Positive Affect and Stress Reactivity in Alcohol-Dependent Outpatients

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ABSTRACT. Objective: Reactivity to stress is a common feature of alcohol dependence and is associated with poorer treatment outcome among alcohol-dependent patients. Despite the importance of stress reactivity in alcohol dependence, little is known about markers of resilience to stress in this population. The current study examined whether positive affect buffered the effect of stress on negative affect and alcohol craving in an alcohol-dependent sample. **Method:** Outpatients ($N = 1,375$) enrolled in a large, randomized controlled trial for alcohol dependence (the Combined Pharmacotherapies and Behavioral Interventions for Alcohol Dependence [COMBINE] Study) completed measures of stress, positive affect, negative affect, and alcohol craving. In this secondary analysis, we hypothesized that positive affect would moderate the association between stress and negative affect and that positive affect

would be negatively associated with craving. **Results:** Results supported these hypotheses, such that patients with higher levels of positive affect exhibited a weaker relationship between stress and negative affect relative to those with low positive affect. Positive affect was negatively associated with craving but did not moderate the association between stress and craving. **Conclusions:** These results replicate studies suggesting a protective effect of positive affect on stress reactivity and extend this effect to an alcohol-dependent sample. If positive affect can aid in resilience to stress, the utilization of interventions that enhance positive affect may be of particular utility for alcohol-dependent patients. Future experimental studies testing the causality of this association as well as studies examining the effect of interventions to enhance positive affect are needed. (*J. Stud. Alcohol Drugs*, 74, 152–157, 2013)

HIGHTENED REACTIVITY TO STRESS is a common feature of alcohol dependence. Alcohol-dependent patients exhibit elevated physiological and affective responses to stress and alcohol craving following a stressor (Sinha et al., 2009), which continues into early abstinence (Cooney et al., 1997; Fox et al., 2007). Greater stress reactivity also predicts drinking behavior in alcohol-dependent patients (Brady et al., 2006) and relapse following treatment (Higley et al., 2011; Sinha et al., 2011). Although research is still needed to understand the mechanisms by which stress is linked to negative outcomes, an increase in negative affect (NA) following a stressor can serve as a powerful motivator for alcohol use (e.g., Baker et al., 2004; Witkiewitz and Villarroel, 2009; Witkiewitz et al., 2011; Zywiak et al., 2006). However, little is known about protective factors that may confer greater resilience to stress (e.g., less NA in response to stress) in alcohol-dependent patients.

A growing body of evidence suggests that positive affect (PA) is associated with enhanced coping and greater resili-

ence to stress (e.g., Ong et al., 2006; Steptoe et al., 2008; Tugade et al., 2004). For example, higher PA is associated with lessened reactivity to stress, such as quicker down-regulation of NA following a stressor (Fredrickson and Levenson, 1998; Fredrickson et al., 2000). PA is hypothesized to broaden psychological resources and increase cognitive and behavioral flexibility, allowing for not only subsequent enhancement of well-being but also buffering against the deleterious effects of stress and NA (Fredrickson, 1998, 2003; Tugade and Fredrickson, 2004). Similar to the cumulative harmful effects of repeated experiences of NA on functioning, repeated experiences of PA are hypothesized to yield cumulative benefits to well-being and resilience to stress (Burns et al., 2008; Fredrickson and Joiner, 2002). Much of the research on the protective effects of PA has focused on unselected samples, and thus the generalizability of these results to clinical samples is unclear. Given the association between stress reactivity and outcomes in alcohol-dependent patients, examining the generalizability of this model to alcohol dependence has promise for identifying targets to enhance treatment response.

The overarching aim of the current study was to extend the literature suggesting that PA buffers the effect of stress to an alcohol-dependent sample. The Combined Pharmacotherapies and Behavioral Interventions for Alcohol Dependence (COMBINE) Study randomized 1,383 alcohol-dependent patients to receive pharmacological treatment, behavioral treatment, or their combination (COMBINE Study Research

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Group, 2003). A previous analysis from the COMBINE Study found that NA was associated with poorer outcome and that this effect was partially mediated by craving (Witkiewitz et al., 2011). In other words, NA was associated with more craving, which was associated with more alcohol use. In this study, we aimed to further examine the role of affect in this sample by testing the associations between stress and NA and alcohol craving, and whether PA moderated these associations, such that the effect of stress would be lessened among those with higher PA.

The specific aims of this study were to evaluate the association between PA and NA and alcohol craving and to test whether PA moderated the relationship between perceived stress and NA. We hypothesized, based on previous research, that PA would significantly moderate the relationship between stress and NA. Specifically, we anticipated that the mechanism by which PA may serve as protective would be via its buffering of the effect of stress on NA. In addition, given that this relationship has not, to our knowledge, been previously examined in an alcohol-dependent sample, we also conducted an exploratory analysis examining whether (a) perceived stress was association with craving and (b) whether PA moderated this association.

Method

This study is a secondary data analysis from the COMBINE trial, a randomized controlled trial of combinations of pharmacological and behavioral treatments for alcohol dependence (COMBINE Study Research Group, 2003). A full description of study methods and main outcomes is available elsewhere (Anton et al., 2006; COMBINE Study Research Group, 2003). Below we describe the methods pertinent to this particular analysis. All study procedures received institutional review board approval at the participating sites.

Participants

Participants were 1,383 alcohol-dependent patients recruited from 11 academic sites, referred for the treatment of alcohol dependence. Inclusion criteria included a current *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994), diagnosis of alcohol dependence and heavy drinking in the previous 90 days as defined by (a) consumption of an average of more than 21 drinks per week for men and 14 drinks per week for women within a consecutive 30-day period before the baseline assessment, and (b) at least 2 heavy drinking days (at least 5 drinks for men and 4 drinks for women). To be included, 4–21 days of abstinence were also required before enrollment to ensure that detoxification was not required. Exclusion criteria comprised (a) a history of other DSM-IV substance use disorder (other than cannabis or nicotine), (b) use of either study medication (naltrexone or

acamprosate) within the past 30 days, (c) current psychiatric disorder that required medication, and (d) an unstable medical condition (such as tests for liver function with results exceeding three times the normal level) or a condition that necessitated medication for which study medications were contraindicated.

In the current analysis, 1,375 participants (426 women, 949 men) who had complete data for all variables of interest at baseline were included. The mean age of the sample was 44.4 years ($SD = 10.2$), 42% of the sample was married, and the mean reported years of education was 14.5 ($SD = 2.7$). Self-reported race was primarily non-Hispanic White (76.7%), followed by Hispanic American (11.2%), Black or African American (7.9%), American Indian or Alaskan Native (1.3%), bi- or multi-racial (1.3%), other race (1.2%), and Asian American or Pacific Islander (0.3%).

Procedures

Participants were randomly assigned to one of nine treatment groups, which included variations of behavioral treatment, naltrexone, acamprosate, and placebo (see Anton et al., 2006). Before randomization, participants completed a baseline assessment consisting of interviewer-administered and self-report measures. Baseline (i.e., pre-randomization) values for measures of stress, affect, and alcohol craving were examined in the current analysis.

Measures

The Perceived Stress Scale (PSS; Cohen and Williamson, 1988; Cohen et al., 1983) is a 14-item self-report measure of respondent perceptions of stressful, uncontrollable, and unpredictable situations experienced during the previous week. Items are rated on a 5-point scale ranging from 0 (*never felt or thought this way*) to 4 (*felt or thought this way very often*). The COMBINE Study used the brief, four-item version of the PSS. Scores range from 0 to 16, with higher scores indicating greater perceived stress. Both the long and short versions of the PSS have demonstrated strong concurrent and discriminant validity and internal consistency reliability (Cohen and Williamson, 1988; Cohen et al., 1983). The internal consistency reliability in the current sample was adequate ($\alpha = .78$).

The Profile of Mood States Brief (POMS; McNair et al., 1992) is a 30-item self-report measure of a range of affective states. Participants are instructed to rate a list of words and short phrases (e.g., weary, tense, active), using a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). Both the POMS Brief and the full POMS have demonstrated strong construct validity and internal consistency reliability. The POMS generates six subscales, including five domains of NA (tension, depression, anger, fatigue, and confusion) and one of PA (vigor). For the purpose of this analysis, the vigor

subscale was used as an index of PA; the tension, depression, and anger subscales were combined to form a composite index of NA, consistent with scoring instructions that combine subscales to provide a composite of mood disturbance (McNair et al., 1971). The range of possible scores for the vigor scale was 0–20, and the range of NA scores was 0–60, with higher scores reflecting more PA and NA, respectively. The vigor subscale consists of high-activation PA terms (e.g., energetic) and has demonstrated strong concurrently validity with broader indices of PA (e.g., Watson and Clark, 1994). These measures assessed affect during the previous week, providing an estimate of average affective state during that period. Internal consistency reliability in this sample was very strong for the NA items ($\alpha = .95$) and the PA items ($\alpha = .91$).

The Obsessive–Compulsive Drinking Scale (OCDS; Anton et al., 1996) is a 14-item self-report scale used to measure alcohol craving. Items are rated on a scale of 0–4 and the total score is calculated as a sum of these items, with possible scores ranging from 0 to 58 (higher scores reflecting greater craving). The OCDS has demonstrated adequate concurrent validity, strong internal consistency ($\alpha = .86$), and good retest reliability in alcohol-dependent samples (Anton et al., 1996). The OCDS consists of several subscales as well as a total score reflecting an overall index of craving. The total score was used for the purpose of this analysis as a measure of craving in the past week. In the current sample, internal consistency reliability of the OCDS total score was strong ($\alpha = .85$).

Data analysis

Data from measures of interest were first evaluated for skewness and outlier values. Subsequently, a series of hierarchical linear regression analyses were conducted with variables of interest entered sequentially to evaluate each of the study aims. The goal of these analyses was to examine whether PA moderated the association between stress and negative outcomes. In the first regression, the association of stress and PA with NA was assessed. Then the association of stress, PA, and NA with craving was assessed. In the first step of each analysis, the dependent variable (NA, craving) was regressed onto the independent variables to examine main effects. In the second step, the PA $\times$ Stress interaction (calculated by multiplying scores on the vigor scale of the POMS with the PSS scores) was added to the model to evaluate whether PA buffered the effects of stress on each outcome variable. Both regression coefficients and tests of significance, as well as R^2 change for the model, were examined as indicators of the strength of moderation. To allow for simultaneous interpretation of main and interactive effects and to minimize multicollinearity, independent variables were standardized before the calculation of interaction terms. All analyses included age and sex as covariates; because only

TABLE 1. Descriptive statistics for study variables ($n = 1,359$)

Variable	<i>M</i>	<i>SD</i>	Range
POMS–negative affect	14.0	10.7	0–56
POMS–positive affect	8.4	4.5	0–20
PSS	5.8	2.9	0–16
OCDS	26.6	8.2	0–51

Notes: POMS = Profile of Mood States; PSS = Perceived Stress Scale; OCDS = Obsessive–Compulsive Drinking Scale (craving); POMS negative and positive affect scores are not on the same scale; negative affect scores are a composite of five subscales each rated from 0 to 20.

baseline (i.e., pre-randomization) data from this trial were included, treatment condition was not examined.

Results

Descriptive statistics of variables of interest are presented in Table 1. There was no evidence of skewness or univariate outlier values. Examination of multicollinearity statistics indicated no concerns with respect to multicollinearity for all regression analyses. In bivariate analyses, PA was negatively associated with stress ($r = -.41, p < .0001$), NA ($r = -.34, p < .0001$), and alcohol craving ($r = -.21, p < .0001$). NA was positively associated with alcohol craving ($r = .64, p < .0001$). Given associations between stress and age ($r = -.13, p < .0001$) and stress and gender ($r = .06, p < .05$), these variables were entered as covariates in regression analyses.

In the first regression model, stress was associated with greater NA ($B = 6.45, SE_B = 0.26, t = 24.44, p < .0001$), and PA was associated with lower NA ($B = -0.73, SE_B = 0.26, t = -2.80, p < .01$); each variable accounted for a significant amount of the variability of NA (stress: R^2 change = .40; PA: R^2 change = .01). The model fit improved modestly (R^2 change = .01) with the addition of the PA $\times$ Stress interaction term, which was significant ($B = -1.19, SE_B = 0.24, t = -4.95, p < .0001$) (Table 2). Consistent with hypotheses, this effect was characterized by a stronger association between stress and NA among those lower in PA (Figure 1).

In the second regression model, PA was significantly negatively associated with craving, and NA and stress were significantly positively associated with craving ($R^2 = .13$). However, the PA $\times$ Stress interaction was not significant, suggesting that PA did not moderate the association between stress and craving (Table 3).

TABLE 2. Multiple regression analysis predicting negative affect ($n = 1,359$)

Predictor	<i>B</i>	<i>SE_B</i>	<i>t</i>	<i>p</i>	<i>R</i> ²
Step 1					.43
Age	-0.04	0.02	-1.76	.08	
Sex	1.30	0.48	2.73	<.01	
Perceived stress	6.45	0.26	24.44	<.0001	
Positive affect	-0.73	0.26	-2.80	<.01	
Step 2					.44
Stress $\times$ Positive Affect	-1.19	0.24	-4.95	<.0001

FIGURE 1. Association between stress and negative affect by median split of positive affect

Discussion

The results of this analysis in a large sample found that PA moderated the association between stress and NA in treatment-seeking alcohol-dependent outpatients. Patients with higher levels of PA exhibited a weaker association between stress and NA. In addition, PA was negatively associated with alcohol craving but did not moderate the association between stress and craving. These results are consistent with reports of the buffering effect of PA against stress in

other (mostly unselected) populations (e.g., Fredrickson and Levenson, 1998; Fredrickson et al., 2000) and suggest that these findings may generalize to an alcohol-dependent sample. Although the magnitude of the moderational effect is modest, this is not surprising given that patients reported their levels of affect and stress on average over the previous week. Studies examining the acute impact of PA (i.e., state PA) on response to a stressor would help to both clarify the strength of this association and to examine the direction of this effect.

As hypothesized, PA moderated the association between stress and NA; however, in an exploratory analysis, it did not moderate the association between stress and craving. This is consistent with the perspective that PA is protective against the affective consequences of stress and not necessarily against other, more distal, consequences of stress (e.g., craving). The mechanisms by which PA buffer the effect of stress on NA have been discussed previously and have primarily focused on the broadening of psychological resources and the enhancement of cognitive flexibility (e.g.,

TABLE 3. Multiple regression analysis predicting craving ($n = 1,359$)

Predictor	<i>B</i>	<i>SE_B</i>	<i>t</i>	<i>p</i>	<i>R</i> ²
Step 1					.13
Age	-0.06	0.02	-2.73	.006	
Sex	-0.06	0.46	-0.13	.90	
Positive affect	-0.73	0.25	-2.92	.004	
Negative affect	1.58	0.26	5.99	<.0001	
Perceived stress	1.20	0.30	3.94	<.0001	
Step 2					.13
Stress × Positive Affect	0.21	0.23	0.89	.38	

Fredrickson and Levenson, 1998). Such enhancement of resources presumably facilitates the adjustment to stressors and thus may lessen the impact of these events on psychological functioning. The results of this study extend these findings to individuals with alcohol dependence, suggesting that PA may enhance the resources available to regulate responses to stress, thus mitigating NA following stress.

There are several important clinical implications of this finding. First, this study provides further support for the association between stress and negative outcomes (NA and alcohol craving). Interventions targeting reduction in stress and stress reactivity may be of particular importance in alcohol-dependent patients given the accumulating evidence for this association. Behavioral interventions for alcohol dependence place significant emphasis on changing contextual cues for alcohol use and using coping skills to manage stress and other triggers. Particularly in the early stages of recovery, interventions that emphasize approach behaviors and building greater PA also may be beneficial. Enhancing PA is a core component of behavioral activation therapies and treatments derived from positive psychology principles, which have yielded initial promise for enhancing PA and well-being (for review, see Duckworth et al., 2005). Adding elements of these approaches to the treatment of alcohol dependence is a promising direction for both building PA and potentially reducing stress reactivity.

There are limitations to the current study. First, this study included cross-sectional observational data and thus causality cannot be assumed. Experimental and longitudinal designs are needed to determine whether PA predicts stress reactivity and alcohol craving. Such designs would be necessary to test the hypothesis that PA buffers the impact of stress on NA relative to alternative explanations for this finding, such as PA serving as a proxy for lessened stress reactivity (i.e., individuals who continue to experience PA despite the presence of stress are in general less reactive to stress). Nonetheless, these findings provide preliminary evidence to support the hypothesis that PA may buffer the negative effects of stress, and can be used to inform future studies. Second, the current sample was a treatment-seeking sample that had reduced alcohol use sufficiently to enroll in outpatient treatment (i.e., did not require detoxification), and thus determining the generalizability of these findings to other alcohol-dependent populations will require further study. Because the COMBINE Study excluded potential participants with a current psychiatric disorder treated with a medication (because of concerns about potential medication interactions), the current analysis may not generalize to alcohol-dependent patients who are taking psychotropic medications. Replication in more heterogeneous samples with respect to psychiatric disorders, treatment-seeking status, and other patient characteristics (e.g., age, race) is needed to determine the generalizability of these findings.

Several future directions may further elucidate the relationships among PA, stress, and craving in alcohol-dependent patients. First, experimental designs testing the effect of PA on stress reactivity will help to clarify potential causality of this effect. Additionally, other moderator variables of interest may be considered. For example, examination of whether this association differs based on the level of other trait affective variables (e.g., emotion regulation, distress intolerance) will provide important information about how treatments may capitalize on this buffering effect of PA and to build this resource among individuals in treatment for alcohol dependence.

In a large sample of treatment-seeking alcohol-dependent patients, PA appeared to be protective against the affective effects of stress. Further investigation of this association, including an examination of whether PA moderates the association between stress and other markers of reactivity (e.g., cardiovascular and endocrine responses) is needed to better understand this relationship. Given the potential impact of stress on craving, use, and relapse in alcohol-dependent patients, it is important to consider interventions to reduce stress reactivity in this population. The results of this study suggest that findings of protective effects of PA extend to patients with alcohol dependence and that greater PA is associated with less alcohol craving. In light of these findings, using interventions that enhance PA may be a promising approach in the treatment of alcohol dependence.

References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- Anton, R. F., Moak, D. H., & Latham, P. K. (1996). The Obsessive Compulsive Drinking Scale: A new method of assessing outcome in alcoholism treatment studies. *Archives of General Psychiatry*, 53, 225–231.
- Anton, R. F., O'Malley, S. S., Ciraulo, D. A., Cisler, R. A., Couper, D., Donovan, D. M., . . . Zweben, A., & the COMBINE Study Research Group. (2006). Combined pharmacotherapies and behavioral interventions for alcohol dependence: The COMBINE Study: A randomized controlled trial. *JAMA: The Journal of the American Medical Association*, 295, 2003–2017.
- Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review*, 111, 33–51.
- Brady, K. T., Back, S. E., Waldrop, A. E., McRae, A. L., Anton, R. F., Upadhyaya, H. P., . . . Randall, P. K. (2006). Cold pressor task reactivity: Predictors of alcohol use among alcohol-dependent individuals with and without comorbid posttraumatic stress disorder. *Alcoholism: Clinical and Experimental Research*, 30, 938–946.
- Burns, A. B., Brown, J. S., Sachs-Ericsson, N., Plant, E. A., Curtis, J. T., Fredrickson, B. L., & Joiner, T. E. (2008). Upward spirals of positive emotion and coping: Replication, extension, and initial exploration of neurochemical substrates. *Personality and Individual Differences*, 44, 360–370.
- Cohen, S., Karmarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 385–396.

- Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample in the United States. In S. Spacapan & S. Oskamp (eds.), *The social psychology of health* (pp. 31-68). Newbury Park, CA: Sage.
- COMBINE Study Research Group. (2003). Testing combined pharmacotherapies and behavioral interventions in alcohol dependence: Rationale and methods. *Alcoholism: Clinical and Experimental Research*, 27, 1107-1122.
- Cooney, N. L., Litt, M. D., Morse, P. A., Bauer, L. O., & Gaupp, L. (1997). Alcohol cue reactivity, negative-mood reactivity, and relapse in treated alcoholic men. *Journal of Abnormal Psychology*, 106, 243-250.
- Duckworth, A. L., Steen, T. A., & Seligman, M. E. P. (2005). Positive psychology in clinical practice. *Annual Review of Clinical Psychology*, 1, 629-651.
- Fox, H. C., Bergquist, K. L., Hong, K. I., & Sinha, R. (2007). Stress-induced and alcohol cue-induced craving in recently abstinent alcohol-dependent individuals. *Alcoholism: Clinical and Experimental Research*, 31, 395-403.
- Fredrickson, B. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist*, 91, 330-335.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2, 300-319.
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, 13, 172-175.
- Fredrickson, B. L., & Levenson, R. W. (1998). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition & Emotion*, 12, 191-220.
- Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, 24, 237-258.
- Higley, A. E., Crane, N. A., Spadoni, A. D., Quello, S. B., Goodell, V., & Mason, B. J. (2011). Craving in response to stress induction in a human laboratory paradigm predicts treatment outcome in alcohol-dependent individuals. *Psychopharmacology*, 218, 121-129.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *EDITS manual for the Profile of Mood States*. San Diego, CA: Educational and Industrial Testing Service.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1992). *POMS: Profile of mood states*. North Tonawanda, NY: Multi-Health Systems.
- Ong, A. D., Bergeman, C. S., Bisconti, T. L., & Wallace, K. A. (2006). Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology*, 91, 730-749.
- Sinha, R., Fox, H. C., Hong, K. A., Bergquist, K., Bhagwagar, Z., & Siedlarz, K. M. (2009). Enhanced negative emotion and alcohol craving, and altered physiological responses following stress and cue exposure in alcohol dependent individuals. *Neuropsychopharmacology*, 34, 1198-1208.
- Sinha, R., Fox, H. C., Hong, K. I., Hansen, J., Tuit, K., & Kreek, M. J. (2011). Effects of adrenal sensitivity, stress- and cue-induced craving, and anxiety on subsequent alcohol relapse and treatment outcomes. *Archives of General Psychiatry*, 68, 942-952.
- Steptoe, A., O'Donnell, K., Badrick, E., Kumari, M., & Marmot, M. (2008). Neuroendocrine and inflammatory factors associated with positive affect in healthy men and women: The Whitehall II study. *American Journal of Epidemiology*, 167, 96-102.
- Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*, 86, 320-333.
- Tugade, M. M., Fredrickson, B. L., & Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality*, 72, 1161-1190.
- Watson, D., & Clark, L. A. (1994). *Manual for the positive and negative affect schedule-expanded form*. Iowa City, IA: University of Iowa.
- Witkiewitz, K., Bowen, S., & Donovan, D. M. (2011). Moderating effects of a craving intervention on the relation between negative mood and heavy drinking following treatment for alcohol dependence. *Journal of Consulting and Clinical Psychology*, 79, 54-63.
- Witkiewitz, K., & Villarroel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of Consulting and Clinical Psychology*, 77, 633-644.
- Zywiak, W. H., Stout, R. L., Trefry, W. B., Glasser, I., Connors, G. J., Maisto, S. A., & Westerberg, V. S. (2006). Alcohol relapse repetition, gender, and predictive validity. *Journal of Substance Abuse Treatment*, 30, 349-353.