Course of functioning 1 year following admission for treatment of alcohol use disorders

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Abstract

Research on alcohol treatment outcomes has the potential to advance knowledge about how treatment combines with other variables to influence post treatment course of functioning. The purpose of this study was to replicate and extend Connors, Maisto, and Zywiak’s (1996) [Connors, G. J., Maisto, S. A., & Zywiak, W. H. (1996). Understanding relapse in the broader context of post-treatment functioning. *Addiction*, 91 (Suppl.), S173–S189] test of a multivariate model of course by testing the model’s fit to data from a larger sample and the use of stronger statistical methods. The participants were 400 men and women presenting for alcohol treatment in two cities in the US. These individuals completed a pretreatment (baseline) assessment battery at treatment initiation and then completed follow-up assessments bimonthly for a period of 1 year. The model included pretreatment, treatment (months 1–6), and post-baseline (months 1–6) factors to predict alcohol use (percent days abstinent, drinks/drinking day, and total number drinks/month, all for months 7–12). The application of structural equation modeling methods revealed that the model fit the data adequately for all three dependent variables, with the major significant findings of direct effects of treatment setting, coping skills, and the mediation of treatment effects through coping skills. Overall, the data replicated several findings from the Connors et al.’s study and point to the importance of investigating the mechanisms underlying treatment effects and the mediation of treatment effects by coping skills in future research.

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Patterns of functioning over time following admission for treatment of alcohol use disorders (AUDs) show considerable variability among individuals and are influenced by pretreatment, treatment, and post-treatment variables in both adults (Miller W. R., 1996; Moos, Finney, & Cronkite, 1990) and adolescents (Brown, D’Amico, McCarthy, & Tapert, 2001; Latimer, Newcomb, Winters, & Stinchfield, 2000; Williams, Chang, & Addiction Center Adolescent Research Group, 2000). Accordingly, studies that apply models of multivariate determinants of areas of functioning (substance use, related consequences, health) would seem to have the greatest potential for advancing understanding of the course of functioning following AUD treatment admission. Multivariate research on course of functioning can provide information that not only is valuable because of its contribution to theory of AUD course, but also because it extends knowledge about how treatment may combine with other individual and environmental factors to affect functioning. Ultimately, such knowledge can lead to enhancement of treatment effectiveness.

Following this reasoning, Connors, Maisto, and Zywiak (1996) evaluated a multivariate, systems model of treatment outcomes that was adapted from Moos et al. (1990) in prediction of 1-year post-treatment admission status on alcohol use and related consequences in a sample of adults admitted for inpatient or outpatient treatment of AUDs. In their paper, Connors et al. conceptualized the major dependent variables in their study as relevant to relapse and, more generally, to treatment outcome. They used path analytic methods to investigate the direct and indirect effects of pretreatment (background factors and alcohol involvement), treatment, and prior post-treatment functioning (coping skills, stressors) on 12-month alcohol use (percent days abstinent, drinks per drinking day), alcohol-related consequences, and craving experiences. According to the model that Connors et al. evaluated, adults presenting for treatment can be described by background (demographic and psychological functioning) variables and degree of alcohol (and other drug) involvement. Each of these two variable sets has a direct path to treatment, because each may influence what program or treatment setting individuals select. The direct paths between background and alcohol/drug involvement and outcomes reflect consistent findings of correlations between pretreatment variables and alcohol use and related outcomes.

Direct paths between treatment and life events/stressors and coping skills are due to treatment’s hypothesized influence on perceptions of stress and the acquisition of skills to cope with stress. In this regard, although social-cognitive theory based treatments are best known for this emphasis, all alcohol treatment approaches essentially aim to impart clients/patients with the resources needed to avoid problem alcohol use when confronted with stress, however defined. The direct path between coping skills and stress indicates that coping skills affect a person’s reaction to stress. Therefore, treatment is hypothesized to affect functioning by helping to provide individuals with ways to manage bio-psycho-social stressors that may affect patterns of alcohol use. Finally, treatment, coping skills, and life events/stressors all are hypothesized to have direct effects on alcohol use and related outcomes.

The results of the path analyses showed consistency across the four dependent variables that Connors et al. (1996) evaluated (percent days abstinent, drinks per drinking day, craving, and consequences). Background and pretreatment alcohol involvement showed significant direct effects on all of the dependent variables, with the one exception of the direct path from background characteristics to consequences at 12 months. Coping skills also showed significant direct effects on all of the dependent variables, and treatment was significantly related to two of them (both alcohol use variables). Stressors was not significantly related to any of the dependent variables.

The analyses also showed that indirect effects had relatively little predictive power. Significant indirect paths were found for background characteristics through treatment to the two alcohol use
variables and craving, and background characteristics through treatment and coping skills on drinks per
drinking day and craving. An exception to the limited contributions of indirect effects was significant
indirect effects of treatment on all dependent variables through coping skills.

Although the Connors et al. (1996) research study contributed to knowledge about the course of
AUDs and its relationship to pretreatment, treatment, and post-treatment factors, they acknowledged
several shortcomings in their design. First, the sample size was small for the path models evaluated,
which raised questions about stability of the findings. Stability of the findings is questioned further by
statistical concerns inherent in the use of path analysis (Klein, 1995).

The purpose of this study was to replicate Connors et al. (1996) while addressing the problems with
their procedures in the following ways. First, this study’s sample size was considerably larger than that in
Connors et al., which was made possible by the use of data collected at two different sites. Both sites
were part of the Relapse Replication and Extension Project (RREP; Lowman, Allen, & Stout, 1996).
One of the sites was that used in Connors et al.; the other was Providence, RI, and the merging of the
data sets was possible because RREP used a set of “core” measures that were common to the
participating sites (see Lowman et al., 1996). We acknowledge that the sample used for the analyses
reported here does include participants from the Connors et al. sample and thus does not provide a “pure”
replication of their findings. However, the present sample is over three times larger than that of Connors
et al. and includes individuals from a second research site. In that sense, the present sample does add a
considerable amount of new information as a basis of a replication effort.

The increased sample size compared to that in Connors et al. (1996) allowed for the use of structural
equation modeling (SEM) methods, which yield more reliable estimates statistically than path analysis
(Marnyama, 1998). The model of functioning evaluated in this study was similar to the model that
Connors et al. tested, with the only exception that the “background characteristics” variable in Connors et
al. was defined as two latent variables of “demographic characteristics” and (pretreatment)
“psychological functioning.” The model depicted in Fig. 1 was evaluated in the prediction of three
different 12-month alcohol use variables of percent days abstinent, drinks per drinking day, and monthly
volume of alcohol consumption. Twelve-month craving and consequences were not included in this
study, because the RREP core data set did not include common indicators of these constructs. It was
hypothesized that Connors et al.’s findings regarding alcohol use would be replicated. Therefore,
significant direct effects were expected between all of the predictors and the three respective alcohol use variables, with the exception that stressors were not hypothesized to predict drinking at 12 months. It also was hypothesized that significant indirect effects of treatment through coping skills on all drinking variables would be observed.

1. Method

1.1. Participants

The participants were 400 men and women initiating AUD treatment. A total of 123 participants were recruited from treatment programs in the Buffalo, NY greater metropolitan area, and 277 were recruited from programs in Providence, RI and surrounding areas. Most (75%) were recruited from inpatient programs, and the remainder were recruited from outpatient programs.1 The sample was 45% female, 71% Caucasian, and 19% African American. The average age was 34.5 years (S.D.=8.7), and the average length of education was 12.0 years (S.D.=2.4). Nineteen percent were working full-time. For this sample, the average time since the onset of alcohol problems was 10.8 years (S.D.=7.7). Most (69%) participants had received some kind of prior formal alcohol treatment. During the 3 months before beginning the index treatment episode, the average percent days abstinent was 47 (S.D.=30) and the average drinks per drinking day was 21 (S.D.=13).

1.2. Design and procedure

The data for this study were collected as part of the RREP, which was a naturalistic study of the relapse process following alcohol treatment. Clients were recruited from an alcohol treatment episode that they had already initiated. To be eligible for the study, clients had to be at least 18 years old, meet criteria for alcohol abuse or dependence, be intravenous drug-free during the last 6 months, and demonstrate residential stability. If a client was drug dependent, then s/he also had to be dependent on alcohol. If eligible and interested in the study, clients were scheduled for in-person interviews at baseline, and 6 and 12 months later. Telephone interviews were conducted 2, 4, 8, and 10 months after the baseline interview. As noted earlier, procedures for the RREP are described in greater detail in Lowman et al. (1996).

1.3. Measures

The Comprehensive Drinker Profile (Miller & Marlatt, 1984) was used at baseline to measure demographics. The Comprehensive Drinker Profile also determines the years since the onset of problem drinking. Psychological functioning was assessed through the Beck Anxiety Inventory (BAI; Beck, 1990), the Beck Depression Inventory (BDI, Beck, Steer, & Garbin, 1988), and the trait anger section of the Spielberger State-Trait Anger Expression Inventory (Spielberger, Jacobs, Russel, & Crane, 1983).

1 Setting (inpatient or outpatient) of the index treatment was one of the components of operationalizing the treatment latent variable. Because the University of New Mexico site of the RREP included only individuals engaged in outpatient treatment, thus nesting setting within site, the New Mexico data were not included in this study.
The Lifetime Treatment History Interview yields information on the number and recency of residential and outpatient psychiatric/psychological treatment episodes, which was used to determine who had ever received any psychiatric treatment. The Lifetime Treatment History Interview also yields information on whether the individual ever had previously entered inpatient alcohol treatment, outpatient alcohol treatment, or alcohol detoxification.

The Form-90 was administered at baseline and then every 2 months for the next year. This interview yields daily drinking data, treatment utilization data, self-help group attendance data, and drug use information (Miller W., 1996). The Alcohol Dependence Scale, which was designed to measure alcohol dependence syndrome, was administered at baseline (Skinner & Allen, 1982).

Coping skills and life events were assessed at the 6-month follow-up. The Coping Behaviors Inventory (CBI) yields four scores: positive thinking, negative thinking, avoidance/distraction, and seeking social support (Litman, Stapleton, Oppenheim, & Peleg, 1983). The score on each of these subscales represents the frequency of use of coping behaviors that are classified in each of the four categories in order to prevent drinking. Higher scores on the CBI mean a more frequent use of coping behaviors. The total score on the Situational Confidence Questionnaire administered at 6 months was computed (Annis & Graham, 1988). Data from the life Events Survey (Sarason, Johnson, & Siegel, 1978) were used to calculate the number of negative life events, and the mean magnitude of these events, respectively. The reference period was the first 6 months of the follow-up period.

### 1.4. Analysis plan

Indicators of the six predictor constructs (latent variables) included in Fig. 1 were measures that were common to both sites. Table 1 lists the measures of each of the latent variables. Demographic factors, psychological functioning, and baseline alcohol involvement all refer to status at or before the initiation of the index treatment episode. Treatment, coping skills, and stressors refer to events occurring during months 1–6 following the baseline assessment. Data for the three drinking dependent variables were collected at month 12 and refer to months 7–12. It should be noted that the three drinking outcomes were

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Possible indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic factors</td>
<td>Age, participant sex, ethnic/racial background, education, employment status, all measured at baseline</td>
</tr>
<tr>
<td>Psychological functioning</td>
<td>Beck Anxiety Inventory, Beck Depression Inventory, anger scale of the Spielberger, report of ever receiving psychological treatment, all measured at baseline</td>
</tr>
<tr>
<td>Alcohol involvement</td>
<td>Alcohol dependence scale score, drug use, duration of alcohol problem, report of ever participating inpatient alcohol treatment, ever receiving alcohol outpatient treatment, ever undergoing alcohol detoxification, baseline percent days abstinent, baseline drinks per drinking day, and baseline monthly volume of alcohol consumption, all measured at baseline</td>
</tr>
<tr>
<td>Treatment</td>
<td>Setting of index treatment (inpatient or outpatient) and, for months 1–6, days of alcohol or drug treatment, days of 12-step meetings, and days of psychological treatment</td>
</tr>
<tr>
<td>Coping skills/resources</td>
<td>For months 1–6, coping behaviors inventory scales of positive thinking, negative thinking, avoidance, and social support, and situational confidence questionnaire (total score)</td>
</tr>
<tr>
<td>Stressors</td>
<td>For months 1–6, life events survey scales of number of negative life events, mean rating of negative life events</td>
</tr>
</tbody>
</table>
analyzed separately for two reasons. First, Connors et al. (1996) followed that procedure, and the intent was to follow their procedures as closely as possible. Second, alcohol treatment research traditionally has viewed percent days abstinent (frequency of drinking) and drinks per drinking day (intensity of drinking) as two important, relatively independent dimensions of alcohol use (Babor, Steinberg, Anton, & DelBoca, 2000). Monthly volume, an index of total consumption that also has been of interest to the field due to its relationship to health indexes, reflects the influence of both frequency and intensity of alcohol use.

A few variables were transformed so that the distributions would approximate normal distributions. Drinks per drinking day at baseline and months 7–12 were transformed using the square root function. Mean volume of alcohol consumption at baseline and months 7–12 were transformed using the fourth root function. Days of alcohol/drug treatment and number of negative life events during months 1–6 also were transformed, by use of the square root function.

2. Results

2.1. Attrition

Only those participants who completed the 12-month research interview were included in the present analyses. These 400 participants represent 90.5% of the 442 clients recruited by research interviewers. The 42 clients who dropped out of the study were compared to the 400 who remained on 19 baseline measures. These measures included age, gender, ethnicity, employment status, scores from the BAI, BDI, the trait section of the Spielberger Anger Inventory, and scores from the Alcohol Dependence Scale. These two groups of participants were also compared on whether they had previously received any psychological treatment, inpatient alcohol treatment, outpatient alcohol treatment, or detoxification, baseline drug use, percent days abstinent, drinks per drinking day, and 3 months volume of alcohol consumption. Finally, participants retained versus those who dropped out were compared on whether they were recruited from inpatient or outpatient alcohol treatment programs. Even though 19 separate tests were conducted (t-tests and chi-square tests), no test was statistically significant.

2.2. Evaluation of the measurement model

Structural equation modeling was conducted with Bentler’s (1995) EQS version 5.7a. The covariance matrix was used as input, and the maximum likelihood method was specified. The model was trimmed by (1) successively deleting the measured variable with the lowest z-score (even if significant) to see if a greater comparative fit index (CFI) could be obtained, and (2) terminating trimming when there were only two measured variables left for a latent variable, or the highest CFI had been obtained (i.e., additional trimming resulted in a lower CFI).

In the initial run, no demographic variable had a z-score > 1.96, so this latent variable was deleted from the model. For the final measurement model, \( \chi^2 (90, N=400) = 253.02, p < .001, \text{CFI} = .91 \). A summary of findings for the final measurement model is presented in Table 2. Note that the “treatment” latent variable is excluded from Table 2, because index treatment setting is the only measured variable that indicates it, as a result of model evaluation. Treatment was retained as a variable in the model because conceptually treatment was a central construct to the model. The demographic variable was
dropped. As can be seen in Table 2, psychological functioning was calculated from BAI, BDI, and trait anger scores. A higher score on this latent variable indicated greater psychological distress. Alcohol involvement consisted of baseline drinks per drinking day, ADS score, number of years of problem drinking, history of inpatient alcohol treatment, history of outpatient alcohol treatment, and history of alcohol detoxification. A higher score on this latent variable indicated greater alcohol involvement. The treatment latent variable consisted of index treatment setting, with a positive score indicating that the index treatment was in an inpatient setting. The four Coping Behaviors Inventory scales loaded on the coping skills latent variable, all positively. The stressors latent variable consisted of the number of negative life events and the mean rating of the negative life events. In summary, higher scores on the latent variables would indicate more psychological distress, more alcohol involvement, inpatient index treatment, more frequent use of coping methods, and more frequent and more intense negative life events.

2.3. Evaluation of the path model

Following determination of the measurement model, EQS equations were written following the model depicted in Fig. 1 but omitting the demographics latent variable. Accordingly, in these equations, alcohol involvement and psychological functioning were specified as correlated exogenous variables. Treatment setting was hypothesized to be predicted by both alcohol involvement and psychological functioning. Treatment setting was hypothesized to predict coping skills and stressors. Finally, coping and stressors each was hypothesized to predict drinking outcome for months 7–12. This model was tested for the drinking outcomes of monthly volume, number of drinks per drinking day, and percent days abstinent, respectively. In the course of model testing, paths were trimmed based on $z$-values, except for paths involving treatment setting, coping, stressors, and the drinking outcome in question. The results of these analyses are summarized in Table 3.

Table 2
Summary of the final measurement model

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Standardized</th>
<th>Measured variable</th>
<th>Beta</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological function</td>
<td></td>
<td>Beck Anxiety Inventory</td>
<td>.68</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beck Depression Inventory</td>
<td>.72</td>
<td>.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trait anger</td>
<td>.42</td>
<td>.17</td>
</tr>
<tr>
<td>Alcohol involvement</td>
<td></td>
<td>Alcohol dependence scale score</td>
<td>.58</td>
<td>.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Years of problem drinking</td>
<td>.34</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inpatient alcohol treatment—Ever</td>
<td>.50</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outpatient alcohol treatment—Ever</td>
<td>.35</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alcohol detoxification—Ever</td>
<td>.29</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Baseline drinks/drinking day</td>
<td>.38</td>
<td>.15</td>
</tr>
<tr>
<td>Coping</td>
<td></td>
<td>CBI-positive thinking score</td>
<td>.90</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBI-negative thinking score</td>
<td>.81</td>
<td>.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBI-avoidance score</td>
<td>.68</td>
<td>.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CBI-social support score</td>
<td>.69</td>
<td>.49</td>
</tr>
<tr>
<td>Stressors</td>
<td></td>
<td>Number of negative life events</td>
<td>.89</td>
<td>.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean rating, negative life events</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
The results of model testing for each of the three drinking variables are summarized in Tables 3 and 4. Table 3 shows a high degree of consistency in findings across the three drinking outcomes. The findings for monthly volume and drinks per drinking day were identical, and percent days abstinence differed from the other two drinking variables on the results for two paths. Specifically, for all three drinking dependent variables, paths associated with psychological functioning were trimmed early in the course of model testing. Alcohol involvement showed a direct relationship to treatment setting for all three models but did not show a direct relationship with drinking outcomes. In each model, treatment setting was directly related to coping skills but not to stressors. Treatment setting was directly related to both monthly volume and drinks per drinking day, but not to percent days abstinent. Coping skills was directly related to both stressors and drinking outcome. Finally, stressors was related to monthly volume and drinks per drinking day, but not to percent days abstinent.

These statistical results have the following substantive meaning. A greater degree of alcohol involvement predicted participation in inpatient treatment. Inpatient treatment setting, in turn, predicted more frequent use of coping behaviors but poorer drinking outcomes as measured by monthly volume and drinks per drinking day. More frequent use of coping behaviors predicted lower stressor levels, as well as more favorable drinking outcomes. Finally, higher stress levels predicted poorer drinking outcomes, as measured by monthly volume and drinks per drinking day.

Table 3
Summary of evaluation of path model depicted in Fig. 1 for each of three drinking outcomes, months 7–12

<table>
<thead>
<tr>
<th>Path</th>
<th>Standardized beta</th>
<th>MV</th>
<th>DDD</th>
<th>PDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol involvement (AI) → treatment setting (TS)</td>
<td>.70**</td>
<td>.61**</td>
<td>.81*</td>
<td></td>
</tr>
<tr>
<td>AI → drinking outcome (DO)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>TS → coping skills (CS)</td>
<td>.32*</td>
<td>.36*</td>
<td>.35*</td>
<td></td>
</tr>
<tr>
<td>TS → stressors</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>TS → DO</td>
<td>.27*</td>
<td>.39*</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>CS → stressors</td>
<td>-.16*</td>
<td>-.16*</td>
<td>-.17*</td>
<td></td>
</tr>
<tr>
<td>CS → DO</td>
<td>-.37***</td>
<td>-.35***</td>
<td>.30***</td>
<td></td>
</tr>
<tr>
<td>Stressors → DO</td>
<td>.13*</td>
<td>.16**</td>
<td>ns</td>
<td></td>
</tr>
</tbody>
</table>

Demographic factors were eliminated from model testing based on the results of evaluation of the measurement model. MV = monthly volume, months 7–12; DDD = drinks per drinking day, months 7–12; PDA = percent days abstinent, months 7–12. PF = psychological functioning; AI = alcohol involvement.

* p ≤ .05.
** p ≤ .01.
*** p ≤ .001.

Table 4
Model fit summary for monthly volume (MV) drinks per drinking day (DDD), and percent days abstinent (PDA), months 7–12

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Drinking outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MV</td>
</tr>
<tr>
<td>Chi square (124; N=400)</td>
<td>287.24***</td>
</tr>
<tr>
<td>Bentler–Bonnet non-normed fit index</td>
<td>.91</td>
</tr>
<tr>
<td>Comparative fit index</td>
<td>.91</td>
</tr>
<tr>
<td>Total variance explained</td>
<td>24%</td>
</tr>
</tbody>
</table>

*** p < .001.
As can be seen, the model depicted in Fig. 1 and subsequently modified provided a reasonable fit to the data, based on the Bentler–Bonett non-normed fit index (NNFI) and comparative fit indexes. Still, Table 4 shows that a considerable amount of variance in the drinking outcomes was not explained by the model.

2.4. Test of indirect effects

Sobel’s test of the significance of the hypothesized treatment setting→coping skills→drinking outcome path was computed for each of the drinking outcomes. The resulting standardized betas (product of standardized beta for treatment setting→coping skills, and coping skills→drinking outcomes) was statistically significant ($p < .05$) for monthly volume and reached $p < .10$ for both drinks per drinking day and percent days abstinent. Based on the sign of the product beta weights (see Table 3), in each case inpatient treatment’s association with outcome was mediated by more frequent use of coping behaviors.

3. Discussion

Consistent with hypotheses, significant direct effects of coping skills were identified for all three dependent variables, and direct affects of treatment were identified for two of the dependent variables. These findings showed that more frequent use of coping skills was associated with more favorable outcomes, and that inpatient treatment (compared to outpatient treatment) was associated with less favorable outcomes, in terms of monthly volume and drinks per drinking day. The direct effects of treatment on two of the drinking outcomes was not in the direction anticipated in the original model. In the context of the model tested in the study, it is possible that baseline differences between individuals presenting for inpatient or outpatient treatment and not measured in this study account for the direct treatment setting–drinking outcome relationships.

However, the data also show that treatment setting’s association with drinking outcome was in part mediated through skills. For each dependent variable, inpatient treatment predicted more frequent use of coping skills, and coping skills were directly related to outcomes. These results are consistent with Connors et al.’s findings and with research on the relationship between the acquisition of coping skills and alcohol treatment outcome (Donovan, 1996; Kadden, 2003; McKay & Weiss, 2001).

Several results of this study were not consistent with predictions, or with the findings of Connors et al. (1996). In this regard, no direct relationships between either alcohol involvement or psychological functioning and the dependent variables were found, and stressors showed direct effects on two of the drinking outcomes. It is possible that both psychological functioning and alcohol involvement at baseline exerted most of their effects on selection of treatment, as hypothesized and supported by the findings. On the other hand, treatment and post-treatment variables explained more of the variance in long-term (12-month) outcomes (Moos et al., 1990). In addition, the result that stressors had significant direct effects on two drinking outcomes differed from Connors et al.’s data and could have been attributed, at least in part, to use of a different measure of stress. Connors et al.’s measure was the Hassles Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981), with dependent measures of number and intensity of hassles. In this study, the number of negative life events and their associated intensity constituted the stressors latent variable, as the Life Events Survey was used by both sites from which this study’s sample was recruited. It may be that, in this context, number and intensity of negative life events is a more sensitive predictor of post-treatment alcohol use than are daily hassles.
In this study, evaluation of the model for each of the dependent variables revealed acceptable values of global fit indexes (CFI and NNFI), but the percent of variance that the model accounted for in all cases was relatively low (range across the drinking outcomes=12–32%). There are several factors that might help to explain these results. For example, demographic factors typically account for a significant proportion of variance in alcohol treatment outcomes. However, a demographics latent variable was not included in the evaluation of the path model, because the indicators used did not load significantly on such a latent variable according to the measurement model analyses. It might be more useful in future analyses to consider demographic variables singly rather than as a latent variable. In addition, the only indicator of the treatment construct based on the measurement model was treatment setting. Treatment was retained in the model nevertheless because of its substantive importance. This pattern might have resulted from the use of only molar indicators (e.g., treatment setting, number of days of psychological or self-help treatment). It may be that indicators that are measures of more specific aspects of the treatment process that have been shown to be strongly related to outcomes, such as the therapeutic alliance (Connors, Carroll, DiClemente, Longabaugh, & Dovovan, 1997), would have made the treatment variable a more powerful predictor.

There are a few limitations of this study that should be taken into account in the interpretation of its findings. First, the follow-up period extended only to 12 months following treatment initiation, so that generalizations of the findings beyond that time are not warranted. In addition, as mentioned earlier, the measures of the treatment variable were global and do not allow for any specific conclusions about dimensions of the treatment process and their direct or mediated effects on drinking during follow-up. Another point is that all of the information collected in this study was through participants’ self-reports, and no additional measures of participants’ behaviors were collected. However, non-alcohol use variables were measured primarily with standardized, well-established instruments, and the alcohol use data were collected under conditions that have been shown consistently to be associated with accurate self-reporting (Babor et al., 2000).

In conclusion, the data from this study replicate several of the major findings of Connors et al. (1996) with a larger sample and the use of more reliable statistical methods. In particular, the importance of coping behaviors in the prediction of drinking outcomes was reaffirmed. Future research should identify more specific dimensions of the processes of alcohol treatment and their relationship to outcomes, as well as attempt to substantiate direct and mediated effects of coping skills on alcohol use following treatment.

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