Indirect Effect of Social Support for Drinking on Drinking Outcomes: The Role of Motivation*

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ABSTRACT. Objective: This study tested an integrated relapse model drawing hypotheses from both interpersonal and intra-individual relapse models. It was hypothesized that the relationships between alcohol-specific social support (support for drinking and support for not drinking) and drinking outcomes would be partially mediated by motivation. **Method:** Participants were 158 women with alcohol use disorders participating in two linked randomized controlled trials. One trial compared standard individual cognitive behavioral therapy (CBT) for alcohol use disorders with female-specific CBT for alcohol use disorders; the other compared alcohol behavioral couple therapy with blended individual CBT and alcohol behavioral couple therapy. Measures included the Important People Interview to measure social-support variables, the Timeline Followback to measure drinking variables, and the Stages of Change Readiness and Treatment Eagerness Scale to measure motivation. **Results:** Results of structural equation modeling suggested a mediational role of motivation in the relationship between support for drinking and drinking frequency. Individuals with more network support for drinking at baseline had less motivation for abstinence at the end of treatment, which predicted drinking frequency over the 6 months after treatment. The indirect effect of baseline support for drinking on 6-month follow-up drinking frequency was statistically significant. A similar, although only marginally significant, pattern was found for the relationship between support for not drinking and drinking frequency. Individuals with more social network for not drinking at baseline had more motivation at the end of treatment at the trend level, which in turn predicted 6-month follow-up drinking frequency. The indirect effect of baseline support for not drinking on 6-month follow-up drinking frequency trended toward significance. **Conclusions:** This study offers preliminary evidence that motivation is one mechanism by which abstinence-specific social support affects treatment outcome. (*J. Stud. Alcohol Drugs, 71,* 930-937, 2010)

F OR PEOPLE WITH ALCOHOL USE DISORDERS, social support has been found to predict positive drinking outcomes (Hunter-Reel et al., 2009). Lower levels of drinking are correlated with the degree of social support individuals receive from the most important person in their social network (Barber and Crisp, 1995), the number of supportive relationships (Booth et al., 1992; Gordon and Zrull, 1991; Humphreys et al., 1996; MacDonald, 1987; Rosenberg, 1983; Zywiak et al., 2002), and having more nondrinking friends (Mohr et al., 2001; Zywiak et al., 2002). The process by which social support affects drinking, however, is not well understood.

The type of support offered is an important aspect of the relationship between social support and relapse. Alcohol-specific support (i.e., support for abstinence or support for

drinking) has been found to be a more robust correlate of drinking than general social support (Beattie et al., 1992; Havassy et al., 1991), and support for abstinence from network members is associated with less relapse (Beattie and Longabaugh, 1999; Havassy et al., 1991; Longabaugh et al., 1995). There is mixed evidence, however, with regard to support for *drinking.* Using Project MATCH (Matching Alcoholism Treatment to Client Heterogeneity) data, Longabaugh and colleagues (1998) found that support for drinking was associated with poorer outcomes. Using the same data set, however, Zywiak et al. (2002) found that support for drinking from the four most important people in the network did not predict drinking outcome. The impact of the social network as a whole may, in fact, be greater than the impact of those who are closest to the drinker, who may be the least likely to encourage drinking.

In 2004, Witkiewitz and Marlatt proposed an adaptation of Marlatt and Gordon's (1985) cognitive-behavioral model of relapse. Hunter-Reel et al. (2009) have extended the Witkiewitz and Marlatt model from a largely intra-individual model focused on individual processes of change (e.g., motivation, coping, self-efficacy, and outcome expectancies) to an intrapersonal and interpersonal model. Hunter-Reel et al. (2009) proposed that social support might affect the individual processes proposed by Witkiewitz and Marlatt, which would then mediate the relationship between social support and drinking outcomes. Although the relationship between alcohol-specific social support and drinking outcomes has

been established (Beattie and Longabaugh, 1999; Havassy et al., 1991; Longabaugh et al., 1995), as have relationships between intrapersonal variables and drinking outcomes, the possible mediational links from social support to intra-individual variables to drinking outcomes have not been tested.

Researchers have been increasingly interested in the role that motivation plays in recovery from alcohol use disorders (DiClemente et al., 1999), and clinical researchers have worked to develop treatments specifically aimed at increasing motivation for change (e.g., Miller and Rollnick, 2002). Although motivationally focused treatments, such as motivational interviewing (Miller and Rollnick, 2002), have been found to be efficacious, to date there is no evidence that these treatments are efficacious because they change motivation. Thus, the present study sought to examine whether changes in motivation may be a result of environmental factors, and whether such changes in motivation are then at least partly responsible for drinking outcomes.

The overall objective of the present study was to test a portion of the Hunter-Reel et al. (2009) integrated model of drinking outcomes in which intra-individual variables are hypothesized to mediate the relationship between social support and drinking outcomes. Specifically, this study examined whether the presence of high alcohol-specific social support in the social environment maintains and/or enhances motivation, an intra-individual process that is predictive of positive outcomes. It was hypothesized that the impact of baseline social network *support for drinking* and *support for not drinking* on 6-month posttreatment drinking outcomes would be mediated by end-of-treatment motivation to change.

Method

Participants

Participants were 158 women participating in two linked randomized controlled trials. One compared standard individual cognitive behavioral therapy (CBT) for alcohol use disorders with female-specific CBT for alcohol use disorders. The second compared behavioral couple therapy for alcohol use disorders with blended CBT and behavioral couple therapy for alcohol use disorders. The women were allowed to choose whether to participate in the individual or couple treatment arm and were then randomly assigned to one of the two treatments within the individual or couple arm. Early in the clinical trial, however, more women chose the individual than the couple treatment; thus, the individual therapy arm of the study was closed, and, subsequently, all new participants were assigned to couple therapy.

Participants met the following six inclusion criteria: they (1) were female; (2) met criteria for current alcohol abuse or dependence on the Structured Clinical Interview for DSM-IV (SCID; First and Gibbon, 2004); (3) had consumed alcohol within the past 30 days; (3) did not meet criteria for

current drug dependence with physiological dependence; (4) were married or cohabitating for at least 6 months or were in a committed heterosexual relationship of at least 1 year's duration; (5) showed no signs of severe cognitive impairment; and (6) showed no signs of current psychosis. For those choosing or assigned to the couple treatment, couples were included if they met the following four criteria: (1) Either there was no evidence of domestic violence in the past 12 months, or, if any violence was reported, then (a) the victim of the violence reported no fear of violent retribution for discussions that might occur during treatment *and* (b) the violence occurred only while the aggressor was intoxicated, *or* (c) the violence did not result in injury requiring medical attention; the Revised Conflict Tactics Scale (Straus et al., 1996) was used in the assessment of domestic violence; (2) the male partner did not meet criteria for current drug dependence with physiological dependence; (3) the male partner showed no signs of severe cognitive impairment; and (4) the male partner had no signs of current psychosis.

Of the 158 women, 99 entered the individual arm of the study, and 59 entered the couple arm of the study. The mean age was 47.17 (range: 25-69, *SD* = 8.97). The percentage of the sample that was married was 80.4%; 10.8% were living together as if married, and 8.9% were in a committed relationship but not living together. The sample was primarily White (95.6%). The percentage of the sample regularly employed full or part time was 53.8; 14.6% were irregularly employed part time, 11.4% were unemployed, 7.6% were homemakers, 7.0% were retired, 1.9% were students, 1.9% were disabled, and 1.9% were otherwise occupied. The mean years of education was 15.15 (range: 8-27, *SD* = 2.6). The median annual household income was U.S. $96,000 (range: $10,000-$650,000).

Measures

An extensive assessment battery was administered to all participants at baseline and 3, 9, and 15 months after baseline. Three measures were used for the present study:

The Important People Interview (Longabaugh, 2001) is an interview measure that assesses the size and nature of the social network, the degree of social support typically offered by the social network, the presence of drinkers and abstainers in the network, and the response of the network to drinking and abstinence (Longabaugh et al., 1998). Reported test–retest reliability for the Important People Interview is excellent (*r* = .95, Longabaugh et al., 1998). Social support for drinking was defined for the current study as the percentage of the social network supporting drinking (the percentage of the network perceived by the woman to "encourage" or "accept" drinking); support for not drinking was defined as the percentage of the social network supporting not drinking (the percentage of the network perceived by the woman to "encourage" or "accept" not drinking).

The Stages of Change Readiness and Treatment Eagerness Scale–Short Form (SOCRATES; Miller and Tonigan, 1996) is a 19-item self-report measure of motivation containing three subscales with high internal consistency and test–retest reliability. The individual items from the SOCRATES were used to construct the proposed mediating construct of motivation.

The Timeline Followback (TLFB) interview (Sobell and Sobell, 1996) is a calendar-based method that uses event prompts to cue recall to obtain daily drinking data for the 90 days prior to the last drinking day before the baseline interview and for the time since the previous interview during follow-up. Reported test–retest reliability of the TLFB is high, and correlations between drinker and collateral reports of drinking also are high, ranging from $r = .84$ to .94 (Maisto et al., 1982). Systematic studies comparing the TLFB with quantity–frequency assessments suggest reasonable agreement for aggregate measures of drinking (Sobell et al., 2003). The TLFB was used to assess drinking frequency by calculating percentage of days drinking (PDD), and drinking intensity was assessed by calculating percentage of heavy drinking days (PHDD), defined as consuming more than three drinks on a given day. PDD and PHDD were the primary outcome variables used for this study.

Procedures

Potential participants were recruited using advertising in local newspapers, sending flyers to local physicians' offices, and advertising on the Internet. Women were screened for eligibility using a telephone interview, during which the study was explained to them. At this point, women chose which arm of the study (individual or couple) they wanted to participate in (until the individual arm of the study was closed). Potentially eligible women or couples were then scheduled for an in-person interview with a master's- or doctoral-level study clinician. During the interview, participants were further screened for eligibility, were given a full explanation of the study procedures, provided demographic information and some additional data, and provided informed consent.

A subsequent in-person baseline interview with each woman was conducted by a trained interviewer using semi-structured interviews to assess drinking, psychopathology, and other areas of functioning. Additional self-report measures were completed during this interview. Participants were then randomized to treatment condition. Participants were paid $50 once the baseline assessment was completed.

Participants completed follow-up interviews at 3 months (just after the completion of treatment), 9 months (6 months after treatment), and 15 months after baseline (1 year after treatment). Women were paid $50 for the 3-month interview and $75 each for the 9-month and 15-month interviews.

Data analysis

Measurement model construction. Exploratory factor analyses of the SOCRATES were conducted using maximum likelihood extraction and oblimin rotation. To confirm the factor structure of the mediating variables, confirmatory factor models were built in the AMOS 17.0 structural equation modeling (SEM) program (Arbuckle, 2005) and estimated using maximum likelihood imputation and maximum likelihood estimation. Model fit was assessed using the Akaike's Information Criterion (lower is better; Akaike, 1987), the comparative fit index (CFI; scale 0-1.0, >.95 is good fit; Hu and Bentler, 1999), and the root mean square error of approximation (RMSEA; <.05 is good fit; Hu and Bentler, 1999).

SEM path models. Four SEM models were constructed. The first had the exogenous variable social support for drinking and the dependent variable PDD. The second had the exogenous variable support for not drinking and PDD. The third had the exogenous variable social support for drinking and the dependent variable PHDD. The fourth had the exogenous variable support for not drinking and PHDD. Although the variables of social support for drinking and support for not drinking may share some conceptual overlap, they are separate constructs and were not significantly associated with one another ($r = -.10$, $p = .21$). They were therefore used to measure two independent constructs of alcohol-specific social support. Further, although there were four different treatment conditions, treatment modality (i.e., individual versus couple) was entered into the model, because participants were not randomized on this variable. The number of sessions attended also was entered into the model as a predictor of posttreatment and follow-up variables. Baseline social support, motivation, and drinking predicted treatment modality and the number of sessions attended, and modality and number of sessions attended predicted 3- and 9-month follow-up motivation and drinking. Also, in each of the models all earlier levels of a variable predicted later levels of that same variable (Figure 1).

Progressive model respecification based on modification indices and regression weight significance was conducted. Next, the individual standardized regression values and significance levels for each path were examined to determine whether there was support for the hypothesized mediational model. The presence of statistical mediation was assessed by evaluating the presence of a significant indirect effect of the social-support variables on the drinking outcomes variables by way of the proposed mediator and using a Sobel Test (Preacher and Leornardelli, 2001) to evaluate the significance of change in direct effect from predictor to outcome.

Results

Descriptives

Table 1 summarizes descriptive data on the sample, including imputed values for missing data that were used for modeling. Maximum likelihood imputation of data was
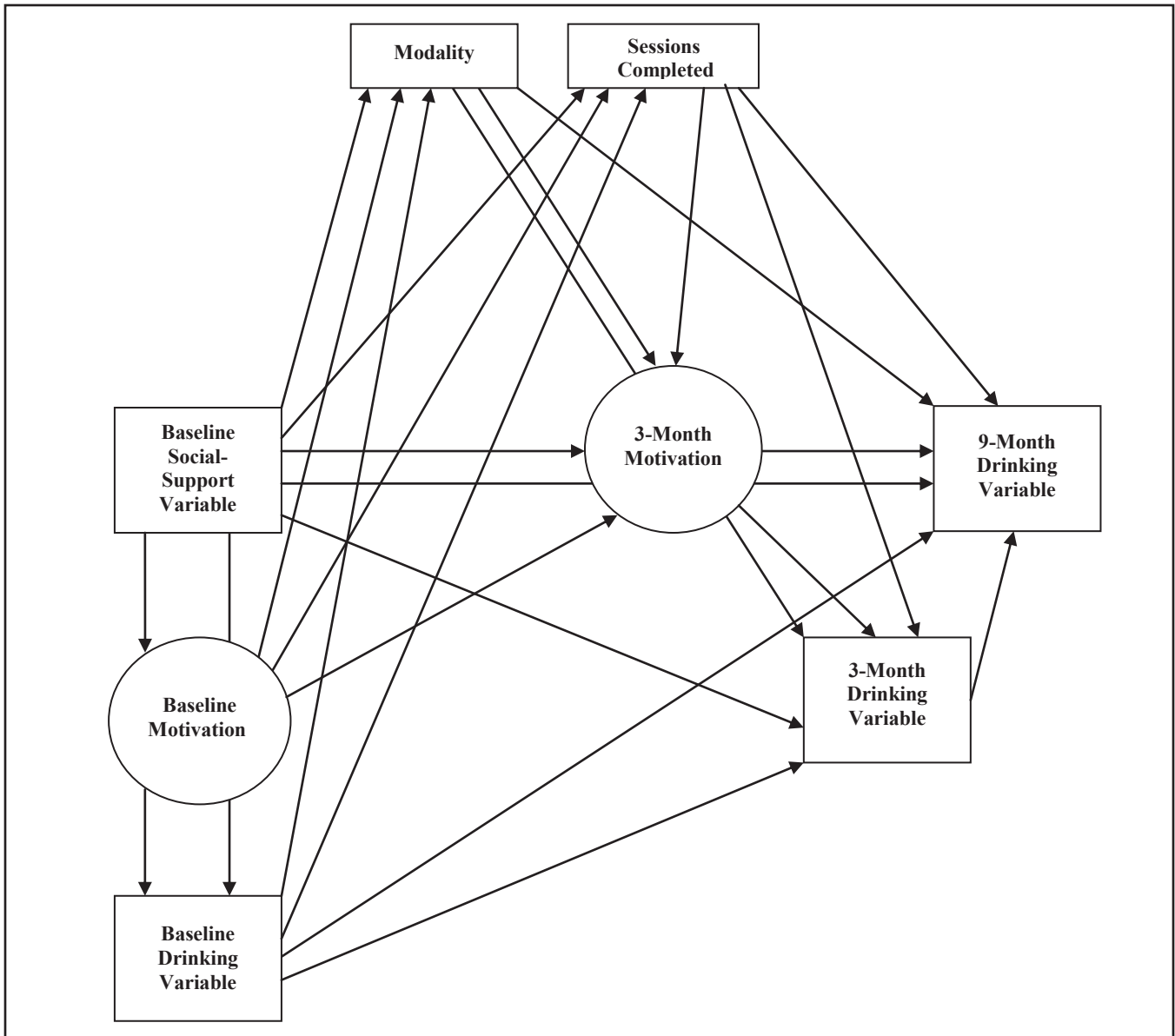
FIGURE 1.   Initially constructed path models

performed rather than excluding those participants lost to follow-up, because this technique maximizes the sample size and power of the analysis without adversely affecting the reliability of the results (Schafer and Graham, 2002). The sum score of the items included in the final latent measure of motivation (see the following sections) are included for descriptive purposes, although a latent motivation variable was constructed and entered into the path models.

Measurement model construction

A latent motivation variable for both baseline and 3 months was constructed using the steps outlined above. The fit of these models was excellent for both the baseline (CFI = 1.00, RMSEA = .05) and 3-month (CFI = 1.00, RMSEA = .005) models. The six individual items in both the baseline and 3-month motivation factor were examined in comparison with the other items in the SOCRATES. Because all of the items were either from the action-stage subscale (four items) or the maintenance subscale (two items), this factor was conceptualized as motivation to take action and to maintain change.

Path models

Support for drinking, motivation, and percentage of days drinking. This model was found to be of excellent fit (CFI = .99, RMSEA = .02; Figure 2). In this model, treatment

TABLE 1.   Descriptive outcomes for social-support variables, proposed mediators, and drinking outcomes

	Baseline		3 Month[a]		9 Month[a]	
Variable	n	M (SD)	n	M (SD)	n	M (SD)
Percentage of network supporting drinking	158	31.07 (30.12)	158	30.75 (28.29)	158	29.75 (26.66)
Percentage of network supporting not drinking	158	73.19 (27.56)	158	70.65 (29.35)	158	69.20 (27.64)
Motivation: Sum score of items[b]	158	21.83 (5.40)	158	26.01 (3.87)	158	24.37 (4.14)
Percentage of days drinking	158	70.58 (27.11)	158	34.64 (29.31)	158	33.31 (27.37)
Percentage of heavy drinking days	158	57.18 (31.08)	158	19.38 (25.27)	158	16.82 (23.42)

[a]Data represented for 3-month and 9-month variables are the imputed values; the observed 3-month sample was n = 132-137 for each of the variables, and for the 6- to 9-month sample it was n = 111-119; [b]the sum score of the six observed items from the Stages of Change Readiness and Treatment Eagerness Scale–Short Form included in the measurement and path models.
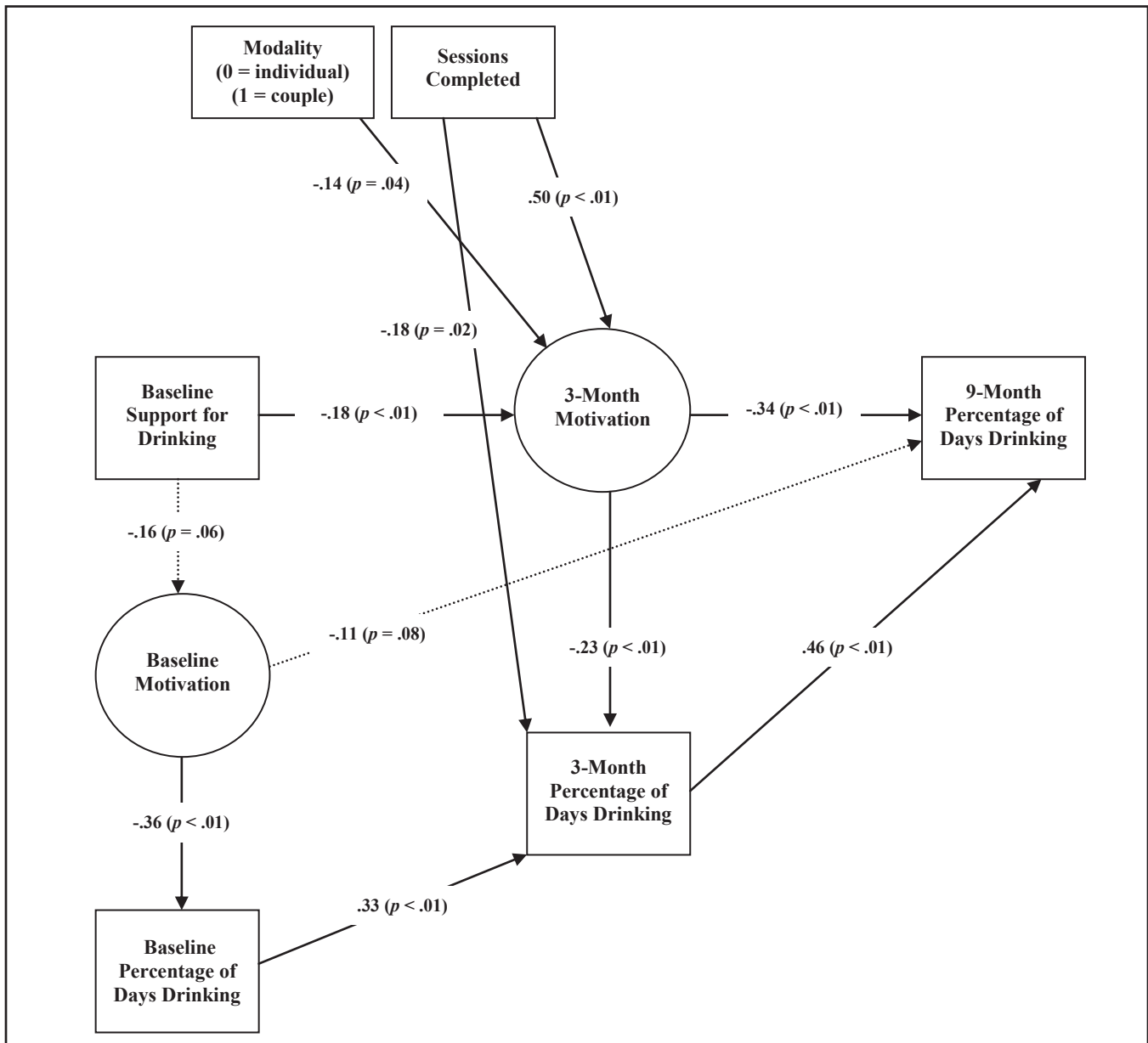

FIGURE 2.   Support for drinking, percentage of days drinking model. The statistical figures are the beta weights (regression terms) with corresponding p values.

modality predicted 3-month motivation, such that women receiving treatment in an individual modality were found to have more motivation at the end of treatment than women in the couple modality. The number of sessions attended predicted 3-month motivation and 3-month PDD. Baseline social support for drinking was associated with baseline motivation and predicted 3-month motivation. Baseline PDD predicted 3-month PDD, which in turn predicted 9-month PDD. Baseline motivation was not found to predict 3-month motivation or 3-month drinking, although it did predict 9-month PDD. Significant paths were found from the predictor variable (social support for drinking) to the mediator variable (motivation; Path A) and from the mediator variable (motivation) to the outcome variable (PDD; Path B), show-

ing initial support for our mediation hypothesis (Shrout and Bolger, 2002; Kline, 2005). The indirect effect of baseline social support for drinking on follow-up PDD was found to be significant using the Sobel test ($z = 2.49$, $p = .01$).

Support for not drinking, motivation, and percentage of days drinking. This model was also of excellent fit (CFI = .99, RMSEA = .02; Figure 3). As in the previous model, treatment modality predicted 3-month motivation, such that women receiving treatment in an individual modality were found to have more motivation at the end of treatment than women in the couple modality. The number of sessions attended also predicted 3-month motivation and 3-month PDD. Baseline motivation was again not found to predict 3-month motivation or 3-month PDD, although it did predict 9-month
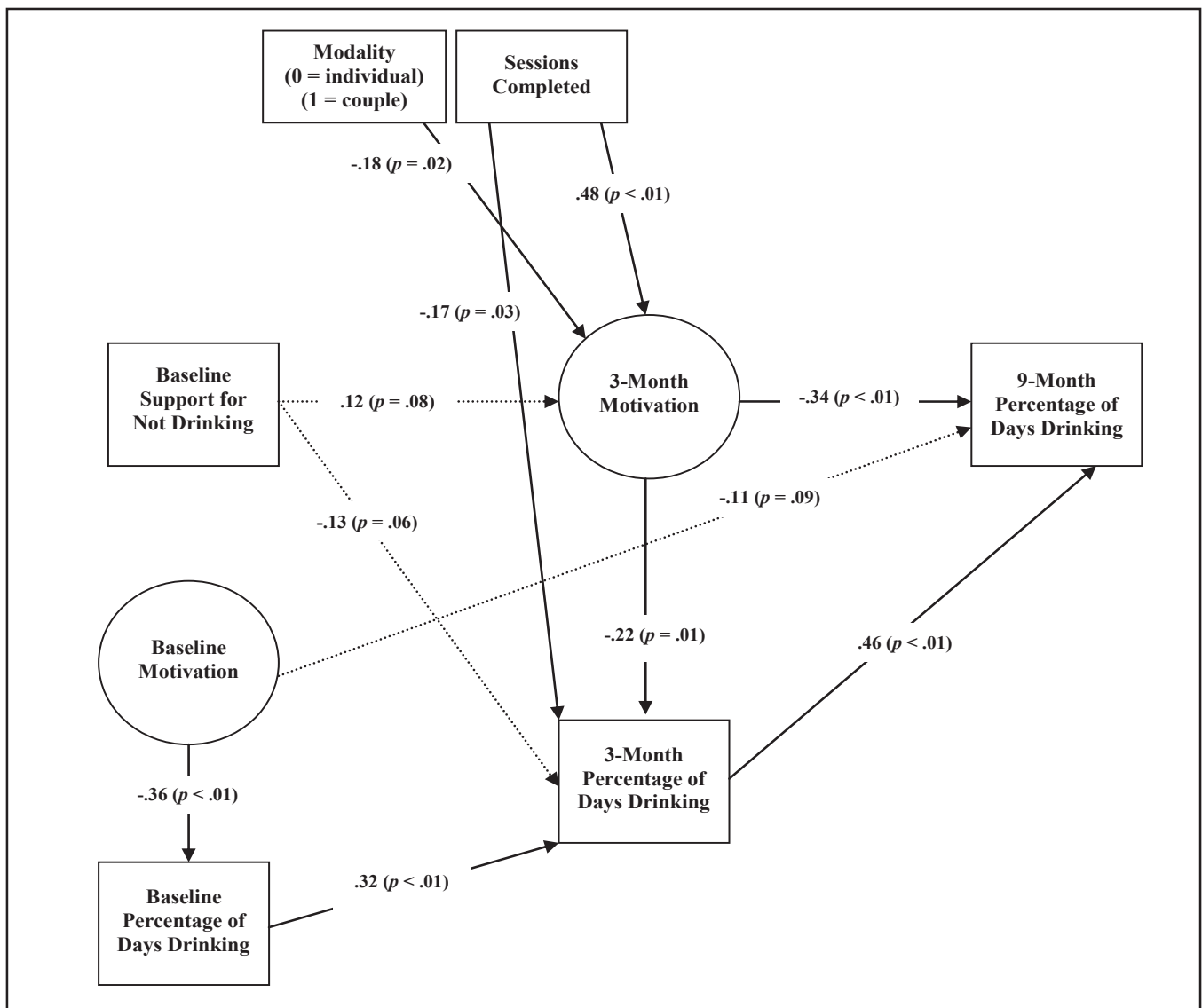

FIGURE 3. Support for not drinking, percentage of days drinking model. The statistical figures are the beta weights (regression terms) with corresponding *p* values.

PDD at the trend level. Baseline support for not drinking was found to predict 3-month PDD at the trend level. A marginally significant path was found from the predictor variable (support for not drinking) to the mediator variable (motivation; Path A), and a statistically significant path was found from the mediator variable (motivation) to the outcome variable (PDD; Path B), showing initial partial support for our mediation hypothesis (Shrout and Bolger, 2002; Kline, 2005). The indirect effect of baseline support for not drinking on follow-up PDD was found to be significant at the trend level using the Sobel test ($z = 1.83$, $p = .07$).

Support for drinking, support for not drinking, motivation, and percentage of heavy drinking days. This model was of excellent fit (CFI = .99, RMSEA = .03). The path from the predictor variable (social support for drinking) to the mediator variable (motivation; Path A) and the path from the proposed mediator variable (motivation) to the outcome variable (PHDD; Path B) were significant at the trend level. The Sobel test did not show a statistically significant indirect effect ($z = 1.79$, $p = .24$), however. Therefore, no evidence of mediation was found.

Support for not drinking, motivation, and percentage of heavy drinking days. This model was found to be of excellent fit (CFI = .99, RMSEA = .03). The path from the predictor variable (support for not drinking) to the mediator variable (motivation; Path A) was significant at the trend level, and the path from the proposed mediator variable (motivation) to the outcome variable (PHDD; Path B) was significant at the trend level. The Sobel test did not show a statistically significant indirect effect ($z = 1.29$, $p = .20$), however. Therefore, no evidence of mediation was found.

Discussion

Alcohol researchers increasingly have been focused on understanding the mechanisms of change in psychological/behavioral treatments and self-help groups. The present study followed in a similar vein, although it tested a potential mechanism by which a pre-existing, environmental variable influenced a psychological mediator and subsequent drinking outcomes in women being treated for alcohol use disorders. It was found that support for drinking predicted the development of less motivation to change and maintain gains and that support for not drinking predicted the development of greater motivation to change and maintain gains, which in turn predicted a lower percentage of days that the women drank in the 6 months following treatment. Further, women in the individual condition showed more motivation to change at 3 months, and the number of sessions attended positively predicted motivation to change at 3 months and negatively predicted drinking at 3 months.

Finding reliable mechanisms of change has long been elusive for treatment researchers (e.g., Huebner and Tonigan, 2007), and the search for mechanisms by which social support affects drinking may be equally difficult. The present study offered preliminary evidence, however, that motivation is a viable mechanism by which abstinence-specific social support affects treatment outcome. More research is needed to further explore the potential mediational role of motivation in the relationship between social support and drinking outcomes.

Limitations and strengths

There are several limitations of this study. First, the demographic homogeneity of the sample may have resulted in limited variance in responses and outcomes. This was an all-female sample, almost completely homogeneous in terms of marital/relationship status, and generally well educated. These demographic variables are known to be related to positive drinking outcomes. Walter et al. (2006), for example, found that unmarried alcoholics were nearly twice as likely to relapse to drinking as married alcoholics. Greenfield et al. (2002) found that certain demographic variables, such as being single and having a lower education, were the best predictors of poorer drinking outcomes. Using a more diverse or different sample may lead to different results. Lack of power is a second limitation of this study. The sample size of 158 is considered a medium to small sample size for structural equation modeling and modest for examining mediation.

This study has several important strengths, including a strong conceptual base for the research, the use of a longitudinal design to assess for mediation, controlling for earlier levels of variables as well as treatment modality and number of sessions attended, use of measures with strong psychometric properties, and the use of structural equation modeling to estimate all relationships in the model simultaneously. The present study used a sample comprised solely of women. Although there are drawbacks to this approach, it is advantageous in this instance. Given that this was an initial test of a model, using a one-gender sample served to increase homogeneity and to potentially reduce error and subgroup effects. Further, mechanisms of change may not generalize from one gender to the other, and using a mixed sample may lead to difficulties with estimation.

Future directions

The present study was a "first pass" at examining a mechanism by which social support may influence drinking outcomes. As detailed in Hunter-Reel et al. (2009), a number of other potential mechanisms could be examined (coping, self-efficacy, negative affect, expectancies), and there are a number of potential methodologies that could be used to explore relationships among social network variables, intra-individual factors, and drinking outcomes.

This question of how the social network may influence intra-individual processes that contribute to positive outcomes is an important one. Future work should seek not

only to delineate the potential mechanisms by which social networks may influence the individual but also to understand specifically *how* social networks exert their effects on the proposed mediators. Understanding how motivation changes as a result of changes in the social network, how behaviors of the individual may modulate this system, and how these effects may vary across groups is of particular importance. It is hoped that this line of research will help in understanding the role of social influence in a dynamic model of relapse and recovery, with the ultimate goal of improving the outcomes of individuals in treatment for alcohol and other substance-use disorders.

Acknowledgment

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