveness in these women's early bonding experiences. For both AA and non-AA women, increased maternal warmth was associated with fewer network members who were treatment professionals. It is possible that women who experienced greater maternal warmth had better non-professional supports, and therefore less need for professional support.

Within the total sample, having a dual disorder was associated with the number of network members who used drugs. This is consistent with previous research (Tracy & Biegel, 2006) that has identified more compromised social networks containing greater numbers of individuals who use substances and fewer members who support recovery efforts, among women with dual disorders compared with women with SUD alone. However, this effect was lost when the sample was separated into AA and non-AA women, possibly losing significance due to decreases in statistical power.

The expected relationships between trauma symptoms and social network/social support variables were supported by these data, but only for non-AA women. Among non-AA women, greater trauma symptoms were associated with having greater numbers of individuals in their social networks who used alcohol. Previous research on trauma symptoms, social support and social networks suggests that rather than having a global effect on social support or social networks, trauma symptoms have an effect only on specific network characteristics (Min, Tracy, & Park, 2014). Trauma symptoms and parental bonding history may in fact influence different facets of social support and social network structure and composition. Trauma symptoms were not associated with social network structure for AA women. However, AA women had significantly lower scores on the Trauma Symptom Checklist than non-AA women, making it more difficult to detect relationships between these variables.

Another unexpected finding was the association between educational attainment and network members who use drugs and alcohol and alcohol only, for non-AA women. Individuals with higher educational attainment also have more network members with higher educational attainment, and previous research (Johnson, et. al., 2005) suggests an association

between higher educational attainment and greater alcohol consumption. However, this relationship was not significant for AA women. Only one previous study (Assari, & Lankarani, 2016) examined racial differences in this education level-alcohol consumption link, and found a smaller effect of education on drinking for Black individuals compared with their White counterparts. Our findings offer further support for differences in the association between education level and alcohol use for AA and non-AA women.

One limitation of this study is the cross-sectional nature of the data and the use of retrospective self-report to assess parental warmth. Future research should utilize more observational methods for measuring parental warmth and additional factors of parent child relationship quality, and examine the utilization of social support and social network composition longitudinally, across developmental time-points. This might illuminate the pathways through which early childhood experiences of parental care impact the use of social relationships across developmental stages and through this pathway influence adult outcomes of health and wellbeing. Additionally, future research should examine the influence of parental warmth for African Americans specifically, as results from this study suggest that parental warmth influences adult functioning in ways that are unique to this population. There are many contextual factors that impact substance use behaviors and recovery maintenance that were not included in this study, such as addiction severity, the influence of current relationships with parents and family members on substance use and recovery, and transgenerational substance abuse, violence, and attachment disorders. Future research should examine these additional variables in a more complex model.

The associations of parental warmth in childhood with adult social support and network structure suggests the importance of prevention by focusing on parent-child relationship quality in early childhood, with a specific focus on fathers. Prevention and intervention programs that help fathers develop developmentally appropriate parenting skills with their children that are warm and sensitive in addition to being activating, may support the development of healthy social competence in their children. Additionally, success in recovery requires social competencies that enable women to manage network relationships. Women who lack warm parenting from fathers in childhood may be specifically at risk for having lower competence in managing network relationships; and the impact of both maternal and paternal warmth on network relationships may be different for AA and non-AA women. Fostering the development of interpersonal skills in substance abuse treatment may be a meaningful and important treatment goal for these women, and a deeper understanding of the differences between AA and non-AA may lead to more culturally competent interventions.

Acknowledgments

Funding: This project was supported by Award Number R01DA022994 from the National Institute on Drug Abuse.

Funding

This study was funded by the National Institute of Drug Abuse grant number RO1DA022994

References

- Ainsworth MS (1989). Attachments beyond infancy. *American Psychologist*, 44(4), 709–716. [PubMed: 2729745]
- Amato PR (1994). Father-child relations, mother-child relations, and psychological well-being. *Journal of Marriage and the Family*, 56(4), 1031–1042.
- Assari S, & Lankarani MM (2016). Education and alcohol consumption among older Americans; Black-White differences. *Frontiers in Public Health*, 4(67), 1–7. [PubMed: 26870721]
- Bowlby J (1969). *Attachment and Loss: Attachment*. V. Basic Books.
- Briere J, & Runtz M (1989). The Trauma Symptom Checklist (TSC-33) early data on a new scale. *Journal of Interpersonal Violence*, 4(2), 151–163.
- Brown S, Jun MK, Min MO, & Tracy EM (2013). Impact of dual disorders, trauma, and social support on quality of life among women in treatment for substance dependence. *Journal of Dual Diagnosis*, 9(1), 61–71. 10.1080/15504263.2012.750147 [PubMed: 23543844]
- Brown S, Tracy EM, Jun M, Park H, & Min MO (2015). Personal Network Recovery Enablers and Relapse Risks for Women with Substance Dependence. *Qualitative Health Research*, 25(3), 371–385. 10.1177/1049732314551055 [PubMed: 25231945]
- Campo AT & Rohner RP (1992). Relationships between perceived parental acceptance-rejection, psychological adjustment, and substance abuse among young adults. *Child Abuse & Neglect*, 16, 429–440. [PubMed: 1617477]
- Carter MM, Sbrocco T, Lewis EL, & Friedman EK (2001). Parental bonding and anxiety: Differences between African American and European American college students. *Journal of Anxiety Disorders*, 15(6), 555–569. [PubMed: 11764312]
- Charuvastra A, & Cloitre M (2008). Social bonds and posttraumatic stress disorder. *Annual Review of Psychology*, 59, 301.
- Cosden M, & Cortez-Ison E (1999). Sexual abuse, parental bonding, social support, and program retention for women in substance abuse treatment. *Journal of Substance Abuse Treatment*, 16(2), 149–155. [PubMed: 10023613]
- Daire AP, Turk J, Johnson JM, & Dominguez V (2013). Parental bonding and its effect on adolescent substance use and sexual debut. *Adolescence*, 12(1), 54–64.
- Datta P, Marcoen A, & Poortinga YH (2005). Recalled early maternal bonding and mother-and self-related attitudes in young adult daughters: A cross-cultural study in India and Belgium. *International Journal of Psychology*, 40(5), 324–338.
- Dayton CJ, Buczkowski RS, Muzik M, Goletz J, Hicks L, Walsh T, & Bocknek EL (2016). Expectant fathers' beliefs and expectations about fathering as they prepare to parent a new infant. *Social Work Research: Special Issue on Social Work with Men and Fathers*, 40(4), 225–236.
- Dobkin PL, Cavita MD, Paraherakis A, & Gill K (2002). The role of functional social support in treatment retention and outcomes among outpatient adult substance abusers. *Addiction*, 97(3), 347–356. [PubMed: 11964111]
- Dodge K, & Potocky M (2000). Female substance abusers: Characteristics and correlates in a sample of inpatient clients. *Journal of Substance Abuse Treatment*, 18(1), 59–64. [PubMed: 10636608]
- DuBois DL, Eitel SK, & Felner RD (1994). Effects of family environment and parent-child relationships on school adjustment during the transition to early adolescence. *Journal of Marriage and Family*, 56(2), 405–414.
- Eddie D, & Kelly JF (2017). How many or how much? Testing the relative influence of the number of social network risks versus the amount of time exposed to social network risks on post-treatment substance use. *Drug and Alcohol Dependence*, 175, 246–253. [PubMed: 28460232]
- El-Bassel N, Chen DR, & Cooper D (1998). Social support and social network profiles among women on Methadone. *Social Service Review*, 72(3), 379–341.
- Elliott DM, & Briere J (1992). Sexual abuse trauma among professional women: Validating the Trauma Symptom Checklist-40 (TSC-40). *Child Abuse & Neglect*, 16(3), 391–398. [PubMed: 1617473]

- Ellis B, Bernichon T, Yu P, Roberts T, & Herrell JM (2004). Effect of social support on substance abuse relapse in a residential treatment setting for women. *Evaluation and Program Planning*, 27(2), 213–221.
- Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, Koss MP, Marks JS (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine*, 14 (4): 245–58. doi:10.1016/S0749-3797(98)00017-8.PMID 9635069.
- Gerra G, Angioni L, Zaimovic A, Moi G, Bussandri M, Bertacca S, Santoro G, Gardini S, Caccavari R, & Nicoli MA (2004). Substance use among high school students: Relationships with temperament, personality traits, and parental care perceptions. *Substance Use and Misuse*, 39(2), 345–367. [PubMed: 15061565]
- Gibbons FX, Gerrard M, Cleveland MJ, Wills TA, & Brody G (2004). Perceived discrimination and substance use in African American parents and their children: A panel study. *Journal of Personality and Social Psychology*, 86(4), 517–529. Doi: 10.1037/0022-3514.86.4.517. [PubMed: 15053703]
- Gottlieb BH (1983). *Social support strategies: Guidelines for mental health practice* (Vol. 7). Sage Publications, Inc.
- Grant KE, O’koon JH, Davis TH, Roache NA, Poindexter LM, Armstrong ML, & McIntosh JM (2000). Protective factors affecting low-income urban African American youth exposed to stress. *The Journal of Early Adolescence*, 20(4), 388–417.
- Gregoire TK, & Snively CA (2001). The relationship of social support and economic self-sufficiency to substance abuse outcomes in a long-term recovery program for women. *Journal of Drug Education*, 31(3), 221–237. [PubMed: 11696960]
- Grella CE (2008). From generic to gender-responsive treatment: Changes in social policies, treatment services and outcomes of women in substance abuse treatment. *Journal of Psychoactive Drugs*, 40(5), 327–343.
- Gurung R, Sarason B, & Sarason I (1997). Close personal relationships and health outcomes: A key to the role of social support. *Handbook of personal relationships: Theory, research and interventions (2nd ed)*. Chichester, UK: Wiley, 547–73.
- Havassy BE, Hall SM, & Tschann JM (1987). Social support and relapse to tobacco, alcohol, and opiates: Preliminary findings. *Problems of Drug Dependence* 1986, 207.
- Hazan C, & Shaver PR (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, 5(1), 1–22.
- Heaney CA, & Israel BA (2008). Social networks and social support. *Health Behavior and Health Education: Theory, Research, and Practice*, 4, 189–210.
- Helzer JE, & Robins LN (1988). The diagnostic interview schedule: its development, evolution, and use. *Social Psychiatry and Psychiatric Epidemiology*, 23(1), 6–16. [PubMed: 3130671]
- Imai K, King G & Lau O (2007). Zelig: Everyone’s Statistical Software. <http://GKing.harvard.edu/zelig>
- Johnson PB, Richter L, Kleber HD, McLellan AT, & Carise D, (2005). Telescoping of drinking-related behaviors: Gender, racial/ethnic, and age comparisons. *Substance Use & Misuse*, 40(8), 1139–1151. [PubMed: 16040374]
- Khantzian EJ (2007). Treating addiction as a human process. Jason Aronson.
- Laudet AB, Magura S, Vogel HS, & Knight E (2000). Support, mutual aid and recovery from dual diagnosis. *Community Mental Health Journal*, 36(5), 457–476. [PubMed: 10994680]
- Laudet AB, Cleland CM, Magura S, Vogel HS, & Knight EL (2004). Social support mediates the effects of dual-focus mutual aid groups on abstinence from substance use. *American Journal of Community Psychology*, 34(3–4), 175–185. [PubMed: 15663205]
- Lazarus RS (1966). *Psychological stress and the coping process*. New York, NY: McGraw Hill.
- Locke LM, & Prinz RJ (2002). Measurement of parental discipline and nurturance. *Clinical Psychology Review*, 22(6), 895–929. [PubMed: 12214330]
- Lung FW, Huang YL, Shu BC, & Lee FY (2004). Parental rearing style, premorbid personality, mental health, and quality of life in chronic regional pain: A causal analysis. *Comprehensive Psychiatry*, 45(3), 206–212. [PubMed: 15124151]

- Mahabee-Gittens EM, Xiao Y, Gordon JS, & Khoury JC (2011). The role of family influences on adolescent smoking in different racial/ethnic groups. *Nicotine & Tobacco Research*, 14(3), 264–273. [PubMed: 22180584]
- Mallinckrodt B (1992). Childhood emotional bonds with parents, development of adult social competencies, and availability of social support. *Journal of Counseling Psychology*, 39(4), 453.
- Manassis K, Owens M, Adam KS, West M, & Sheldon-Keller AE (1999). Assessing attachment: convergent validity of the adult attachment interview and the parental bonding instrument. *Australian and New Zealand Journal of Psychiatry*, 33(4), 559–567. [PubMed: 10483852]
- McCarty C (2002). Structure in personal networks. *Journal of Social Structure*, 3, 1–10.
- Manuel JK, McCrady BS, Epstein EE, Cook S, & Tonigan JS (2007). The pre-treatment social networks of women with alcohol dependence. *Journal of Studies on Alcohol and Drugs*, 68(6), 871–878. [PubMed: 17960305]
- Min MO, Tracy EM, & Park H (2014). Impact of trauma symptomatology on personal networks among substance using women. *Drug and Alcohol Dependence*, 142, 277–282. DOI: 10.1016/j.drugalcdep.2014.06.032 [PubMed: 25042762]
- Mitjasko JL, Vivolo-Kantor AM, Henry DB, Gorman-Smith D, & Schoeny ME (2013). The relationship between a family-focused preventive intervention, parenting practices, and exposure to violence during the transition to adolescence. *Journal of Aggression, Maltreatment, and Trauma*, 22(1), 45–66.
- Moreira JM, de Fátima Silva M, Moleiro C, Aguiar P, Andrez M, Bernardes S, & Afonso H (2003). Perceived social support as an offshoot of attachment style. *Personality and Individual Differences*, 34(3), 485–501.
- Muller RT, & Lemieux KE (2000). Social support, attachment, and psychopathology in high risk formerly maltreated adults. *Child Abuse & Neglect*, 24(7), 883–900. [PubMed: 10905414]
- Neal TM, & Nagle JE (2013). Measuring abuse sequelae: Validating and extending the Trauma Symptom Checklist-40. *Journal of Aggression, Maltreatment, and Trauma*, 22(3), 231–247. Doi: org/10.1080/10926771.2013.764953
- Pallock LL, & Lamborn SD (2006). Beyond parenting practices: Extended kinship support and the academic adjustment of African American and European American Teens. *Journal of Adolescence*, 29(5), 813–828. [PubMed: 16455133]
- Parke RD, Dennis J, Flyr ML, Morris KL, Killian C, McDowell DJ et al.(2004) Fathering and children's peer relationships In: *The Role of the Father in Child Development*, 4th edn (ed. Lamb ME), pp. 307–40. Wiley, Hoboken, NJ
- Parker G (1978). Parental characteristics in relation to depressive disorders. *British Journal of psychiatry*, 134, 138–147.
- Parker G, Tupling H, & Brown LB (1979). A parental bonding instrument. *British Journal of Medical Psychology*, 52(1), 1–10.
- Paquette D (2004). Theorizing the father-child relationship: Mechanisms and developmental outcomes. *Human Development*, 47(4), 193–219.
- Pearlin LI, & Aneshensel CS (1986). Coping and social supports: Their functions and applications. *Applications of Social Science to Clinical Medicine and Health Policy*, 417–437.
- Core Team R (2017). R: A language and environment for statistical computing R Foundation for Statistical Computing, Vienna, Austria URL <https://www.R-project.org/>.
- Sapra KJ, Crawford ND, Rudolph AE, Jones KC, Benjamin EO, & Fuller CM (2013). Social network members' roles and use of mental health services among drug users in New York city. *The Journal of Behavioral Health Services and Research*, 40(4), 476–487. [PubMed: 23897001]
- Sarason BR, Sarason IG, & Pierce GR (1990). *Social support: An interactional view*. John Wiley & Sons.
- Sarason BR, Pierce GR, Shearin EN, Sarason IG, Waltz JA, & Poppe L (1991). Perceived social support and working models of self and actual others. *Journal of Personality and Social Psychology*, 60(2), 273.
- Savage A, & Russell LA (2005). Tangled in a web of affiliation: Social support networks of dually diagnosed women who are trauma survivors. *Journal of Behavioral Health Services and Research*, 32(2), 199–214. [PubMed: 15834268]

- Scott JP (2017). *Social network analysis*, (4th ed.). Thousand Oaks, CA: Sage.
- Smith W, & Weisner C (2000). Alcohol problems in women: Making the case for gender specific research. *FRONTLINES: Linking Alcohol Services Research and Practice*. National Institute on Alcohol Abuse and Alcoholism.
- Spano S, Rivera C, Vazsonyi AT, & Bolland JM (2008). The impact of exposure to violence on a trajectory of parental monitoring. *Criminal Justice and Behavior*, 35(11), 1411–1428.
- Suchman NE, McMahon TJ, Slade A, & Luthar SS (2005). How Early Bonding, Depression, Illicit Drug Use, and Perceived Support Work Together to Influence Drug-Dependent Mothers' Caregiving. *American Journal of Orthopsychiatry*, 75(3), 431–445. [PubMed: 16060738]
- Tracy EM, & Biegel DE (2006). Personal social networks and dual disorders: A literature review and implications for practice and future research. *Journal of Dual Disorders*, 2(2), 59–88.
- Tracy EM, Min MO, Park H, Jun M, Brown S, & Francis MW (2016). Personal network structure and substance use in women by 12-months post intake. *Journal of Substance Abuse Treatment*, 62, 55–61. [PubMed: 26712040]
- Tucker JA, Cheong J, Chandler SA, Crawford SM, & Simpson CA (2015). Social networks and substance use among at risk emerging adults living in disadvantaged urban areas in the southern United States: A cross-sectional naturalistic study. *Addiction Research Report*, 110, 1524–1532.
- Wallace JL, & Vaux A (1993). Social support network orientation: The role of adult attachment style. *Journal of Social and Clinical Psychology*, 12(3), 354.
- Wark MJ, Kruczek T, & Boley A (2003). Emotional neglect and family structure: impact on student functioning. *Child Abuse & Neglect*, 27(9), 1033–1043. [PubMed: 14550330]
- Warren JI, Stein JA, & Grella CE (2007). Role of social support and self-efficacy in treatment outcomes among clients with co-occurring disorders. *Drug and Alcohol Dependence*, 89(2), 267–274. [PubMed: 17329040]
- Weaver TL, Gilbert L, El-Bassel N, Resnick HS, & Noursi S (2015). Identifying and intervening with substance-using women exposed to intimate partner violence: phenomenology, comorbidities, and integrated approaches within primary care and other agency settings. *Journal of Women's Health*, 24(1), 51–56. doi:10.1089/jwh.2014.4866.
- Westreich L, Guedj P, Galanter M, & Baird D (1997). Differences between men and women in dual-diagnosis treatment. *The American Journal on Addictions*, 6(4), 311–317. [PubMed: 9398929]
- Whittaker JK, & Garbarino J (Eds.). (1983). *Social support networks: Informal helping in the human services*. Transaction Publishers.
- Wilhelm K, Niven H, Parker G, & Hadzi-Pavlovic D (2005). The stability of the parental bonding instrument over a 20-year period. *Psychosocial Medicine*, 35, 387–393.
- Young-Wolff KC, Fromont SC, Delucchi K, Hall SE, Hall SM, & Prochaska JJ (2014). PTSD symptomatology and readiness to quit smoking among women with serious mental illness. *Addictive Behaviors*, 39(8), 1231–1234. 10.1016/j.addbeh.2014.03.024 [PubMed: 24813548]

Figure 1. Predicted values for recovery support given high and low levels of parental warmth.
Note: High levels set equal to the warmth score's third quartile value; low levels set equal to the first quartile value

Figure 2. Predicted values for recovery support given different levels of maternal and paternal warmth.

Note: High levels set equal to the warmth score's third quartile value; low levels set equal to the first quartile value.

Table 1.

Descriptive statistics comparing African American (AA) women and non-AA women

	Overall (N =254)	AA women (N = 146)	Non-AA women (N = 108)	
Variable	Mean (s.d.) or %	Mean (s.d.) or %	Mean (s.d.) or %	Chi-square or t-test
Race				
African American	57.5	-	-	-
Non-AA	42.5			
Age	37.2 (10.6)	39.3 (10.1)	34.4 (10.7)	t = 3.70 df = 224 p < .001
Education				
Elementary/junior high	37.5	44.5	28.0	$\chi^2 = 8.03$ df = 2
GED/high school	47.4	43.8	52.3	p = 0.018
Voc/assoc/bachelor's	15.0	11.6	19.6	
Dual diagnosis				
No	25.7	30.8	18.7	$\chi^2 = 4.15$ df = 1
Yes	74.3	69.2	81.3	p = 0.042
Number of substance use disorders identified				
One	45.8	47.2	43.9	$\chi^2 = 1.26$ df = 2
Two	34.1	35.2	32.7	p = 0.532
Three or more	20.1	17.6	23.4	
Trauma Symptom Checklist (range: 0 – 92)	43.6 (20.9)	40.8 (20.7)	47.4 (20.8)	t = -2.52 df = 228 p = .012
Recovery Support Scale (range: 11-36)	28.7 (4.8)	29.0 (4.8)	28.2 (4.7)	t = 1.41 df = 230 p = .160
Network members who:				
Support recovery	20.6 (4.8)	20.6 (5.2)	20.7 (4.2)	t = -0.21 df = 245; p = 0.828
Use drugs and alcohol	7.9 (5.3)	7.4 (5.3)	8.4 (5.2)	t = -1.48 df = 230; p = 0.140
Use drugs only	3.8 (3.8)	3.4 (3.7)	4.2 (3.8)	t = -1.61 df = 223; p = 0.109
Use alcohol only	2.9 (3.1)	2.9 (3.0)	3.1 (3.2)	t = -0.55 df = 218; p = 0.577
Are treatment professionals	1.2 (1.7)	1.1 (1.7)	1.3 (1.8)	t = -0.94 df = 224; p = 0.349
Substance dependence (type)				
Alcohol	44.8	44.8	44.9	$\chi^2 = 0.00$ df = 1; p = 1
Marijuana	38.0	44.8	29.0	$\chi^2 = 5.82$ df = 1; p = 0.016
Amphetamines	0.8	0.7	0.9	Fisher's exact test; p = 1
Sedatives	5.6	1.4	11.2	$\chi^2 = 9.38$ df = 1; p = 0.002
Cocaine	54.4	60.1	46.7	$\chi^2 = 3.91$ df = 1; p = 0.048
Opiates	24.4	9.8	43.9	$\chi^2 = 36.8$ df = 1; p < .001

s.d. = standard deviation

Table 2.

Correlation matrix of independent and dependent variables.

Independent variables	Social Support for Recovery Scale	Network members who support recovery	Network members who use both drugs and alcohol	Network members who use drugs	Network members who use alcohol	Network members who are treatment professionals
Age ^a	.20 [*]	.15 [*]	-.06	-.08	.11	.03
Race ^a	.09	-.01	-.09	-.10	-.04	-.06
Education ^b	.21 [*]	.09	.04	.04	.12	.09
Dual diagnosis ^a	-.12	-.02	.13 [*]	.15 [*]	.03	.04
Number of SUDs ^a	.06	-.08	-.02	.00	-.05	.05
Trauma Symptoms ^a	-.16 [*]	.03	.18 [*]	.10	.18 [*]	.04
Maternal warmth ^a	.34 [*]	.18 [*]	-.08	-.10	.04	-.22 [*]
Paternal warmth ^a	.19 [*]	.21 [*]	-.20 [*]	-.20 [*]	-.06	.00

Note:

* p < .05

^a Pearson's correlation^b Spearman rank correlation

SUD = substance use disorder

Adjusted associations with dimensions of recovery support and social network composition based on ordinal logistic, Poisson and multiple linear regressions.

Table 3.

Independent variable	Social Support for Recovery score Unstandardized coefficient (95% CI)	Network members who support recovery AOR (95% CI)	Network members who use both drugs and alcohol IRR (95% CI)	Network members who use drugs IRR (95% CI)	Network members who use alcohol IRR (95% CI)	Network members who are treatment professionals IRR (95% CI)
Age	0.05 (-0.01 – 0.11)	1.02 (1.00 – 1.04)	-	-	-	-
Race						
Non-African American	-	-	-	-	-	-
African American (AA)						
Education						
Elementary/junior high	Ref	-	-	-	-	-
GED/high school	0.95 (-0.28 – 2.18)					
Voc/Assoc/Bachelor	1.86 (0.17 – 3.58)					
Dual diagnosis						
No	-	-	Ref	Ref	-	-
Yes			1.10 (0.90 – 1.35)	1.43 (1.03 – 1.97)		
Trauma symptoms	-0.02 (-0.05 – 0.01)	-	1.00 (1.00 – 1.01)	-	1.01 (1.00 – 1.01)	-
Maternal warmth	0.13 (0.08 – 0.19)	1.02 (0.99 – 1.04)	-	-	-	0.97 (0.96 – 0.99)
Paternal warmth	0.05 (0.00 – 0.10)	1.03 (1.01 – 1.05)	0.99 (0.98 – 0.99)	0.98 (0.97 – 0.99)	-	-
R ² / Pseudo R ²	0.19	.09	0.25	0.21	0.12	0.11

Note: AOR = adjusted odds ratio; IRR = incident rate ratio; CI = confidence interval. Regression use was determined by the underlying distribution of the dependent variable, and only independent variables significantly correlated with the dependent variable were used in each model. A report of unstandardized coefficients indicates a linear regression was used; AORs indicate ordinal logistic regression; IRRs indicate a Poisson regression. Bolded values are significant at an alpha level of 0.05 as demonstrated by a confidence interval that does not cross 0 for unstandardized coefficient values and does not cross 1 for AOR and IRR values.

Correlation matrix of independent and dependent variables for African American women

Independent variables	Social Support for Recovery Scale	Network members who support recovery	Network members who use both drugs and alcohol	Network members who use drugs	Network members who use alcohol	Network members who are treatment professionals
Age ^a	.25*	.18*	-.07	-.07	.09	.00
Education ^b	.27*	.14	-.12	-.10	.03	.15
Dual diagnosis ^a	-.11	-.10	.10	.15	.03	.02
Number of SUDs ^a	.05	-.06	-.01	-.03	-.01	-.06
Trauma Symptoms ^a	-.16	.03	.17*	.10	.11	.17*
Maternal warmth ^a	.31*	.25*	-.16*	-.09	-.10	-.22*
Paternal warmth ^a	.22*	.20*	-.24*	-.23*	-.06	-.06

Note:

* p < .05

^a Pearson's correlation^b Spearman rank correlation

SUD = substance use disorder

Table 5.
Correlation matrix of independent and dependent variables for non-African American women

Independent variables	Social Support for Recovery Scale	Network members who support recovery	Network members who use both drugs and alcohol	Network members who use drugs	Network members who use alcohol	Network members who are treatment professionals
Age ^a	.10	.11	-.01	-.05	.17	.09
Education ^b	.17	.00	.22*	.17	.26*	-.04
Dual diagnosis ^a	-.10	.12	.14	.13	.10	.04
Number of SUDs ^a	.08	-.11	-.04	.03	-.11	.17
Trauma Symptoms ^a	-.12	.04	.18	.05	.26*	-.16
Maternal warmth ^a	.37*	.09	.05	-.08	.20*	-.21*
Paternal warmth ^a	.15	.22*	-.13	-.15	-.06	.07

Note:

* p < .05

^a Pearson's correlation

^b Spearman rank correlation

SUD = substance use disorder

Adjusted associations with dimensions of recovery support and social network composition for African American women based on ordinal logistic, Poisson and multiple linear regressions.

Table 6.

Independent variable	Social Support for Recovery score	Network members who support recovery	Network members who use both drugs and alcohol	Network members who use drugs	Network members who use alcohol	Network members who are treatment professionals
	Unstandardized coefficient (95% CI)	AOR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
Age	0.07 (-0.01 – 0.15)	1.02 (0.99 – 1.05)	-	-	-	-
Education						
Elementary/junior high	Ref	-	-	-	-	-
GED/high school	0.76 (-0.94 – 2.46)					
Voc/Assoc/Bachelor	2.42 (-0.04 – 4.89)					
Dual diagnosis						
No	-	-	-	-	-	-
Yes						
Trauma symptoms	-	-	1.00 (0.99 – 1.01)	-	-	1.01 (0.99 – 1.02)
Maternal warmth	0.12 (0.04 – 0.20)	1.03 (0.99 – 1.06)	0.99 (0.98 – 1.00)	-	-	0.97 (0.95 – 0.99)
Paternal warmth	0.05 (-0.01 – 0.12)	1.03 (0.99 – 1.05)	0.99 (0.98 – 0.99)	0.98 (0.97 – 0.99)	-	-
R ² / Pseudo R ²	.18	-	.32	.18	-	.17

Note: AOR = adjusted odds ratio; IRR = incident rate ratio; CI = confidence interval. Regression use was determined by the underlying distribution of the dependent variable, and only independent variables significantly correlated with the dependent variable were used in each model. A report of unstandardized coefficients indicates a linear regression was used; AORs indicate ordinal logistic regression; IRRs indicate a Poisson regression. Bolded values are significant at an alpha level of 0.05 as demonstrated by a confidence interval that does not cross 0 for unstandardized coefficient values and does not cross 1 for AOR and IRR values.

Adjusted associations with dimensions of recovery support and social network composition for non-African American women based on ordinal logistic, Poisson and multiple linear regressions.

Table 7.

Independent variable	Social Support for Recovery score	Network members who support recovery	Network members who use both drugs and alcohol	Network members who use drugs	Network members who use alcohol	Network members who are treatment professionals
	Unstandardized coefficient (95% CI)	AOR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
Age	-	-	-	-	-	-
Education						
Elementary/junior high	-	-	Ref	-	Ref	-
GED/high school			1.22 (0.92–1.62)		1.33 (0.88 – 2.00)	
Voc/Assoc/Bachelor			1.44 (1.08–1.93)		2.11 (1.33 – 3.33)	
Dual diagnosis						
No	-	-	-	-	-	-
Yes						
Trauma symptoms	-	-	-	-	1.01 (1.00 – 1.02)	-
Maternal warmth	0.15 (0.08 – 0.23)	-	-	-	1.02 (1.00 – 1.03)	0.97 (0.95 – 0.99)
Paternal warmth	-	1.04 (1.01 – 1.07)	-	-	-	-
R ² / Pseudo R ²	.14	.07	.26	-	.46	.10

Note: AOR = adjusted odds ratio; IRR = incident rate ratio; CI = confidence interval. Regression use was determined by the underlying distribution of the dependent variable, and only independent variables significantly correlated with the dependent variable were used in each model. A report of unstandardized coefficients indicates a linear regression was used; AORs indicate ordinal logistic regression; IRRs indicate a Poisson regression. Bolded values are significant at an alpha level of 0.05 as demonstrated by a confidence interval that does not cross 0 for unstandardized coefficient values and does not cross 1 for AOR and IRR values.