

# Depressive Symptoms, Friend and Partner Relationship Quality, and Posttreatment Abstinence\*

LAURA G. MCKEE, PH.D.,<sup>†</sup> MARCEL O. BONN-MILLER, PH.D.,<sup>†</sup> AND RUDOLF H. MOOS, PH.D.<sup>†</sup>

*Center for Developmental Science, University of North Carolina, Chapel Hill, Chapel Hill, North Carolina*

**ABSTRACT. Objective:** This study employed a prospective design to examine the role of friend and partner relationship quality 1 year following substance use disorder treatment in the association between depressive symptoms at discharge from treatment and abstinence from substance use 2 years after treatment. **Method:** The sample consisted of 1,453 male veterans who used alcohol and at least one other substance in the 3 months before treatment admission, who completed treatment, and who were abstinent from substances during the 2 weeks before discharge. **Results:** Fewer depressive symptoms at treatment discharge predicted better relationship quality with friends and a partner at 1-year

follow-up, as well as abstinence from substance use at 2-year follow-up. Furthermore, friend and partner relationship quality at 1 year predicted abstinence from substance use at 2 years. Friend relationship quality at 1 year mediated part of the association between fewer depressive symptoms at treatment discharge and abstinence at 2-year follow-up. **Conclusions:** A stronger focus in treatment on reducing depressive symptoms and enhancing the quality of patients' relationships with their friends and partner may increase the likelihood of long-term abstinence. (*J. Stud. Alcohol Drugs*, 72, 141-150, 2011)

ALTHOUGH THERE IS GROWING INTEREST in the area, there still is relatively little definitive information about how personal and contextual variables contribute to abstinence or decreased risk for relapse following acute substance use disorder treatment. The high prevalence of relapse after treatment makes it especially important to identify protective factors that reduce the likelihood of return to problematic substance use. Several avenues of inquiry have highlighted personal and contextual factors implicated in individual differences in posttreatment outcome (Moos, 2007). We focus here on one personal factor (depressive symptoms) and two contextual factors (friend relationship quality and partner relationship quality), including their connections with one another and with abstinence from substance use after treatment.

## *Depressive symptoms and friend and partner relationship quality*

It has been theorized that depressed individuals create stress and discord in their relationships, which in turn increase the likelihood of heightened distress and depression in

the future (Hammen, 1991, 1999, 2006; Holahan et al., 2005; Potthoff et al., 1995). According to such theory, individuals experiencing depressive symptoms should have less harmonious, or more conflicted, friend and partner relationships. In fact, there is substantial evidence that adults and children with higher levels of depressive symptoms have lower quality relationships characterized by rejection and dissatisfaction (e.g., Gotlib and Lee, 1989; Joiner et al., 1992, 1993; reviewed in Joiner, 2002; see also Chan and Poulin, 2009; Rudolph et al., 2007). There is also an inverse relation between level of depressive symptoms and amount of marital satisfaction (Kouros et al., 2008).

Existing literature has primarily considered the positive association between higher levels of depressive symptoms and interpersonal problems. An alternative competence-driven perspective that focuses on the association between lower levels of depressive symptoms and better interpersonal relationships is also valuable in that it may identify mechanisms underlying healthy adaptation or positive change following intervention. In one such study, Beach and O'Leary (1992) showed that women's satisfaction with their relationship to their partner mediated the link between pretreatment to post-treatment decreases in depressive symptoms. Several other

Received: December 29, 2009. Revision: August 19, 2010.

\*This work was supported by the Department of Veterans Affairs Health Services Research and Development Service funds. Preparation of this article was also supported, in part, by National Institute of Child Health and Human Development grants HD049325-04 and HD007376 that have funded Laura G. McKee's training. This work was also supported by a Department of Veterans Affairs Clinical Science Research and Development Career Development Award-2 awarded to Marcel O. Bonn-Miller. The views expressed here are the authors' and do not necessarily represent those of the Department of Veterans Affairs.

<sup>†</sup>Laura G. McKee is now with the Department of Psychology, Frances L. Hiatt School of Psychology, Clark University, 950 Main Street, Worcester, MA 01610-1477. Correspondence may be sent to her at that address or via email at: lmckee@clarku.edu. Marcel O. Bonn-Miller is with the National Center for PTSD and the Center for Health Care Evaluation, Veterans Affairs Palo Alto Health Care System, Menlo Park, CA. Rudolf H. Moos is with the Center for Health Care Evaluation, Veterans Affairs Palo Alto Health Care System, Menlo Park, CA, and Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Stanford, CA.

investigations have shown an association between decreased levels of depressive symptoms and higher marital satisfaction (Davila et al., 2003; see also Fagan, 2009).

Here, we extend prior work by examining the connection between the level of depressive symptoms at treatment discharge and the quality of relationships with friends and partner at a 12-month follow-up.

#### *Friend and partner relationship quality and posttreatment abstinence*

Social support from friends and partners has been positively associated with higher rates of posttreatment abstinence (e.g., Beattie and Longabaugh, 1999; Heinz et al., 2009; McKay et al., 2001). The key contributing factors to this association appear to be cohesion, clarity regarding abstinence messages and norms, and abstinence-specific and general support (Beattie and Longabaugh, 1997; Bond et al., 2003). Not surprisingly, friends who foster involvement in rewarding activities, play a monitoring role for the patient, and abstain from substances themselves act as healthy role models and provide the support that contributes to an increased likelihood of sustained recovery (Moos, 2007).

Higher levels of marital satisfaction also have been related to better treatment outcomes (Beattie, 2001; McCrady et al., 2002, 2004). More generally, a stable relationship with a partner and more family support have been positively associated with abstinence and tend to protect against relapse to substance use (McKay et al., 2001; Walton et al., 2002). Conversely, an earlier analysis of part of the sample used here found that patients who reported more stressful relationships with their spouse or partner at entry to treatment were more likely to continue to drink and to experience substance use problems after treatment (Tracy et al., 2005).

We extend this body of work here by focusing on how a reduction in patients' depressive symptoms during treatment affects subsequent friend and partner relationship quality and, in turn, how the quality of these relationships foreshadows patients' posttreatment abstinence.

#### *Depressive symptoms and abstinence from substances after treatment*

There is a close association between depressive symptoms and substance misuse; one estimate suggests that up to 80% of individuals with alcohol use disorders report significant depressive symptoms (Daepfen et al., 2000). Experience sampling and daily diary methods have shown a positive association between sadness and the likelihood of alcohol use (Armeli et al., 2000). Moreover, depressive symptoms seem to exacerbate substance-related problems among marijuana (Milich et al., 2000) and polydrug (e.g., individuals using both cocaine and alcohol) users (R. A. Brown et al., 1998).

More importantly, depressive symptoms have been

positively associated with posttreatment substance use. For example, Kodl and coworkers (2008) found that, compared with individuals who did not have significant depressive symptoms, individuals with significant depressive symptoms were more likely to return to drinking after treatment. In fact, higher levels of depressive symptoms at entry into treatment have been prospectively related to a lower likelihood of abstinence at discharge (R. A. Brown et al., 1998; Dodge et al., 2005). Furthermore, negative emotional states are cited as the most frequent precipitant of relapse following remission from substance dependence (Hodgins et al., 1995; Witkiewitz and Marlatt, 2006) and are related to a greater severity and longer duration of first relapse (Zywiak et al., 1996).

Although it is intuitively appealing, much less attention has focused on whether a decline in symptoms of depression during treatment is associated with a higher likelihood of posttreatment abstinence, an issue we address here. In this regard, depressive symptoms are likely to decrease among men during substance use treatment (R. A. Brown et al., 1998; S. A. Brown et al., 1995; Brown and Schuckit, 1988). To the extent that depressive symptoms elicit substance misuse because of self-medication and the use of substances to reduce distress (Greeley and Oei, 1999), fewer depressive symptoms at treatment discharge should be associated with a higher likelihood of abstinence.

#### *A model linking depressive symptoms, relationship quality, and abstinence*

Based on a synthesis and proposed extension of the literature, we formulated a model linking depressive symptoms, relationship quality, and abstinence from substances after treatment (Figure 1). Prior literature suggests that there is an inverse association between depressive symptoms and friend and partner relationship quality (Path A). In addition, friend and partner relationship quality and depressive symptoms have been implicated in abstinence following treatment for substance use disorders (Paths B and C in Figure 1). We extend prior work here by integrating these conceptually related areas of research into a prospective model of the determinants of abstinence.

We expected that lower levels of depressive symptoms at discharge from acute treatment would predict improved friend and partner relationship quality 12 months after treatment (Path A). Furthermore, we expected that improved relationship quality 12 months after treatment and lower levels of depressive symptoms at treatment discharge would be positively related to abstinence from substances 24 months after treatment (Paths B and C). Finally, we expected increases in relationship quality to act as one mechanism by which lower levels of depressive symptoms would lead to abstinence. Specifically, we hypothesized that 12-month relationship quality with friends and a partner would mediate

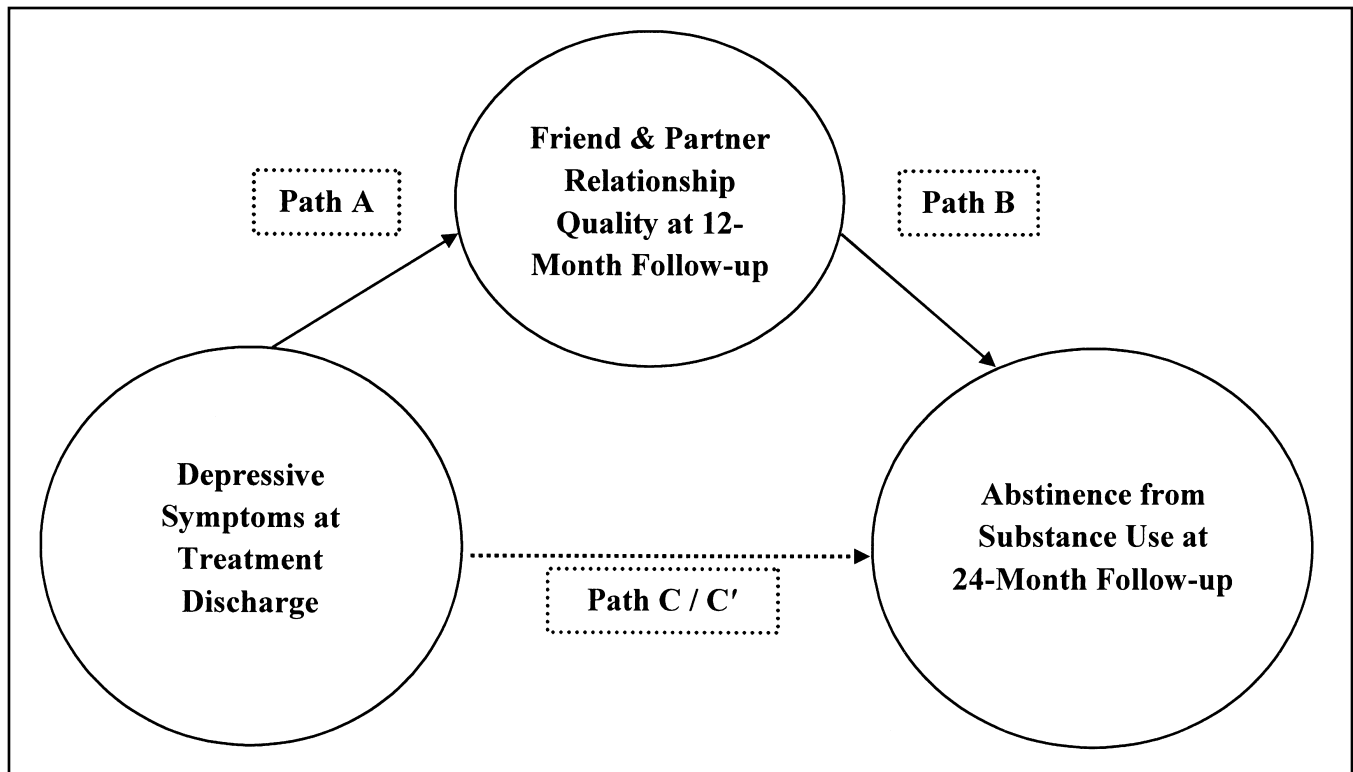


FIGURE 1. Proposed model of depressive symptoms, friend and partner relationship quality, and posttreatment abstinence from substance use

the association between depressive symptoms immediately following treatment and abstinence 24 months following treatment (Path C').

### Method

#### Participants

A total of 1,828 male patients ( $M_{age} = 39.41$  years,  $SD = 7.27$ ) who used alcohol and at least one other drug (e.g., marijuana, cocaine) in the 3 months before admission to one of 15 Veterans Affairs (VA) residential substance use treatment programs were included. These patients completed treatment and were abstinent from alcohol and other drugs during the 2 weeks before discharge. The current sample was part of a larger VA-approved treatment evaluation study of male patients with substance use disorders (Finney et al., 2001). In terms of ethnicity, more than half of the patients were African American/Black (63.4%) and slightly less than one third (32.2%) were White. The remaining patients were Hispanic or Latino (2.8%), Native American (1.0%), Asian (0.1%), and "other" (0.5%).

On admission to the program and based on the International Classification of Diseases–Ninth Revision (ICD-9-CM; United States National Center for Health Statistics, 1988), trained clinicians evaluated patients for current Axis-I

diagnoses. A total of 10.9% were diagnosed with alcohol abuse/dependence only; 67.2% were diagnosed with both drug and alcohol abuse/dependence; and, although they were using alcohol, 18.7% were diagnosed with drug abuse/dependence only.

#### Measures

Depressive symptoms ( $\alpha = .88$ ) were assessed at treatment intake and discharge by the mean of six, 5-point Likert items (0 = *not at all* to 4 = *extremely*) drawn from the Brief Symptom Inventory (Derogatis and Melisaratos, 1983). The items tapped the patient's mood (e.g., "Feeling hopeless about the future" or "Feeling lonely even when you are with people") in the 3 months before admission and the 2 weeks before discharge. The Brief Symptom Inventory is a well-established, psychometrically sound measure that has been used extensively in prior research, including research with individuals who have alcohol and/or drug use disorders (e.g., Buckner and Mandell, 1990; Derogatis and Fitzpatrick, 2004; Derogatis and Savitz, 2000; Preston and Harrison, 2003).

Patient-friend and patient-partner relationship quality were assessed with the Life Stressors and Social Resources Inventory (LISRES; Moos and Moos, 1994). The LISRES produces an overall score for friend and for partner (defined

as current spouse/partner) relationship quality that ranges from 0 to 44 and has two components: (a) The interpersonal resources subscale ( $\alpha = .90$  for friend and  $.88$  for partner relationships) is comprised of six items rated on 5-point Likert-type scales (0 = *never* to 4 = *often*). Sample items include "Can you count on her/him to help you when you need it?" and "Does she/he cheer you up when you are sad or worried?" (b) The interpersonal stressors subscale ( $\alpha = .73$  for friend and  $.76$  for partner relationships) is comprised of five items employing an identical 5-point Likert-type scale. Sample items include "Is she/he critical or disapproving of you?" and "Does she/he get angry or lose her/his temper with you?" The LISRES has good psychometric qualities (Moos and Moos, 1994; Tracy et al., 2005) and has been used extensively in prior work to assess relationship quality among individuals with substance use disorders (e.g., Brennan et al., 1999; Humphreys et al., 1999; Tracy et al., 2005).

Frequency of alcohol and drug use was assessed at intake, discharge, and 24-month follow-up with a measure derived from the Treatment Outcome Prospective Study (TOPS; Hubbard et al., 1989). Participants indicated, on a 5-point Likert-type scale (0 = *never* to 4 = *every day*), the frequency of their substance use in the past 3 months at intake and 24-month follow-up and in the past 2 weeks at discharge. In the current study, frequencies of beer, wine, and distilled spirit use at intake were *summed* to create a composite alcohol use frequency score (range: 0-12). Furthermore, drug use frequencies from each of 16 measured drugs (e.g., cocaine, marijuana, heroin, amphetamines, barbiturates, and hallucinogens) were *summed* to compute a composite drug use frequency score (range: 0-64).

### Procedure

All patients provided informed consent. Patients reported on their depressive symptoms and substance use at admission to treatment and just before discharge. Patients completed the measures of friend and partner relationship quality at admission to treatment and again at a 12-month follow-up, and they completed the substance use measure again at a 24-month follow-up. Twelve and 24-month follow-up assessments were primarily completed by mail (93.7% at 12 months), with the remainder of participants completing the questionnaires via telephone or during an in-person visit (Finney et al., 2001).

In general, the programs ranged in length from 21 to 28 days, were staffed by a multidisciplinary team, and employed both individual and group therapy. Patients completed detoxification before treatment admission. Treatments varied but generally included 12-step, cognitive-behavioral, and combined (12-step and cognitive-behavioral) treatment approaches. There were no significant differences in outcomes between patients who did and those who did not complete the full treatment protocol (Ouimette et al., 1997). The pro-

grams referred patients to outpatient continuing care and community-based self-help groups following discharge (for more information about the characteristics of the treatment programs, see Finney et al., 2001).

### Results

A total of 1,453 of the 1,828 patients (79.5%) who were assessed at baseline were reassessed at both the 12- and 24-month follow-ups. *T* test analyses revealed no significant differences in terms of participant age, ethnic background, or frequency of alcohol or drug use at intake between individuals who completed the 12- and 24-month follow-ups and those who did not ( $p > .05$ ). A total of 513 of the 1,453 patients who were followed at 12 and 24 months had a spouse or partner. Thus, the following analyses are based on an *n* of 1,453 for friend relationship quality and an *n* of 513 for partner relationship quality.

In terms of prior treatment, 52.9% ( $n = 769$ ) of the patients who were followed at 12 and 24 months ( $n = 1,453$ ) reported residential treatment and 28.4% ( $n = 413$ ) reported outpatient treatment for an alcohol or drug use problem during the 2 years before intake. At intake, 79.2% of the patients reported drinking beer, 48.2% reported drinking distilled spirits, and 27.7% reported drinking wine at least weekly during the 3 months before admission. Regarding other substance use before intake, 76.7% of participants reported cocaine use, 64.3% reported marijuana use, 8.3% reported amphetamine use, 8.3% reported injection heroin use, 5.4% reported barbiturate use, and 3.3% reported hallucinogen use. At 24 months following discharge from treatment, 36.5% of the patients reported abstinence from alcohol and drugs. On average, patients reported moderate depressive symptoms during the 3 months before admission and mild depressive symptoms during the 2 weeks before discharge (Table 1).

There was an inverse relation between patient-reported depressive symptoms at discharge and 12-month friend and partner relationship quality. Better 12-month friend and partner relationship quality were positively and significantly related to 24-month abstinence from substances (see Table 1).

### Friend relationship quality regression analyses

A logistic regression was conducted to examine Path C in the model, that is, the relation between depressive symptoms at discharge (the predictor) and 24-month abstinence (the criterion: 1 = abstinence [defined as no alcohol or drug use in the past 3 months], 0 = relapse [defined as any alcohol or drug use in the past 3 months]). Alcohol and drug use at intake as well as intake depressive symptoms were covariates at Step 1 of the model, and discharge depressive symptoms were entered at Step 2. Step 1 of the model revealed no significant predictors of 24-month abstinence. In Step 2,

TABLE 1. Descriptive data and zero-order relations among indices of alcohol and drug use, depressive symptoms, and friend and partner relationship quality

Variable name	1	2	3	4	5	6	7	8	9	<i>M (SD)</i>
1. Intake alcohol use	—	.23**	.21**	.15**	-.12**	-.09*	-.16**	-.08*	-.03	5.30 (2.76)
2. Intake drug use	—	—	.15**	.13**	-.10**	-.04	-.07**	-.06	-.04	4.67 (4.03)
3. Intake depressive symptoms	—	—	—	.44**	-.29**	-.31**	-.18**	-.18**	.02	1.93 (0.97)
4. Discharge depressive symptoms	—	—	—	—	-.18**	-.20**	-.23**	-.28**	-.05	0.89 (0.76)
5. Intake friend quality	—	—	—	—	—	.35**	.36**	.23**	-.03	23.95 (6.92)
6. Intake partner quality	—	—	—	—	—	—	.22**	.33**	.01	25.65 (7.76)
7. 12-month friend quality	—	—	—	—	—	—	—	.51**	.27**	26.14 (7.50)
8. 12-month partner quality	—	—	—	—	—	—	—	—	.27**	28.22 (8.08)
9. 24-month substance abstinence	—	—	—	—	—	—	—	—	—	36.5% abstinent

*Notes:* Correlations were calculated based on the sample of 1,453 patients. (1) Intake alcohol use = a summed composite of beer, wine, and distilled spirits use frequency at intake (range: 0-12); (2) intake drug use = a summed composite of drug use frequencies from each of the 16 measured drugs (range: 0-64); (3) intake depressive symptoms = mean depressive symptoms at intake as measured by six items from the Brief Symptom Inventory (BSI) (range: 0-4); (4) discharge depressive symptoms = mean depressive symptoms at discharge as measured by six items from the BSI (range: 0-4); (5) intake friend quality = friend relationship quality as measured by the Life Stressors and Social Resources Inventory (LISRES) at intake (range: 0-44); (6) intake partner quality = spouse/partner relationship quality as measured by the LISRES at intake (range: 0-44); (7) 12-month friend quality = friend relationship quality as measured by the LISRES at 12-month follow-up (range: 0-44); (8) 12-month partner quality = spouse/partner relationship quality as measured by the LISRES at 12-month follow-up (range: 0-44); (9) 24-month substance abstinence = substance use abstinence at 24-month follow-up (1 = abstinence [defined as no alcohol or drug use in the past 3 months]; 0 = relapse [defined as any alcohol or drug use in the past 3 months]).

\* $p < .05$ ; \*\* $p < .01$ .

fewer discharge depressive symptoms predicted 24-month abstinence from substance use (see Analysis 1 in Table 2).

As a test of Path A, a hierarchical linear regression was conducted to examine the association between depressive symptoms at discharge (the predictor) and friend relationship quality at 12-month follow-up (the criterion). Intake friend relationship quality was positively associated with 12-month friend relationship quality, whereas depressive symptoms at intake were negatively associated with 12-month friend relationship quality. In the second step of the model, fewer depressive symptoms at discharge were significantly associated with increased 12-month friend relationship quality (see Analysis 2 in Table 2), contributing 2.3% of unique variance in prediction of 12-month friend relationship quality.

Next, a logistic regression was conducted to examine Path B in the model, that is, the link between 12-month friend relationship quality (the predictor) and 24-month substance use abstinence (the criterion: 1 = abstinence, 0 = relapse). Alcohol and drug use at intake, intake friend relationship quality, and depressive symptoms at intake and discharge were included as covariates at Step 1; 12-month friend relationship quality was entered at Step 2. Step 1 of the model revealed that fewer discharge depressive symptoms significantly predicted a higher likelihood of 24-month abstinence. In Step 2, better 12-month friend relationship quality significantly contributed to the prediction of 24-month abstinence (see Analysis 3 in Table 2).

#### Mediation analyses

The procedure proposed by Kenny et al. (1998) was employed to test for mediation (see Table 2). As shown earlier, there was a significant negative association between

the predictor (discharge depressive symptoms) and criterion (24-month substance abstinence) (Path C; see Analysis 1 in Table 2). Next, the predictor (discharge depressive symptoms) was inversely related to 12-month friend relationship quality (the mediator), after accounting for the original covariates (Path A; see Analysis 2 in Table 2). In addition, after controlling for the predictor (discharge depressive symptoms) and original covariates in Step 1, the proposed mediator (12-month friend relationship quality) was positively related to the outcome (24-month abstinence; Path B; see Analysis 3 in Table 2). Finally, the relation between discharge depressive symptoms and 24-month substance use abstinence was rendered insignificant (odds ratio [OR] = 0.94 vs. 0.82, respectively) by the inclusion of 12-month friend relationship quality in the model, indicating partial mediation (Path C'; see Analysis 4 in Table 2).

#### Partner relationship quality regression analyses

The analyses of partner relationship quality used a subset of the total sample ( $n = 513$ ) who reported having a partner at both intake and 12-month follow-up and who were followed at 24 months. To focus on Path C in the model, a logistic regression was conducted to examine the relation between depressive symptoms at discharge (the predictor) and 24-month abstinence (the criterion: 1 = abstinence, 0 = relapse). Alcohol and drug use at intake and intake depressive symptoms were covariates at Step 1 of the model, and discharge depressive symptoms were entered at Step 2. Step 1 of the model revealed no significant predictors of 24-month substance use abstinence. In Step 2, discharge depressive symptoms *did not* predict 24-month abstinence from substance use above and beyond the variance accounted



TABLE 2. Regression analyses testing the role of friend relationship quality in the association between discharge depressive symptoms and 24-month abstinence from substance use

Independent variable(s)	Dependent variable	Exp(B) or $\beta$	<i>t</i> or [CI]
<sup>a</sup> 1. Intake alcohol use (Step 1)	24-month abstinence	0.98	[0.94, 1.02]
Intake drug use (Step 1)		0.98	[0.96, 1.01]
Intake depressive symptoms (Step 1)		1.08	[0.96, 1.20]
Discharge depressive symptoms (Step 2)		0.82	[0.70, 0.96]*
<sup>b</sup> 2. Intake friend quality (Step 1)	12-month friend quality	0.34	13.20**
Intake depressive symptoms (Step 1)		-0.08	-3.23**
Discharge depressive symptoms (Step 2)		-0.17	-6.39**
<sup>a</sup> 3. Intake alcohol use (Step 1)	24-month abstinence	0.98	[0.94, 1.02]
Intake drug use (Step 1)		0.98	[0.96, 1.01]
Intake friend quality (Step 1)		0.99	[0.98, 1.01]
Intake depressive symptoms (Step 1)		1.13	[1.00, 1.28]
Discharge depressive symptoms (Step 1)		0.82	[0.69, 0.96]**
12-month friend quality (Step 2)		1.10	[1.08, 1.12]**
<sup>a</sup> 4. Intake alcohol use (Step 1)	24-month abstinence	1.00	[0.95, 1.04]
Intake drug use (Step 1)		0.98	[0.95, 1.01]
Intake depressive symptoms (Step 1)		1.11	[0.98, 1.26]
Intake friend quality (Step 1)		0.96	[0.94, 0.98]**
12-month friend quality (Step 1)		1.10	[1.09, 1.12]**
Discharge depressive symptoms (Step 2)		0.94	[0.80, 1.12]

Notes:  $n = 1,453$ . Exp(B) = odds ratio provided for binary logistic regression;  $\beta$  = standardized beta weight provided for hierarchical multiple regression;  $t = t$  statistic provided for hierarchical multiple regression; CI = confidence interval provided for binary logistic regression. <sup>a</sup>Binary logistic regression; <sup>b</sup>hierarchical multiple regression.

\* $p < .05$ ; \*\* $p < .01$ .

for by the variables entered at Step 1 (see Analysis 1 in Table 3).

To focus on Path A in the model, a hierarchical linear regression examined the association between depressive symptoms at discharge (the predictor) and partner relationship quality at 12-month follow-up (the criterion). Partner relationship quality and depressive symptoms at intake significantly predicted 12-month partner relationship quality at Step 1; intake relationship quality was positively associated with 12-month relationship quality, whereas depressive symptoms were inversely associated with 12-month relationship quality. In Step 2 of the model, fewer depressive symptoms at discharge were significantly associated with increased 12-month partner relationship quality (see Analysis 2 in Table 3), contributing 2.8% of unique variance in prediction of 12-month partner relationship quality.

Finally, a logistic regression was conducted to examine Path B, that is, the relation between 12-month partner relationship quality (the predictor) and 24-month abstinence (the criterion: 1 = abstinence, 0 = relapse). Alcohol and drug use at intake, intake partner relationship quality, and depressive symptoms at intake and discharge were included as covariates at Step 1, and 12-month partner relationship quality was entered at Step 2. Step 1 of the model revealed no significant predictors of 24-month abstinence. In Step 2, higher levels of 12-month partner relationship quality significantly contributed to the prediction of 24-month abstinence

from substance use (see Analysis 3 in Table 3). As discharge depressive symptoms were not significantly associated with 24-month abstinence from substance use (Path C), no mediation analyses were conducted for partner relationship quality.

#### Subsidiary analyses

*Controlling for program treatment orientation and aftercare.* Preliminary analyses showed that patients who attended 12-step treatment programs were more likely to be abstinent at 24 months than were patients who attended cognitive-behavioral or combined programs,  $\chi^2(1, n = 1,453) = 22.72, p < .01$ . Accordingly, we repeated the main analyses controlling for treatment program orientation (1 = 12 step, 0 = cognitive-behavioral or combined). This control did not affect any of the associations between the primary predictors and the criteria.

Because patients were encouraged to engage in continuing outpatient care and to attend 12-step self-help groups following treatment, we conducted subsidiary analyses controlling for (a) the number of individual or group substance use and psychiatric treatment sessions patients attended during the year before the time point of the criterion variable or (b) the number of 12-step self-help group sessions attended during the 3 months before the time point of the criterion variable (i.e., 12-month follow-up when the criterion was

TABLE 3. Regression analyses testing the role of partner relationship quality in the association between discharge depressive symptoms and 24-month abstinence from substance use

Independent variable(s)	Dependent variable	Exp(B) or $\beta$	<i>t</i> or [CI]
<sup>a</sup> 1. Intake alcohol use (Step 1)	24-month abstinence	1.00	[0.93, 1.08]
Intake drug use (Step 1)		0.98	[0.94, 1.03]
Intake depressive symptoms (Step 1)		0.89	[0.73, 1.09]
Discharge depressive symptoms (Step 2)		0.82	[0.61, 1.11]
<sup>b</sup> 2. Intake partner quality (Step 1)	12-month partner quality	0.29	6.76**
Intake depressive symptoms (Step 1)		-0.14	-3.34**
Discharge depressive symptoms (Step 2)		-0.21	-4.61**
<sup>a</sup> 3. Intake alcohol use (Step 1)	24-month abstinence	1.01	[0.94, 1.08]
Intake drug use (Step 1)		0.99	[0.94, 1.03]
Intake partner quality (Step 1)		1.00	[0.98, 1.03]
Intake depressive symptoms (Step 1)		0.95	[0.76, 1.19]
Discharge depressive symptoms (Step 1)		0.83	[0.61, 1.12]
12-month partner quality (Step 2)		1.10	[1.07, 1.14]**

Notes:  $n = 513$ . Exp(B) = odds ratio provided for binary logistic regression;  $\beta$  = standardized beta weight provided for hierarchical multiple regression;  $t = t$  statistic provided for hierarchical multiple regression; CI = confidence interval provided for binary logistic regression. <sup>a</sup>Binary logistic regression; <sup>b</sup>hierarchical multiple regression.

\* $p < .05$ ; \*\* $p < .01$ .

12-month relationship quality and 24-month follow-up when the criterion was 24-month abstinence). Group-based treatment for a substance use disorder significantly predicted a higher likelihood of 24-month abstinence; 12-step self-help group attendance significantly predicted better friend and partner relationship quality and a higher likelihood of 24-month abstinence. However, the associations between the primary predictors and the criteria remained the same after controlling for group-based substance use treatment sessions and 12-step self-help group attendance.

*Examining interpersonal resources and interpersonal stressors.* We also conducted subsidiary analyses with each of the two subscales that comprise the total friend relationship quality score (i.e., interpersonal resources subscale and interpersonal stressors subscale) to examine the associations between depressive symptoms, the potential positive and negative aspects of friendship, and 24-month abstinence from substance use. With regard to friend resources, which captures the general tendency for a friend to offer instrumental and emotional support, fewer discharge depressive symptoms predicted increased 12-month friend interpersonal resources, above and beyond the initial covariates (Path A;  $\beta = -.14$ ;  $p < .01$ ). In essence, patients with lower levels of depressive symptoms at discharge were more likely to describe friends as supportive at the 12-month assessment. In turn, increased 12-month friend resources were positively associated with 24-month abstinence, after accounting for the variables in Step 1 of the model (Path B; OR = 1.13, 95% CI [1.11-1.16],  $p < .01$ ). Finally, there was a significant reduction in the relation between discharge depressive symptoms and 24-month abstinence after the introduction

of 12-month friend interpersonal resources (OR = 0.82 vs. 0.92), indicating that friend resources mediated part of the association between discharge depressive symptoms and 24-month abstinence (Path C').

Turning to friend interpersonal stressors, measured by a subscale assessing the general tendency for a friend to be negative, hostile, or angry, fewer discharge depressive symptoms predicted fewer 12-month friend interpersonal stressors, above and beyond the initial covariates (Path A;  $\beta = .14$ ;  $p < .01$ ). Fewer 12-month friend interpersonal stressors were associated with 24-month substance use abstinence, after accounting for the variables in Step 1 of the model (Path B; OR = 0.92, 95% CI [0.89-0.95],  $p < .01$ ). However, there was a nonsignificant reduction in the association between discharge depressive symptoms and 24-month abstinence after introduction of friend stressors (OR = 0.82 vs. 0.86), indicating that these stressors did *not* mediate the relation between discharge depressive symptoms and 24-month abstinence (Path C').

## Discussion

We examined the role of friend and partner relationship quality 12 months following substance use treatment in the association between depressive symptoms at treatment discharge and abstinence from substance use 24 months after treatment. In brief, lower levels of depressive symptoms at discharge were associated with an increase in friend and partner relationship quality at a 12-month follow-up. In turn, improved friend and partner relationship quality at 12 months was associated with a higher likelihood of 24-month abstinence from substance use. Moreover, improved friend

relationship quality mediated part of the association between reduced depressive symptoms at discharge and 24-month abstinence.

After accounting for intake alcohol and drug use and depressive symptoms, we found that lower levels of depressive symptoms at treatment discharge were related to 24-month abstinence from substance use in the overall sample of patients, that is, those who reported on friend relationship quality at intake and 12 months. This finding is consistent with prior studies that have identified depressive symptoms as a salient risk factor for relapse (R. A. Brown et al., 1998; Dodge et al., 2005; Kodl et al., 2008) and extends this literature by showing that lower levels of depression posttreatment bolster the likelihood of successful abstinence as long as 2 years later.

Although there was an inverse association between depressive symptoms and 24-month abstinence among the more restricted set of patients who had a partner at intake and 12-month follow-up, this association was not statistically significant. Secondary analyses revealed that a possible explanation for the differences in the significance of Path C between the two subgroups lies in the significant group difference in intake depression scores. Here, a Brown-Forsythe test, used because of the unequal group sizes, revealed that patients with partners ( $n = 513$ ) reported significantly lower levels of depression at discharge compared with patients without partners ( $n = 940$ ), Brown-Forsythe ( $F(1, 1135.33) = 20.40, p < .01$ ). This difference highlights a possible buffering effect for individuals with partners in terms of depressive symptoms, thus providing a more restricted range of depressive symptoms from which to improve.

After controlling for friend relationship quality and depressive symptoms at intake, fewer depressive symptoms at discharge were associated with increased friend relationship quality 12 months following treatment, which was associated with a higher likelihood of abstinence at 24 months. These findings support prior studies that highlight the detrimental influence of depressive symptoms on the quality of interpersonal relationships (e.g., Gotlib and Lee, 1989; Joiner et al., 1992, 1993; reviewed in Joiner, 2002). In addition, they add to prior work on the positive influence of a supportive social network on sobriety (Bond et al., 2003; Litt et al., 2009) by emphasizing the importance of the quality of peer relationships.

We also found that friend relationship quality 12 months after treatment explained (mediated) part of the association between discharge depressive symptoms and abstinence at 24 months. These findings identify friend relationship quality as a potentially malleable protective factor that can be targeted and bolstered to improve abstinence rates following treatment. Future work could benefit from replicating and extending the current findings with prospective monitoring of friend relationships during treatment and follow-up, as

well as by obtaining "real-time" information about other contributors to abstinence.

Subsidiary analyses indicated that the partial mediation effect of the quality of friend relationships was the result of positive aspects of the friendship, such as emotional support, rather than interpersonal stressors in the friendship, such as hostility and anger. Thus, a focus on increasing the likelihood that friends can and will offer consistent support may be the most important target for interventions aimed at increasing abstinence rates. Such a focus is consistent with findings on 12-step self-help groups that highlight the benefits of a wide network of social support for continued abstinence (Moos, 2008).

In terms of partner relationship quality, fewer depressive symptoms at treatment discharge were associated with improved partner relationship quality at 12-month follow-up, and, in turn, 12-month partner relationship quality predicted 24-month abstinence from substance use. These data add to the body of work indicating that decreased depressive symptoms are related to higher marital satisfaction (Davila et al., 2003; Kouros et al., 2008).

The findings are also consistent with work showing an association between higher partner relationship quality and reduced substance use (McCrary et al., 2002; Tracy et al., 2005). In this regard, spousal involvement in treatment for problematic substance use can enhance treatment outcomes and prevent relapse (Baucom et al., 1998). Regardless of whether partners are included in treatment, our results suggest that the partner relationship may be enhanced when patients' levels of depressive symptoms decline. Future work could benefit from replicating and extending the current findings by examining the contribution of other familial relationships (e.g., siblings, parents, children, extended kin) to the current model.

A number of limitations of the study qualify the present findings. First, the homogeneity of the sample, in terms of gender and veteran status, limits the generalizability of the results. Although the all-male sample precludes broad statements about the findings, it is noteworthy that depressive symptoms are an integral component of the model tested. Given that women are twice as likely to be diagnosed with depression and tend to score higher on measures of depressive symptoms than men (Kessler et al., 1993; Nolen-Hoeksema, 1987), much of the literature examining the relations between depressive symptoms and psychosocial outcomes has focused on women (Addis, 2008). The current study, then, adds to a growing literature that recognizes the importance of including men in efforts to delineate the correlates of depression, particularly among a population characterized by problematic alcohol and drug use. Nonetheless, it remains an important empirical question as to whether the same relations would hold among a sample inclusive of women.

Second, because single-respondent self-report measures were used as the primary assessment strategy, the results are



not fully protected against reporting errors. To address these points, future studies could use a multiple-respondent assessment strategy (e.g., reporting from both patient and partner) and examine the contribution of relationship quality and depressive symptoms to abstinence in more diverse samples. In addition, although the measures employed here to determine levels of alcohol/drug use and depressive symptoms are widely used, more comprehensive measures of substance use (e.g., multiple daily use, drug potency) should be included in future research. Use of a more comprehensive measurement approach could extend beyond the current dichotomous abstinence findings to a more nuanced model of the relations among depression, relationship quality, and substance use at treatment follow-up. Finally, it is important to note that some significant interrelations in the current investigation are small in magnitude. Future work would benefit from testing whether these significant relationships, which were modest in the present study, replicate in other samples (e.g., women, women and men in outpatient treatment settings).

Overall, our findings add to the literature on the role of depressive symptoms and partner and friend relationship quality in predicting abstinence. The findings are consistent with a social context perspective that highlights the potential for strengthening the individual's microsystem (i.e., friends and partner) and reducing the likelihood of relapse by bolstering protective factors (e.g., interpersonal resources) and reducing risk factors (e.g., chronic relationship stress). Our results suggest that lower depressive symptoms contribute to posttreatment abstinence and that this association is partly the result of friend relationship quality. Moreover, patients whose depressive symptoms improved more during treatment experienced friend and partner relationships characterized by more support and less stress, which, in turn, raised the likelihood of long-term abstinence. Further work is needed to guide our understanding of the full range of clinically relevant processes associated with depressive symptoms, partner and friend relationships, and abstinence.

### Acknowledgement

The authors thank Dr. Kerry Makin-Byrd for her thoughtful comments on an earlier draft of this article.

### References

- Addis, M. (2008). Gender and depression in men. *Clinical Psychology: Science and Practice, 15*, 153-168.
- Armeli, S., Tennen, H., Affleck, G., & Kranzler, H. R. (2000). Does affect mediate the association between daily events and alcohol use? *Journal of Studies on Alcohol, 61*, 862-871.
- Baucom, D. H., Shoham, V., Mueser, K. T., Daiuto, A. D., & Stickle, T. R. (1998). Empirically supported couple and family interventions for marital distress and adult mental health problems. *Journal of Consulting and Clinical Psychology, 66*, 53-58.
- Beach, S. R., & O'Leary, K. D. (1992). Treating depression in the context of marital discord: Outcome and predictors of response for marital therapy vs. cognitive therapy. *Behavior Therapy, 23*, 507-528.
- Beattie, M. C. (2001). Meta-analysis of social relationships and posttreatment drinking outcomes: Comparison of relationship structure, function and quality. *Journal of Studies on Alcohol, 62*, 518-527.
- Beattie, M. C., & Longabaugh, R. (1997). Interpersonal factors and post-treatment drinking and subject well-being. *Addiction, 92*, 1507-1521.
- Beattie, M. C., & Longabaugh, R. (1999). General and alcohol-specific social support following treatment. *Addictive Behaviors, 24*, 593-606.
- Bond, J., Kaskutas, L. A., & Weisner, C. (2003). The persistent influence of social networks and Alcoholics Anonymous on abstinence. *Journal of Studies on Alcohol, 64*, 579-588.
- Brennan, P., Schutte, K., & Moos, R. (1999). Reciprocal relations between stressors and drinking behavior: A three-wave panel study of older women and men. *Addiction, 94*, 737-749.
- Brown, R. A., Monti, P. M., Myers, M. G., Martin, R. A., Rivinus, T., Dubreuil, M. E., & Rohsenow, D. J. (1998). Depression among cocaine abusers in treatment: Relation to cocaine and alcohol use and treatment outcome. *American Journal of Psychiatry, 155*, 220-225.
- Brown, S. A., Inaba, R. K., Gillin, J. C., Schuckit, M. A., Stewart, M. A., & Irwin, M. R. (1995). Alcoholism and affective disorder: Clinical course of depressive symptoms. *American Journal of Psychiatry, 152*, 45-52.
- Brown, S. A., & Schuckit, M. A. (1988). Changes in depression among abstinent alcoholics. *Journal of Studies on Alcohol, 49*, 412-417.
- Buckner, J. C., & Mandell, W. (1990). Risk factors for depressive symptomatology in a drug using population. *American Journal of Public Health, 80*, 580-585.
- Chan, A., & Poulin, F. (2009). Monthly instability in early adolescent friendship networks and depressive symptoms. *Social Development, 18*, 1-23.
- Daepfen, J.-B., Smith, T. L., Danko, G. P., Gordon, L., Landi, N. A., Nurnberger, J. I., Jr., . . . the Collaborative Study Group on the Genetics of Alcoholism. (2000). Clinical correlates of cigarette smoking and nicotine dependence in alcohol-dependent men and women. *Alcohol and Alcoholism, 35*, 171-175.
- Davila, J., Karney, B. R., Hall, T. W., & Bradbury, T. N. (2003). Depressive symptoms and marital satisfaction: Within-subject associations and the moderating effects of gender and neuroticism. *Journal of Family Psychology, 17*, 557-570.
- Derogatis, L. R., & Fitzpatrick, M. (2004). The SCL-90, the Brief Symptom Inventory (BSI), and the BSI-18. In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcomes assessment: Volume 3. Instruments for adults* (3rd ed., pp. 1-41). Mahwah, NJ: Lawrence Erlbaum.
- Derogatis, L. R., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine, 13*, 595-605.
- Derogatis, L. R., & Savitz, K. L. (2000). The SCL-90 and Brief Symptom Inventory (BSI) in primary care. In M. E. Maruish (Ed.), *Handbook of psychological assessment in primary care settings* (pp. 297-334). Mahwah, NJ: Lawrence Erlbaum.
- Dodge, R., Sindelar, J., & Sinha, R. (2005). The role of depression symptoms in predicting drug abstinence in outpatient substance abuse treatment. *Journal of Substance Abuse Treatment, 28*, 189-196.
- Fagan, J. (2009). Relationship quality and changes in depressive symptoms among urban married African Americans, Hispanics, and Whites. *Family Relations, 58*, 259-274.
- Finney, J., Ouimette, P. C., Humphreys, K., & Moos, R. H. (2001). A comparative, process-evaluation of VA substance abuse treatment. In M. Galanter (Ed.), *Recent developments in alcoholism: Vol. 15. Services research in the era of managed care* (pp. 373-391). New York: Kluwer Academic/Plenum.
- Gotlib, I. H., & Lee, C. M. (1989). The social functioning of depressed patients: A longitudinal assessment. *Journal of Social and Clinical Psychology, 8*, 223-237.
- Greeley, J., & Oei, T. (1999). Alcohol and tension reduction. In K. E. Leonard, & H. T. Blane (Eds.), *Psychological theories of drinking and alcoholism* (2nd ed., pp. 14-53). New York: Guilford Press.

- Hammen, C. (1991). Generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology, 100*, 555-561.
- Hammen, C. (1999). The emergence of an interpersonal approach to depression. In T. Joiner and J. Coyne (Eds.), *The interactional nature of depression: Advances in interpersonal approaches* (pp. 21-35). Washington, DC: American Psychological Association Press.
- Hammen, C. (2006). Stress generation in depression: Reflections on origins, research, and future directions. *Journal of Clinical Psychology, 62*, 1065-1082.
- Heinz, A. J., Wu, J., Witkiewitz, K., Epstein, D. H., & Preston, K. L. (2009). Marriage and relationship closeness as predictors of cocaine and heroin use. *Addictive behaviors, 34*, 258-263.
- Hodgins, D., el-Guebaly, N., & Armstrong, S. (1995). Prospective and retrospective reports of mood states before relapse to substance abuse. *Journal of Consulting and Clinical Psychology, 63*, 400-407.
- Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: A 10-year model. *Journal of Consulting and Clinical Psychology, 73*, 658-666.
- Hubbard, R. L., Marsden, M. E., Rachal, J. V., Harwood, H. J., Cavanagh, E. R., & Ginsburg, H. M. (1989). *Drug abuse treatment: A national study of effectiveness*. Chapel Hill, NC: University of North Carolina Press.
- Humphreys, K., Mankowski, E., Moos, R., & Finney, J. (1999). Enhanced friendship networks and active coping mediate the effect of self-help groups on substance abuse. *Annals of Behavior Medicine, 21*, 54-60.
- Joiner, T. E., Jr. (2002). *Mood disorders: Diagnostic & therapeutic issues*. Tallahassee, FL: Center Circle Press.
- Joiner, T. E., Jr., Alfano, M. S., & Metalsky, G. I. (1992). When depression breeds contempt: Reassurance-seeking, self-esteem, and rejection of depressed college students by their roommates. *Journal of Abnormal Psychology, 101*, 165-173.
- Joiner, T. E., Jr., Alfano, M. S., & Metalsky, G. I. (1993). Caught in the crossfire: Depression, self-consistency, self-enhancement, and the response of others. *Journal of Social and Clinical Psychology, 12*, 113-134.
- Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (Vol. 1, 4th ed., pp. 233-265). Boston, MA: McGraw-Hill.
- Kessler, M., McGonagle, K., Swartz, M., Blazer, D., & Nelson, C. (1993). Sex and depression in the national comorbidity survey. I: Lifetime prevalence, chronicity and recurrence. *Journal of Affective Disorders, 29*, 85-96.
- Kodl, M., Fu, S. S., Willenbring, M. L., Gravely, A., Nelson, D. B., & Joseph, A. M. (2008). The impact of depressive symptoms on alcohol and cigarette consumption following treatment for alcohol and nicotine dependence. *Alcoholism: Clinical and Experimental Research, 32*, 92-99.
- Kouros, C. D., Papp, L. M., & Cummings, E. M. (2008). Interrelations and moderators of longitudinal links between marital satisfaction and depressive symptoms among couples in established relationships. *Journal of Family Psychology, 22*, 667-677.
- Litt, M. D., Kadden, R. M., Kabela-Cormier, E., & Petry, N. M. (2009). Changing network support for drinking: Network Support Project 2-year follow-up. *Journal of Consulting and Clinical Psychology, 77*, 229-242.
- McCrary, B. S., Epstein, E. E., & Kahler, C. W. (2004). Alcoholics Anonymous and relapse prevention maintenance strategies after conjoint behavioral alcohol treatment for men: 18-month outcomes. *Journal of Consulting and Clinical Psychology, 72*, 870-878.
- McCrary, B. S., Hayaki, J., Epstein, E. E., & Hirsch, L. S. (2002). Testing hypothesized predictors of change in conjoint behavioral alcoholism treatment for men. *Alcoholism: Clinical and Experimental Research, 26*, 463-470.
- McKay, J. R., Merikle, E., Mulvaney, F. D., Weiss, R. V., & Koppenhaver, J. M. (2001). Factors accounting for cocaine two years following initiation of continuing care. *Addiction, 96*, 213-225.
- Milich, R., Lynam, D., Zimmerman, R., Logan, T. K., Martin, C., Leukefeld, C., . . . Clayton, R. (2000). Differences in young adult psychopathology among drug abstainers, experimenters, and frequent users. *Journal of Substance Abuse, 11*, 69-88.
- Moos, R. (2007). Theory-based processes that promote remission of substance use disorders. *Clinical Psychology Review, 27*, 537-551.
- Moos, R. (2008). Active ingredients of substance use focused self-help groups. *Addiction, 103*, 387-396.
- Moos, R., & Moos, B. (1994). *Life Stressors and Social Resources Inventory Manual*. Odessa, FL: Psychological Assessment Resources.
- Nolen-Hoeksema, S. (1987). Sex differences in unipolar depression: Evidence and theory. *Psychological Bulletin, 101*, 259-282.
- Ouimette, P. C., Finney, J. W., & Moos, R. H. (1997). Twelve step and cognitive-behavioral treatment for substance abuse: A comparison of treatment effectiveness. *Journal of Consulting and Clinical Psychology, 65*, 230-240.
- Potthoff, J. G., Holahan, C. J., & Joiner, T. E., Jr. (1995). Reassurance seeking, stress generation, and depressive symptoms: An integrative model. *Journal of Personality and Social Psychology, 68*, 664-670.
- Preston, N. J., & Harrison, T. J. (2003). The Brief Symptom Inventory and the Positive and Negative Syndrome Scale: Discriminate validity between a self-reported and observational measure of psychopathology. *Comprehensive Psychiatry, 44*, 220-226.
- Rudolph, K. D., Ladd, G., & Dinella, L. (2007). Gender differences in the interpersonal consequences of early-onset depressive symptoms. *Merrill-Palmer Quarterly, 53*, 461-488.
- Tracy, S. W., Kelly, J. F., & Moos, R. H. (2005). The influence of partner status, relationship quality, and relationship stability on outcomes following intensive substance-use disorder treatment. *Journal of Studies on Alcohol, 66*, 497-505.
- U.S. National Center for Health Statistics. (1988). *International Classification of Diseases* (9th rev., Clinical Modification, 4th ed.). Ann Arbor, MI: Commission of Professional and Hospital Activities.
- Walton, M. A., Blow, F. C., Bingham, C. R., & Chermack, S. T. (2002). Individual and social/environmental predictors of alcohol and drug use 2 years following substance abuse treatment. *Addictive Behaviors, 28*, 627-642.
- Witkiewitz, K., & Marlatt, G. A. (2006). Overview of harm reduction treatments for alcohol problems. *International Journal of Drug Policy, 17*, 285-294.
- Zywiak, W. H., Connors, G. J., Maisto, S. A., & Westerberg, V. S. (1996). Relapse research and the Reasons for Drinking Questionnaire: A factor analysis of Marlatt's relapse taxonomy. *Addiction, 91* (Suppl.), 121-130.