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Do Social Networks Explain 12-Step Sponsorship Effects? A Prospective Lagged Mediation Analysis

Kristina N. Rynes and J. Scott Tonigan

Center on Alcoholism, Substance Abuse, and Addictions (CASAA), University of New Mexico.

Abstract

Sponsorship is a basic and important part of the 12-step approach to recovery from substance abuse (Alcoholics Anonymous, 2005) and research has shown that having a sponsor is associated with increased involvement in 12-step programs and improved outcomes (Bond, Kaskutas, & Weisner, 2003; Tonigan & Rice, 2010). However, little is known about how sponsorship improves outcomes. Given research demonstrating bivariate associations between sponsorship and social support for abstinence (Majer, Jason, Ferrari, Venable, & Olson, 2002), we hypothesized that the association between having a sponsor and increased abstinence outcomes would be explained by increases in one's abstinence-based social network. Prospective fully lagged mediational analyses did not support this hypothesis and these results ran counter to findings of five previous studies (cf. Groh, Jason, & Keys, 2008). A review of these studies showed that researchers often used cross-sectional or partially-lagged methods to test mediation and the mediational effect of the social network was small in magnitude. Results suggest that the prospective association between sponsorship and abstinence is not explained by increases in the abstinence-based social network and demonstrate the need for future studies to use rigorous and time-lagged methods to test social support for abstinence as a mediator of the effects of 12-step involvement.

Keywords

Alcoholics Anonymous; 12-step; sponsors; social support; social network

Twelve-step mutual-help programs are among the most popular community-based programs available to help people with substance misuse problems (Emrick, Tonigan, Montgomery, & Little, 1993) and most treatment providers in the United States encourage 12-step participation (Kelly, Yeterian, & Myers, 2008). In general, prospective studies indicate that 12-step attendance is predictive of reductions in alcohol use (Emrick et al., 1993; Tonigan & Rice, 2010) and illicit drugs (Carroll et al., 2000; Gossop, Stewart, & Marsden, 2007; Timko, DeBenedetti, & Billow, 2006; Timko & Sempel, 2004; Toumbourou, Hamilton, U'Ren, Stevens-Jones, & Storey, 2002; Weiss et al., 2005; Witbrodt & Kaskutas, 2005; Worley et al., 2008). With the knowledge that 12-step participation is beneficial for many, but not all, substance abusers, funded 12-step investigations are now seeking to identify the *active ingredients* and *mechanisms* that account for increased abstinence among 12-step participants.

Correspondence concerning this article should be addressed to Kristina N. Rynes, CASAA, 2650 Yale S.E., MSC11-6280, University of New Mexico, Albuquerque, NM 87106. krynes@unm.edu.

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One active ingredient in 12-step programs, *sponsorship*, is widely encouraged and has documented benefit in predicting increased abstinence. It has been reported in the Triennial Survey of Alcoholics Anonymous (AA, 2007), for example, that about 75% of members acquire a sponsor in the first 90 days of affiliation and prospective studies suggest that between 20% to 45% of 12-step affiliates have sponsors at nine and 12-month follow-ups (Humphreys & Moos, 2001; Kaskutas, Bond, & Humphreys, 2002; Tonigan, Connors, & Miller, 2003). By nearly all accounts, the role of the sponsor spans both 12-step program and fellowship domains (AA, 2005; Whelan, Marshall, Ball, & Humphreys, 2009). In addition to the primary task of guiding a newer member through the 12 steps, Morgenstern, Kahler, Frey, & Labouvie (1996) reported that having a sponsor predicted increased 12-step service work, reading 12-step literature, prayer, and advice-seeking from AA members. Twelve-step sponsorship also appears to be associated with increased access to the abstinence-based social support provided in 12-step fellowship. At the broadest level, Kelly and Moos (2003) reported that acquiring a sponsor during alcohol treatment predicted a higher probability of continuing to attend 12-step meetings. More narrowly, Rush (2002) found that, among female members of community-based AA, those with a sponsor perceived that they had greater personal and social support than did those without a sponsor. In addition, Majer et al. (2002) showed that, among participants receiving inpatient alcohol treatment, having a sponsor was significantly associated with a higher proportion of people in the social network either in recovery or abstinent from alcohol. Collectively, then, a majority of new 12-step affiliates acquire a sponsor during their early efforts to initiate behavior change, and it appears that having a sponsor more effectively engages new members into the prescribed practices of 12-step programs, e.g., 12-step work, meeting attendance, and the 12-step social network.

In general, having a 12-step sponsor is predictive of reductions in substance use. Tonigan and Rice (2010), for instance, reported that 12-step affiliates who had sponsors were 3.6 times more likely to be abstinent from alcohol at 6 months relative to affiliates who did not have sponsors, even after controlling for participant motivation, concurrent substance use treatment, and 12-step meeting attendance. This finding is consistent with the work of other investigations of sponsorship during early 12-step affiliation (cf. Witbrodt & Kaskutas, 2005), and it is especially interesting to note that having a sponsor significantly increases the odds of abstinence at longer-term follow-up (Bond et al., 2003).

In spite of strong evidence supporting the benefits of 12-step sponsorship the question remains, *why* is sponsorship effective? Several studies have shown that sponsorship and other indicators of AA involvement lead to increases in abstinence-based social support (George & Tucker, 1996; Humphreys, Finney, & Moos, 1994; Humphreys & Noke, 1997; Majer et al., 2002; Snow, Prochaska, & Rossi, 1994; Timko, Finney, & Moos, 2005; Witbrodt & Kaskutas, 2005). In addition, five studies using formal mediational analyses have found that social support for abstinence mediates or accounts for the pathway between composite measures of AA involvement and later abstinence (Bond et al., 2003; Humphreys, Mankowski, Moos, & Finney, 1999; Kaskutas et al., 2002; Kelly, Stout, Magill, & Tonigan, 2011; Laudet, Cleland, Magura, Vogel, & Knight, 2004). The composite measures of AA involvement in two of these studies addressed sponsorship. In the Bond et al. (2003) study, two of five items in the composite measure asked about 12-step sponsorship and in the Kaskutas et al. (2002) study, one of the seven items in the composite AA measure asked whether the participant was sponsored. Although not definitive, these studies are consistent with other reports that 12-step sponsorship mobilizes increased social networks supportive of abstinence, e.g., Majer et al. (2002) and Rush (2002).

Using a prospective design, this study had two aims. We first sought to investigate change over time in the number of abstinent and in-recovery people in the social network of adults

newly affiliated with 12-step programs. Second, we investigated whether the benefit of sponsorship could be explained by changes in the abstinence-based social network of the sponsee. Here, we applied Baron & Kenny's (1986) approach for assessing statistical mediation by investigating the temporal pathways between having a 12-step sponsor, the abstinence-based social network, and drinking reduction.

Method

Participants

The current study is part of an assessment-only investigation of how 12-step participation aids the mobilization and change processes of adults with alcohol and/or substance use disorders (R21AA017131, Tonigan PI). Participants were 115 adults recruited from community-based AA clubs, substance abuse treatment programs, and via advertisement and word-of-mouth. Although the study did not offer intervention, participants were not prohibited from attending formal treatment. Eligibility criteria were narrow in terms of lifetime AA experiences to ensure that participants' observed change was unconfounded by prior change histories. Thus, individuals were excluded if they reported more than 16 weeks of lifetime AA exposure and/or if they reported having successfully achieved abstinence from alcohol for 12 months or longer in the past. To be included, participants had to meet current *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association [DSM-IV-TR], 2000) criteria for at least alcohol abuse, attended at least one AA meeting in the prior 3 months, and used alcohol in the prior 90 days. Illicit drug abuse and dependence were not exclusion criteria.

Participants' average age was 39 ($SD = 9.6$), 49.6% ($n = 57$) were men, 64.3% ($n = 74$) were either single or divorced, and 20.9% ($n = 24$) were either married or cohabiting. Almost half of participants (45.2%, $n = 52$) were Hispanic, 34.8% ($n = 40$) were non-Hispanic white, 14.8% ($n = 17$) were Asian, 2.6% ($n = 3$) were African-American or black, and 2.6% were of an unspecified ethnicity. Participants had an average of 12.6 ($SD = 3.2$) years of education and 67% ($n = 77$) were unemployed.

Procedures

Breathalyzers were used to ensure that participants' blood alcohol concentration did not exceed .05 prior to the consent process or before any of the assessments. Once consented, participants completed a baseline interview that included 12 self-report questionnaires, 3 semi-structured interviews, and urine toxicology screens for five classes of illicit drugs. Follow-up interviews were conducted at 3, 6, and 9 months after intake. Strong preference was given to conducting follow-up interviews in-person with telephone interviews used if required. Referrals to treatment were made when requested by the participant or when deemed warranted by clinical staff. Participants were reimbursed \$50 for a completed interview. All procedures and assessments were approved by the institutional review board at the University of New Mexico (UNM Protocol # 27147).

Following procedures developed in Project MATCH (1997; 1998) if participants missed an interview but were successfully interviewed at a later follow-up point then data were reconstructed for the missed interview. At 3 months, 96 participants (74%) were interviewed in person and one participant was interviewed by telephone (.07%). Twenty-one participants reconstructed the 3-month interview at a later assessment (16%) resulting in complete data at 3 months for 91% ($n = 118$) of the participants. At 6 months, 95 in-person interviews were completed (73%) and 5 telephone interviews were done (3.8%). Fourteen participants (10.8%) reconstructed 6-month data at the 9-month interview resulting in complete data on 87.7% of the participants at the 6-month interview. At the 9-month interview 86.9% ($n =$

113) of participants were interviewed, 106 (93.8%) in-person and 7 by telephone. Because of the focus of this study, we excluded participants who had a missing response on the item asking whether they had a sponsor at the 3-month follow up ($n = 15$). Thus, this study includes 115 (88.5%) of the total recruited sample.

Assessments

Substance Use—The *Form 90* interview (Miller, 1996) was used to gather calendar-based alcohol use and other drug use data, ideally collected in 90-day intervals. Research has shown that the *Form 90* has satisfactory reliability for measuring self-reported abstinent days from alcohol ($r = .79$ for outpatients and $r = .97$ for aftercare patients) and heavy drinking days, $r = .96$ for outpatients, and $r = .97$ for aftercare patients (Tonigan, Miller, & Brown, 1997). Urine toxicology screens for five classes of illicit drugs were also collected at the intake and the 9-month follow-up interviews. Three outcome measures of substance use were computed using *Form 90* data, namely proportion of days abstinent from alcohol (PDAA), drinks per drinking day (DPDD), and frequency of illicit drug use. Proportion of days abstinent from alcohol was defined as the number of days the participant was abstinent from alcohol in the last 90 days divided by the total number of days in the assessment period. Drinks per drinking day were measured by assessing the number of drinks consumed per drinking day divided by the number of drinking days in a period (abstinent days not included in the denominator). Illicit drug use was measured by calculating the proportion of days in the assessment period that participants took their most frequently used illicit drug. The *Form 90* collected data regarding how many days in the assessment period participants used cannabis, sedatives, hypnotics, amphetamine, cocaine, hallucinogens and/or opioids. From this information we assessed which drug the participant used most often. The number of days on which the participant used this drug was divided by the total number of days in the assessment period to create our illicit drug use measure.

Help-Seeking Behaviors—The *Alcoholics Anonymous Involvement* (AAI) questionnaire was developed to assess AA program and fellowship behaviors and practices. Normative data have been published on the AAI, and test-retest psychometric analyses indicate that the AAI scales and items are reliable and valid (Tonigan, Connors, & Miller, 1996). A single item from the AAI was used at each interview to identify which respondents currently had an AA sponsor (yes/no).

Social network—The *Important People and Activities Inventory* (IPA; (Longabaugh, Beattie, Noel, & Stout, 1993) examines participants' social networks by asking participants questions about the people they consider to have significantly impacted their life. The participant is first asked to list up to 10 people that are important to them and that they have had contact with in the past 4 months. Participants are then asked questions about these important people including their relationship to the participant, how frequently the participant has had contact with them in the past 4 months (on a 1 – 7 scale), their drinking and drug use status, and the level of support they give the participant (on a 1 – 6 scale). In the current study, the IPA was used to measure the number of abstinent and in-recovery contacts in participants' social networks. We also calculated the proportion of participants' social networks that consisted of abstinent and in-recovery individuals by dividing the number of abstinent and in-recovery contacts by the total number of individuals the participant listed on the IPA.

Data analysis—To test whether the associations between having a sponsor at 3 months and substance use at 9 months (e.g., PDAA, DPDD, complete abstinence from alcohol, and illicit drug use) were explained by the proportion of abstinent and in-recovery contacts in the social network at 6 months, we employed Baron & Kenny's (1986) 4-step mediational

analysis method. We assessed each condition of mediation with four separate sets of hierarchical multiple regressions. Each set of regressions evaluated the four conditions of mediation (i.e., *a* predicts *c*, *a* predicts *b*, *b* predicts *c* controlling for *a*, and the association between *a* and *c* is insignificant after controlling for *b*) for a different indicator of substance use at 9-months, e.g., PDAA, DPDD, complete abstinence from alcohol, and illicit drug use. All regressions controlled for baseline levels of the dependent variable being assessed. Outside of the different dependent variables they evaluated, each set of regressions were identical.

Results

At baseline, participants used alcohol on 45% of the last 90 days, and they also reported using cocaine and marijuana on 10% and 11% of the last 90 days respectively. Participants' average score on the Alcohol Dependence Scale (ADS; Skinner & Allen, 1982) at baseline was 24.30 ($SD = 10.18$). Table 1 shows the substance use and 12-step participation of the sample over 12 months – from the baseline assessment that evaluated substance use in the 3 months prior to intake to the 9-month follow-up. Paired *t*-tests comparing participants' substance use at baseline to their use at the 9-month follow up indicated that drinks per drinking day decreased ($t(109) = 5.72, p < .0001; d = -.60$), frequency of abstinent days increased about 17% ($t(109) = 5.29, p < .0001$), and number of participants abstinent from alcohol increased from less than 1% at baseline to 29.6% at 9 months, $t(114) = 6.92, p < .0001$). Illicit drug use also significantly decreased. On average, participants reported taking their most frequently used drug on 28% of the 90 days prior to baseline and this decreased to 18% of days in the 7 – 9 months post-intake, $t(109) = 3.01, p = .003$.

At intake, all participants were relatively new to the 12-step program. Although we did not measure how long participants had been continuously attending 12-step meetings prior to the baseline interview, participants all reported having less than four months of lifetime exposure to the 12-step program. At each measurement point the majority of participants reported that they attended 12-step meetings and, on average, they attended about 1.5 meetings every 7 days. Less than half of participants (43.5%) reported having a sponsor at baseline, a percentage that remained relatively stable throughout the study. Having a sponsor at 3 months was unrelated to participant gender ($p = .11$) and baseline ADS score ($p = .50$). In addition, 73% of participants that had a sponsor at 3 months also had a sponsor at 9 months.

Descriptive statistics showed that participants attended formal substance abuse treatment on an average of 10% of days throughout the study ($SD = 11\%$). The theoretical orientation of the treatment programs participants attended was not formally assessed. However, given that the treatment programs from which participants were recruited were all publically funded, their orientation was likely similar to other programs throughout the country that are funded by the Substance Abuse and Mental Health Services Administration (SAMHSA), e.g., eclectic with emphasis on supportive, expressive, interpersonal, relapse prevention, cognitive-behavioral, 12-step facilitation, and motivational interviewing techniques (cf. SAMHSA, 2010).

Change over time in the abstinence-based social network

The abstinence-based social networks of participants over 12 months is described in Table 1. The number of abstinent and in-recovery contacts in participants' social networks was about 1.85 throughout the study, and descriptive statistics suggest that this number did not change much over time. The proportion of contacts in the social network that were abstinent was approximately 0.35 throughout the study and the proportion of people in the social network that were in recovery was about 0.15 throughout the study. Altogether, about 50% of people

in participants' social networks were either abstinent or in recovery over the length of the study. An unconditional multilevel growth model that included intercept and time as Level-1 predictors of participants' social networks showed that the mean number of abstinent and in-recovery contacts in participants' social networks did not change over time, $F(1, 114) < 1$. However, a nested model comparison of a multilevel model (MLM) that allowed both intercept and time to randomly vary fit better than an MLM that allowed the intercept to vary but kept time fixed, $\Delta D = 3.78, p = .05$. This shows that there were significant differences between participants with respect to their how their abstinence-based social networks changed over time.

Social network as a mediator of the association between sponsorship and abstinence

Table 2 displays results from our mediation analyses. As shown, sponsorship at 3 months significantly predicted PDAA at 9 months ($\beta = .20, p = .03$), but did not predict DPDD, complete abstinence from alcohol, or illegal drug use at 9 months (all $ps > .07$). Analyses indicated, however, that the association between sponsorship and PDAA was not explained by increases in the proportion of abstinent and in-recovery contacts in participants' social networks. Having a sponsor in months 0 – 3 was associated with a higher proportion of abstinent and in-recovery contacts in the social network from months 4 – 6 ($\beta = 0.19, p = .04$), but this association became insignificant after controlling for the proportion of abstinent and in-recovery contacts in the social network at baseline, $\beta = 0.13, p = .13$. The abstinence-based social network in months 4 – 6 did not predict any of the indicators of 9-month substance use (all $ps > .07$). In addition, after controlling for the abstinence-based social network, the association between sponsorship at 3 months and PDAA at 9 months remained significant ($\beta = .21, p = .02$).

Secondary analyses

Our findings were unexpected, especially considering that previous research has shown significant associations between 12-step sponsorship and increased social support for abstinence (Rush, 2002; Majer et al., 2002), between AA involvement and increases in abstinence-based social networks (Timko et al., 2005; Witbrodt & Kaskutas, 2005), and between social support for abstinence and increased abstinence (Beattie & Longabaugh, 1999). Given that previous research using formal mediational analyses has reported that abstinence-based social support accounts for the benefits of AA involvement, we conducted three post-hoc analyses to further assess whether prospective associations existed between overall AA involvement, abstinence-based social networks, and substance use in our sample. We measured AA involvement by summing seven yes/no items from the AAI that indicated whether or not participants attended an AA meeting, considered themselves to be an AA member, went to 60 AA meetings in the last 90 days, celebrated an AA sobriety birthday, had an AA sponsor, acted as an AA sponsor, or had a spiritual awakening or conversion between intake and the 3-month assessment. The first analysis showed that, after controlling for baseline proportion of in-recovery and abstinent contacts in the social network, AA involvement did not predict change in proportion of in-recovery and abstinent contacts in the social network from baseline to the 6-month follow-up, $\beta = 0.14, p = .09$. An analysis that did not control for the abstinence-based social network at baseline showed similar insignificant results, $\beta = .03, p = .08$. A second and third post-hoc analysis also returned insignificant results. Specifically, a hierarchical regression that controlled for baseline PDAA indicated that the proportion of in-recovery and abstinent contacts in the social network at 6 months did not predict 9-month PDAA ($\beta = -.04, p = .65$) and an analysis controlling for baseline PDAA demonstrated that the proportion of in-recovery and abstinent contacts in the social network at 6 months did not predict 9-month abstinence from alcohol, $B = -0.76, p = .17$.

Discussion

Findings indicated that, on average, neither the number nor the proportion of abstinent and in-recovery people in the social network of early 12-step affiliates changed significantly over time. Specifically, about 51% of participants' social networks were comprised of abstinent and in-recovery people at baseline, and this proportion remained relatively stable over time. Given that the Center for Disease Control (CDC) estimates that the proportion of currently abstinent adults in the United States is 34.6% (including lifetime alcohol abstainers, former infrequent drinkers, and former regular drinkers; CDC, 2009), having a social network in which 50% of people are in recovery or abstinent seems remarkable. However, as has been mentioned in previous research, early recovery is a period of time in which many individuals may discontinue contact with alcohol or drug-involved friends and begin establishing relationships with new friends who are abstinent and in recovery (cf. Laudet et al., 2004). In this time of flux, our participants may have had smaller than usual social networks and a motivation to surround themselves with individuals who were abstinent and/or in recovery. Thus, the total size of the social network and proportion of abstinent and in-recovery friends of our study participants may differ from individuals with greater 12-step experience.

Consistent with prior research, we found that having a sponsor early in 12-step recovery predicted later increases in the number of days participants abstained from alcohol. However, contrary to our hypotheses, sponsorship was not predictive of changes in the abstinence-based social network, the abstinence-based social network did not predict later abstinence from alcohol or drugs, and the association between early sponsorship and later abstinent days was not mediated by changes in the abstinence-based social network. In addition, our lagged analyses demonstrated that a composite measure of AA involvement was also a poor predictor of later changes in social networks. These results were surprising given that 12-step participation has been shown to significantly predict increased social support for abstinence (Humphreys et al., 1994; Humphreys & Noke, 1997; Snow et al., 1994) and social support for abstinence has been shown to mediate the association between 12-step participation and abstinence outcomes (Bond et al., 2003; Humphreys et al., 1999; Kaskutas et al., 2002; Kelly et al., 2011; Laudet et al., 2004).

Why did the current study obtain insignificant findings when several other studies have reported that abstinence-based social networks explain 12-step benefit? One explanation may be that in contrast to the rigorous fully-lagged prospective design used in the current study, many previous studies used either cross-sectional (cf. Humphreys et al., 1999; Kaskutas et al., 2002) or partially lagged analyses (Bond et al., 2003; Laudet et al., 2004) that did not provide strong or conclusive tests of social support as a mediator. Without using a fully-lagged prospective design, the possibility that AA involvement predicts change in the social network is equally as plausible as the possibility that the social network predicts change in AA involvement. A second way in which past studies differed from the current study has to do with their sample size and power. While the current study had 115 participants, most previous studies had sample sizes of 654 or more (except for Laudet et al., 2004 who had 99 participants). These large sample sizes made it possible for the researchers to detect bivariate associations that explained as little as one percent of the total variance, whereas our study was powered to detect effects that explained at least five percent of the total variance. If the current study had included 600 or more participants, the pathways in the mediational model that were marginally significant at $p = .07$ might have reached statistical significance at $p < .05$. However, the fact that our study did not detect the mediating effect of the abstinence-based social network calls into question the strength and meaningfulness of the mediating role of the abstinence-based social network.

In addition to differing in statistical design and power, the sampling procedures and measurement design used in the current study differed from those used in previous research. Unlike previous studies, the current study excluded individuals who had extensive 12-step histories and included individuals who had co-morbid substance use. It is possible that including participants with previous 12-step experience amplified the associations of interest in previous studies. For example, more experienced 12-step participants may have been more able to use the 12-step program to connect with others in recovery. It is also possible that including participants with co-morbid substance use problems weakened the associations of interest in the current study. Given that individuals with co-morbid substance use problems tend to drink and use drugs simultaneously (Staines, Magura, Foote, Deluca & Kosanke, 2001), ongoing substance use may have triggered our participants to have urges to drink. These increased drinking urges may have in turn weakened the effects of sponsorship and social network on the drinking outcomes of our participants. Another way in which the current study differed from previous studies concerns the time period in which participants' abstinence-based social networks were measured. While our study assessed social networks at the 6-month follow-up, Kaskutas et al. (2002), Humphreys et al. (1999), and Laudet et al. (2004) measured social network at their 1-year follow-up, and Bond et al. (2003) measured social network at their 3-year follow-up. It is possible that a mediating effect is present further along in 12-step participation than at the 6-month follow-up point. Finally, a ceiling effect may have contributed to the insignificant findings of our study. On average, 43.5% of our participants had a sponsor at baseline and this percentage did not vary much over time. In contrast, about 16% of participants in previous studies had a sponsor at the study initiation (Bond et al., 2003; Crape, Latkin, Laris, & Knowlton, 2002; Kaskutas et al., 2002) and this percentage increased to 28.5% (Bond et al., 2003) and 26% (Kaskutas et al., 2002) at 1-year follow-up.

Findings from the current study indicate that the benefits of having a sponsor early in 12-step affiliation are not explained by increases in the abstinence-based social network. This leaves open the question of what it is about sponsorship that predicts improved drinking outcomes. We postulate two answers to this question. First, having a sponsor may be beneficial because it gives the new 12-step member the opportunity to have a close and supportive relationship with a trusted mentor. Second, people with sponsors might be more motivated to change their drinking and practice 12-step principles or more likely to be concurrently attending alcohol treatment. In consideration of these two possibilities, recent research has shown that having a sponsor predicts improved drinking outcomes despite controlling for motivation to change and proportion of days attending alcohol treatment (Tonigan & Rice, 2010). These results may indicate that the benefits of having a sponsor cannot be entirely explained by self-selection. They may also lend more credence to the possibility that the quality of the relationship with the sponsor, e.g., trust, closeness, or bond, is important in explaining the reduced drinking outcomes of individuals with sponsors.

There were some limitations in our study that should be considered. First, in this study sponsorship was measured using a dichotomous variable that indicated simply whether or not the participant had a sponsor. Measuring sponsorship dichotomously clearly fails to capture salient dimensions of sponsorship that may moderate its influence, e.g., frequency of contact, relationship satisfaction, or trust. Future research on 12-step sponsorship would most likely benefit from using several measurements to capture the complex and multi-faceted nature of members' relationships with their sponsors. Second, while this study excluded participants who had prior experience in AA, participants were not excluded on the basis of whether they had attended other 12-step programs, e.g., Narcotics Anonymous or Gamblers' Anonymous. If participants had prior experience in attending other 12-step programs, they might have begun the study with a higher degree of readiness or motivation to practice 12-step principles and had different trajectories of drinking and behavior change.

In conclusion, participants in this study began with and maintained high amounts of abstinent and in-recovery social contacts, involvement in 12-step programs, and dedication to practicing 12-step principles. Although having a sponsor at 3 months significantly predicted the proportion of days abstinent from alcohol in months 7 – 9, the abstinence-based social network at 6 months did not mediate this association. Future research that examines how sponsorship and the social network affect each other over time, considers the role of potential third variables, and uses several measures of sponsorship may enhance our understanding of the association between sponsorship and the abstinence-based social network and how this association impacts drinking and substance use outcomes.

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Table 1
Sample Drinking, 12-step, and Social Network Measures: Intake through 9 months

	Months				CI and <i>d</i> (Pre-post)
	Intake	0 – 3	4 – 6	7 – 9	
Substance use					
% abstinent (alcohol only)	<1	19.1	27.8	29.6	[20, 38]
PDAA, <i>M</i> (<i>SD</i>)	0.55 (0.31)	0.72 (0.32)	0.74 (0.30)	0.72 (0.32)	0.57
DPDD, <i>M</i> (<i>SD</i>)	14.02 (9.23)	9.79 (10.85)	8.87 (9.15)	8.66 (8.89)	-0.60
% days use of most frequently used drug	0.28 (0.34)	0.22 (0.32)	0.22 (0.33)	0.19 (0.30)	-0.28
Proportion therapy days	0.08 (0.15)	0.12 (0.19)	0.11 (0.20)	0.09 (0.17)	0.06
12-step measures					
Proportion 12-step days, <i>M</i> (<i>SD</i>)	0.16 (0.19)	0.24 (0.31)	0.22 (0.29)	0.17 (0.24)	0.05
% attending 12-step programs	98.3	80.0	76.5	72.2	[-35, -17]
% sponsored	43.5	40.0	41.7	44.3	[-13, 14]
GAATOR score, <i>M</i> (<i>SD</i>)	64.16 (12.37)	63.51 (13.30)	65.03 (14.60)	63.05 (14.29)	-0.07
Social network					
Proportion friends abstinent, <i>M</i> (<i>SD</i>)	0.35 (0.34)	0.34 (0.34)	0.37 (0.37)	0.35 (0.35)	0.00
Proportion friends in recovery, <i>M</i> (<i>SD</i>)	0.16 (0.26)	0.16 (0.28)	0.14 (0.26)	0.15 (0.28)	0.04
Proportion friends abstinent and in recovery, <i>M</i> (<i>SD</i>)	0.51 (0.35)	0.49 (0.35)	0.51 (0.38)	0.50 (0.37)	0.03
Number friends abstinent, <i>M</i> (<i>SD</i>)	1.26 (1.54)	1.26 (1.36)	1.40 (1.61)	1.34 (1.50)	0.05
Number friends in recovery, <i>M</i> (<i>SD</i>)	0.63 (1.10)	0.53 (1.09)	0.52 (1.06)	0.49 (0.94)	-0.14
Number friends abstinent and in recovery, <i>M</i> (<i>SD</i>)	1.89 (1.68)	1.79 (1.63)	1.92 (1.80)	1.83 (1.65)	-0.04

Note. *N* = 115. 95% confidence interval given for difference of the 9-month versus intake binary measures, Cohen's *d* given for difference of the 9-month versus intake continuous and proportion measures. PDAA = Proportion days abstinent from alcohol in 90-day window; DPDD = Drinks per drinking day in a 90-day window (abstinent days not in the denominator); GAATOR = General Alcoholics Anonymous Tools of Recovery Scale, total score.

Table 2

Fully lagged regression analyses evaluating whether the abstinence-based social network mediates the association between having a sponsor and substance use

Conditions for mediation	β	<i>B</i> (<i>SE</i>)	<i>p</i>
Condition 1			
Having a sponsor (3 mo.) predicting substance use (9 mo.) ¹			
PDAA	.20	.13 (.06)	.03
DPDD	-.02	-.32 (1.60)	.84
Abstinence from alcohol		.76 (.42)	.07
% days use of most frequently used drug	.04	.02 (.05)	.64
Condition 2			
Having a sponsor (3 mo.) predicting abstinence-based social network (6 mo.) controlling for baseline abstinence-based social network			
	.13	.10 (.07)	.13
Having a sponsor (3 mo.) predicting abstinence-based social network (6 mo.) not controlling for baseline abstinence-based social network			
	.19	.15 (.07)	.04
Condition 3			
Abstinence-based social network (6 mo.) predicting substance use (9 mo.) ²			
PDAA	-.09	-.07 (.08)	.37
DPDD	.16	3.81 (2.20)	.09
Abstinence from alcohol		-1.06 (.59)	.07
% days use of most frequently used drug	.02	.02 (.07)	.82
Condition 4			
Sponsorship (3 mo.) predicting substance use (9 mo.) controlling for abstinence-based social network (6 mo.) ¹			
PDAA	.21	.14 (.06)	.02
DPDD	-.05	-.86 (1.62)	.60
Abstinence from alcohol		.94 (.44)	.03
% days use of most frequently used drug	.04	.02 (.05)	.68

Note. PDAA = Proportion of days abstinent from alcohol. DPDD = Drinks per drinking day.

¹Controlled for baseline substance use measure; PDA, DPDD, abstinence from alcohol, and % days use of most frequently used drug respectively.

²Controlled for having a sponsor at 3 mo. and baseline substance use measure; PDA, DPDD, abstinence from alcohol, % days use of most frequently used drug respectively.