Published in final edited form as:

J Subst Abuse Treat. 2012 October ; 43(3): 344–351. doi:10.1016/j.jsat.2011.12.013.

THE ROLE OF THERAPEUTIC ALLIANCE IN SUBSTANCE USE DISORDER TREATMENT FOR YOUNG ADULTS

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Abstract

The therapeutic alliance is deemed to be integral to psychotherapeutic interventions, yet little is known about the nature of its role in treatment for substance use disorders (SUD), especially among young people. We investigated baseline predictors of the therapeutic alliance measured mid-treatment, and tested whether the alliance influenced during-treatment changes in key process variables (psychological distress, motivation, self-efficacy, coping skills, and commitment to AA/NA) independent of these baseline influences. Young adults in residential treatment (N=303; age 18-24) were assessed at intake, mid-treatment, and discharge. Older age and higher baseline levels of motivation, self-efficacy, coping skills, and commitment to AA/NA predicted a stronger alliance. Independent of these influences, participants who developed a stronger alliance achieved greater reductions in distress during treatment. Findings clarify a role for alliance in promoting during-treatment changes through reducing distress.

Keywords

young adults; substance use treatment; therapeutic alliance; motivation

1. Introduction

1.1 Treatment process in young adults

The developmental stage of young adulthood carries significant risk for harmful use of alcohol and other drugs, and for the onset of substance use disorders (SUD). In 2007, an estimated 330,000 individuals aged 18-25 years old received specialty SUD treatment in the public system in the US (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). Yet, little is known about the processes of treatment and early recovery in this population. A better understanding of the ways in which psychotherapeutic interventions impact on health and behavior change is needed to inform age-appropriate intervention efforts (National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2007).

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In a previous study, we examined during-treatment changes in several common processes of treatment-assisted recovery (i.e., psychological distress, motivation, self-efficacy, coping skills, and commitment to AA/NA) in a sample of young adults participating in residential care (Kelly, Urbanoski, Hoepfner, & Slaymaker, 2011). We found significant during-treatment changes in all process variables, and the changes in motivation, self-efficacy and coping skills predicted abstinence 3 months post-treatment. Toward the broader aim of elucidating the factors that influence change among young adults in SUD treatment, we extend this prior work by investigating the role of the therapeutic alliance as a moderator of the treatment process.

1.2 Therapeutic alliance, during-treatment changes and outcomes

From many theoretical perspectives, the alliance between patients and their counselors is deemed integral to successful treatment, by facilitating a greater therapeutic response (Orlinsky, Ronnestad, & Willutzki, 2004). In the psychotherapy literature, the therapeutic alliance is commonly defined as the “degree to which the therapy dyad is engaged in collaborative, purposeful work” (p. 293; Hatcher & Barands, 2006), including consensus on the goals and tasks of therapy, and the emotional bond between clients and therapists. The construct is also manifest in empirically-based conceptual models delineating the process of treatment-assisted recovery from SUD (Orford, et al., 2006; Simpson, 2004).

Nonetheless, the exact role of the therapeutic alliance in the behavior change process remains unclear. Among adults in SUD treatment, a stronger alliance has been linked to greater engagement, retention, and early improvements in substance use and distress (Gibbons, et al., 2010; Lebow, Kelly, Knobloch-Fedders, & Moos, 2006; Meier, Barrowclough, & Donmall, 2005), as well as larger improvements in self-efficacy over the course of treatment (Hartzler, Witkiewitz, Villarroel, & Donovan, 2011). In SUD treatment studies, however, the alliance has only inconsistently been associated with post-treatment outcomes (Meier, Barrowclough, et al., 2005). Recent studies have provided further evidence for a more nuanced role for the therapeutic alliance by evaluating interactions between the alliance and patient characteristics or by partitioning out variance at patient- and therapist-levels (Crits-Christoph, et al., 2009; Ilgen, Tiet, Finney, & Moos, 2006; Ilgen, McKellar, Moos, & Finney, 2006).

Limited work to date has examined the role of the therapeutic alliance in the treatment process and outcomes among young people with SUD. The development of a strong alliance may be particularly critical for treatment engagement and outcomes among youth, given their typically low levels of intrinsic motivation for change at treatment entry (Diamond, et al., 2006). Stronger alliance ratings predicted reduced cannabis use and related problems during and after treatment among adolescents in the Cannabis Youth Treatment (CYT) trial, although results varied depending on the source of the alliance rating (i.e., patient versus therapist) and across the patient and therapist components of variance in alliance scores (Diamond, et al., 2006; Marcus, Kashy, Wintersteen, & Diamond, 2011). Evidence from the general psychotherapy literature supports a modest role for the therapeutic alliance in influencing outcomes among youth with a variety of psychological and behavioral problems (Zack, Castonguay, & Boswell, 2007).

In order to generate a better understanding of the role of therapeutic alliance in treatment-assisted recovery among young adults, analyses are needed that model its influence on during-treatment changes. From a theoretical standpoint, a stronger therapeutic alliance should translate into greater during-treatment gains on important therapeutic targets. Examples of typical therapeutic targets that are common across treatment models and approaches include reduced psychological distress, as well as enhanced abstinence motivation and self-efficacy, recovery focused coping skills for managing high-risk

situations, and commitment to post-treatment supports, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA; Finney, Noyes, Coutts, & Moos, 1998; Gossop, Marsden, & Stewart, 2006; Humphreys, Mavis, & Stofflemayr, 1991; Knudsen, Ducharme, Roman, & Johnson, 2008; Morgenstern, Labouvie, McCrady, Kahler, & Frey, 1997). To the extent that changes in these common processes define a successful treatment episode, the identification of factors that influence their magnitude of change during treatment is warranted.

1.3 Predictors of the therapeutic alliance

Few studies have evaluated the determinants of a strong therapeutic alliance in SUD treatment. Yet, a better understanding of the role of therapeutic alliance requires analyses that adjust for any pre-treatment factors that may account partially or in whole for the alliance-outcome association (Meier, Barrowclough, et al., 2005). The most consistent predictor of a strong therapeutic alliance, found in studies of both adults and adolescents, appears to be greater motivation at admission (Garner, Godley, & Funk, 2008; Meier, Barrowclough, et al., 2005; Meier, Donmall, Barrowclough, McElduff, & Heller, 2005). It makes intuitive sense that a stronger therapeutic alliance would be more easily built among patients who enter treatment with a greater readiness and willingness to change, as these individuals may be more open and amenable to therapy. Additional predictors of a strong alliance include better coping strategies and greater social support at admission (Garner, et al., 2008; Meier, Donmall, et al., 2005). Also, given that most programs in the US strongly encourage their patients to make use of 12-step recovery resources (Knudsen, et al., 2008; Roman & Blum, 2005), patients' pre-treatment commitment to AA/NA may influence the development of the therapeutic alliance by facilitating patient-counselor consensus over the tasks and goals of treatment.

Overall, in the few studies that have examined predictors of the therapeutic alliance in SUD treatment, the pattern of results suggest that the psychological and social resources that patients bring to treatment, as well as their treatment related attitudes and prior experiences, are most consistently associated with the therapeutic alliance (Barrowclough, Meier, Beardmore, & Emsley, 2010; Meier, Barrowclough, et al., 2005). On the other hand, demographic and substance-related factors, including substance use, symptom severity, and diagnoses, typically do not account for significant variance in the therapeutic alliance. We were, however, unable to locate any published studies that evaluated the therapeutic alliance specifically among young adults in SUD treatment.

1.4 Study aims

Toward elucidating the role of the therapeutic alliance in the treatment process among young adults with SUD, we 1) examined the baseline predictors of therapeutic alliance, and 2) tested whether the alliance moderated changes in common process variables over the course of treatment. We hypothesized that greater readiness and functioning at admission, as indicated by baseline scores on the process variables, would predict a stronger therapeutic alliance. Further, we expected that, independent of baseline influences, a strong alliance would enhance the magnitude of during-treatment change achieved in the common process variables.

2. Methods

2.1 Participants

Participants were young adults (n=303; 18-24 years) entering a private residential treatment center in the upper US Midwest, and enrolled in a naturalistic study of treatment process and outcome. An age-stratified sample of 384 patients was selected from all admissions (n=607)

to the center from October 2006 to March 2008. The final sample of 303 represents 78.9% of those approached. Reasons for non-participation included not wanting to participate in the follow-up assessments (44%), not interested (31%), wanting to focus on treatment (14%), and legal issues (2%).

Average age was 20.4 years old ($SD = 1.6$). Participants were predominantly male (73.9%), and all were single. Most were Caucasian (94.7%); 1.7% identified as American Indian, 1.3% identified as African American, and 1.0% as Asian (1.4% reported “other” or missing). At admission, 24.1% were employed full- or part-time, and 31.7% were students. Most had completed high school: 43.6% had a high school diploma and 39.6% had attended college. The most common primary substance was alcohol (28.1%) or marijuana (28.1%), followed by heroin or other opiates (22.4%), cocaine or crack (12.2%), and amphetamines (5.9%). Participants were more likely to be Caucasian than other young adults (18-24) in public sector residential treatment (76%; SAMHSA, 2009), or adults (18+) in private sector treatment (71%; Roman & Johnson, 2004). They were, however, comparable in terms of gender, marital status, and employment status, suggesting that results are broadly generalizable to youth treated for SUD in the US (Roman & Johnson, 2004).

2.2 Treatment

Treatment services were comprehensive and multi-faceted, centered on 12-step approaches. Motivational enhancement, cognitive-behavioral, and family therapeutic approaches were also used. Programming included clinical assessment, individual and group therapy, and specialty groups, such as relapse prevention, anger management, eating issues, dual disorders, gender issues, assertiveness training, and trauma. Integrated mental health care was provided on-site, including clinical assessment, therapy, and medication management. Treatment was delivered by licensed addiction therapists. Participants' average length of stay was 25.6 days ($SD = 5.7$, ranging from 4-35 days). The majority (83.8%) were discharged with staff approval.

2.3 Procedure

The study was conducted in accordance with the Institutional Review Board at Schulmann Associates IRB, an independent review board, and all participants signed informed consent documents. Research staff conducted assessments at baseline, mid-treatment, and discharge. Baseline assessments were conducted a mean of 4.1 days ($SD=1.4$) after admission, mid-treatment assessments 14.0 days ($SD=1.2$) after admission, and discharge assessments 24 days ($SD=2.5$) after admission. All assessments included both interview-based and self-administered questionnaires. Participants were reimbursed \$30 for the baseline and discharge assessments, and \$10 for the mid-treatment assessment. Follow-up rates were 91.1% ($n=276$) at mid-treatment and 87.1% ($n=264$) at discharge. Baseline comparisons revealed that those who missed assessments had significantly ($p<.05$) lower education, were younger and less likely to be Caucasian.

2.4 Measures

Demographics and primary substance—Participant age, gender, ethnicity, education, and marital status, and drug of choice were abstracted from medical records.

Therapeutic alliance was rated in regard to patients' assigned therapist by patients at the mid-treatment assessment using the short form of the Working Alliance Inventory (WAI-S; Horvath & Greenberg, 1989; Tracey & Kokotovic, 1989). The measure includes three subscales assessing agreement over the goals and tasks of therapy and the patient-counselor bond, consonant with alliance theory (Hatcher & Barands, 2006). Items are rated on a 7-point scale based on agreement with each statement, and are summed to provide total

subscale scores. As in previous analyses (Connors, et al., 2000; Diamond, et al., 2006), a combined total score was used because of high correlations between subscales ($\rho=.78-82$). Scores ranged from 12-84, with higher scores indicating stronger alliance. The WAI-S has shown high internal consistency and construct validity in psychotherapy samples (Busseri & Tyler, 2003; Tracey & Kokotovic, 1989). It is notable that alliance is commonly assessed early on in treatment, as early as the second session in outpatient programs (Diamond, et al., 2006; Garner, et al., 2008; Hartzler, et al., 2011); such that we expect 2 weeks to be a sufficient length of time to permit the development of a patient-counselor alliance in a residential setting.

Psychological distress was measured at admission, mid-treatment and discharge with the Global Severity Index (GSI) of the 18-item Brief Symptom Inventory (BSI-18; Derogatis, 2001). Items are rated on a 5-point scale measuring past-week distress, and the raw summed scores are converted to standardized T scores ($M=50$, $SD=10$) using published gender-specific community norms (Derogatis, 2001). The measure has shown good internal consistency, test-retest reliability, and construct validity in similar populations (Derogatis, 2001; Wang, et al., 2010).

Motivation and self-efficacy for abstinence were assessed at admission and discharge with single items, rated on a 10-point scale: "How important is it for you to not drink or use drugs in the next 90 days or 3 months?" and "How confident are you that you will be able to stay clean and sober in the next 90 days or 3 months?", respectively. While a coefficient alpha cannot be calculated for single-item measures, the psychometric advantages of their use versus multiple-item measures include face validity, reduction of the chance of common method variance (Gardner, Cummings, Dunham, & Pierce, 1998), straight-forward adaptation to new populations (Nagy, 2002), and, in the case of self-efficacy, improved prediction of treatment outcome (Hoepfner, Kelly, Urbanoski, & Slaymaker, 2011).

Coping skills were assessed at admission and discharge with the 9-item abstinent-focused coping subscale of the Adolescent Relapse Coping Questionnaire (ARCQ; Myers & Brown, 1996). This measure presents respondents with a commonly encountered relapse situation (i.e., a social gathering at which alcohol and drugs are present), followed by items assessing the likelihood of using different coping strategies, rated on a 7-point scale. Summed totals range from 9-63, with higher scores indicating greater coping resources. The subscale has demonstrated good internal consistency, concurrent and predictive validity among adolescents in SUD treatment (Myers & Brown, 1996).

Commitment to AA/NA was assessed at admission and discharge with a 6-item subscale from the Addiction Treatment Attitudes Questionnaire (ATAQ; Morgenstern, Frey, McCrady, Labouvie, & Neighbors, 1996). Items are rated on a 5-point scale based on level of agreement with attitudes toward treatment and recovery. Summed totals range from 6-30, with higher scores indicating greater commitment. The subscale has shown high internal consistency and construct validity among adults in SUD treatment (Morgenstern, et al., 1996).

Pre-treatment substance use and recent treatment experience were captured at admission using a modified version of the Form-90 (Miller & Del Boca, 1994). The Percentage of Days Abstinent (PDA) from all substances, except nicotine, was derived for the 90 days prior to treatment entry. A binary variable was also derived indicating past-year hospitalization because of alcohol or other drug use. The Form-90 has shown good test-retest reliability and construct validity in both adult and adolescent samples (Slesnick & Tonigan, 2004; Tonigan, Miller, & Brown, 1997).

Adverse consequences of substance use were assessed at admission with the 50-item Inventory of Drug Use Consequences – Recent (InDUC-2R; Tonigan & Miller, 2002). Items are rated in terms of their frequency in the past 90 days, from *never* (0) to *daily or almost daily* (3). These are summed to provide a total score (0-135) with higher scores indicating more severe consequences. The InDUC-2R has shown good test-retest reliability and shown sensitivity to change during treatment among adults with SUD (Tonigan & Miller, 2002).

2.5 Analysis

Spearman correlations were used to identify the demographic and baseline psychological and substance-related predictors of patient-rated therapeutic alliance. Following the lead of prior studies (Barrowclough, et al., 2010; Garner, et al., 2008; Meier, Donmall, et al., 2005), we tested an array of potential patient predictors of the therapeutic alliance, including demographic characteristics (age, gender, race, and education), baseline levels of the common process variables (distress, motivation, self-efficacy, coping, and commitment to AA/NA), and substance-related factors (pre-treatment substance use, severity of adverse consequences, and past-year substance-related hospitalization).

To test whether therapeutic alliance was associated with during-treatment changes in process variables, separate mixed effects models were fit with the repeated measures of the common processes as dependent variables. Predictors included a linear time effect, a main effect for alliance, and an interaction between alliance and time. A significant interaction provides evidence of a moderating effect of therapeutic alliance on the during-treatment change in each process variable. A significant main effect indicates an association between therapeutic alliance and initial status for the process variable, or its value at admission. A second set of models was run adjusting for the baseline predictors of therapeutic alliance identified by Spearman correlation, as well as their interactions with time. The latter terms were added to test whether any influence of therapeutic alliance was independent of other, potentially related influences on during-treatment changes. All models additionally adjusted for predictors of attrition (age, race, and education) in accordance with expert recommendations (Judd & Kenny, 2010; Singer & Willett, 2003), as well as for pre-treatment PDA to account for heterogeneity in levels of substance use at admission.

All continuous variables were mean-centered to avoid multicollinearity in the presence of the interaction terms. Psychological distress, coping skills and commitment to AA/NA were modeled as normally distributed using maximum likelihood estimation. Motivation and self-efficacy, both highly negatively skewed, were reflected and fitted with Poisson models. All models included random intercepts and slopes for time. Due to variation in the assessment content across time points (see 2.4 Measures), the model predicting psychological distress incorporated data from three time points (i.e., admission, mid-treatment and discharge), while the others incorporated data from admission and discharge. Analyses were conducted in Stata 11.0 and used an alpha of .05.

3. Results

Table 1 displays results from the correlational analysis examining predictors of therapeutic alliance. Older age and higher baseline levels of motivation, self-efficacy, coping skills, and commitment to AA/NA predicted a stronger therapeutic alliance. Trend-level associations were found for female gender and more severe adverse consequences.

The models predicting during-treatment change in the process variables are summarized in Table 2. Adjusting for pre-treatment substance use and attrition predictors (Model A), significant changes were found for psychological distress, motivation, self-efficacy, coping skills and commitment to AA/NA between admission and discharge. Therapeutic alliance

was associated only with the change in psychological distress, as indicated by the significant interaction with time. Splitting the sample at the median value for therapeutic alliance revealed that the decline in distress was steeper among those with “stronger” therapeutic alliances at mid-treatment (i.e., those with WAI-S scores exceeding the median; Figure 1).

Significant main effects for therapeutic alliance were found for the remaining process variables (Table 2). That is, although not associated with the *change* in process variables over the course of treatment, the therapeutic alliance was stronger among those who entered treatment with higher motivation, self-efficacy, coping resources, and commitment to AA/NA. These associations are consistent with the correlational analysis presented in Table 1.

The second set of models in Table 2 (Model B) display the findings after adjusting for the admission variables associated with therapeutic alliance ($p < .1$): age, gender, and adverse consequences, as well as baseline motivation, self-efficacy, coping, and commitment to AA/NA where these factors were not already represented in the dependent variable (i.e., the model predicting change in motivation adjusted for baseline self-efficacy, coping, and commitment to AA/NA). Overall, including these baseline variables did not substantively alter the pattern of associations involving therapeutic alliance. The moderation of during-treatment distress was attenuated, but remained significant. In contrast, the association between therapeutic alliance and admission level of coping skills was reduced to non-significance ($p > .05$).

4. Discussion

This study contributes to a burgeoning literature examining processes of treatment and recovery in SUD treatment, and offers novel findings pertaining to the role of the patient-therapist alliance in facilitating during-treatment change in young adults. Patients who were older and those who entered treatment with higher levels of motivation, self-efficacy, coping skills and commitment to AA/NA developed a stronger therapeutic alliance in the initial weeks of treatment. Independent of these baseline predictors, however, patients who developed a stronger alliance early on in treatment achieved greater reductions in psychological distress between admission and discharge. Contrary to our hypothesis that the alliance would facilitate during-treatment changes across multiple common processes, the alliance was unrelated to changes in abstinence motivation, self-efficacy, coping skills, or commitment to AA/NA.

The results of the analysis predicting patient-ratings of the therapeutic alliance are largely consistent with prior research among adults and adolescents in treatment (Garner, et al., 2008; Meier, Barrowclough, et al., 2005; Simpson, 2004). Across age groups then, there is evidence to suggest that a strong therapeutic alliance may be built more easily among those who enter SUD treatment with a greater degree of treatment readiness. Findings from the mixed effects models examining during-treatment changes provided further clarification of these associations. Specifically, the significant associations found between therapeutic alliance and initial status in motivation, self-efficacy, and commitment to AA/NA persisted after adjusting for each other's influences and for pre-treatment substance use. In other words, baseline motivation and self-efficacy for abstinence and commitment to AA/NA were independently predictive of the therapeutic alliance. Conversely, the association between baseline coping and therapeutic alliance appeared to be accounted for by these other psychological variables. As in prior studies, substance use severity and symptoms were not predictive of the therapeutic alliance, suggesting that the level of substance-related impairment may not preclude the development of a strong patient-counselor alliance (Barrowclough, et al., 2010; Garner, et al., 2008; Meier, Donmall, et al., 2005). Given the paucity of research examining the development of the therapeutic alliance in SUD treatment,

particularly in this age group, these findings require replication and extension in further studies.

The association between therapeutic alliance and reduced psychological distress provides one possible mechanism through which the alliance may impact on recovery. To the extent that the alliance is characterized by patient-centeredness, consensus over goals and tasks, and accurate empathy toward patients by clinicians (Lebow, et al., 2006), counselors that facilitate or incorporate these aspects are likely to help patients feel better sooner. Given the limited work conducted to date with this age group, the role of during-treatment change in psychological distress in the broader recovery process among young adults requires further clarification. For instance, although not tested specifically in the current study, it is possible that the decrease in psychological distress accelerated by a stronger alliance may indirectly facilitate other therapeutic changes by helping patients to more easily assimilate and retain new coping skills and increase abstinence motivation and self-efficacy. At the same time, the lack of an association between alliance and during-treatment changes in motivation, self-efficacy, coping skills, and commitment to AA/NA suggests that other individual and/or contextual variables account for the majority of changes in these factors in young adults. For instance, peer group influences may constitute an important part of the therapeutic process, particularly in residential settings. That said, motivation and self-efficacy were negatively skewed, suggesting that patients were fairly highly motivated and confident at admission. It is possible that factors related to study participation, such as assessment reactivity or demand characteristics, may have influenced patient expectations for treatment. Future research is needed to tease apart these and other alternative explanations.

4.1 Limitations

Due to the nature of the data available, we were unable to account for the dyadic or multi-level nature of the therapeutic alliance, such as by incorporating therapists ratings of the alliance or taking into account patient clustering within therapists (Baldwin, Wampold, & Imel, 2007; Marcus, et al., 2011). In the absence of data linking patients with specific therapists, we were also unable to assess the influence of specific therapist characteristics on patient ratings of the alliance or during-treatment change. The unavailability of multiple informants for the alliance and other constructs may have contributed to bias due to common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). These factors warrant future investigation. Although analytic procedures were used to minimize the impact of attrition bias (Graham, 2009; Singer & Willett, 2003), participant attrition from the study at discharge (13%) remains a limitation. Common to other studies of the determinants and outcomes of therapeutic alliance, alliance ratings were unavailable for subjects who left treatment very early on, limiting the extent to which we can draw conclusions about those who found it particularly difficult to engage with treatment (Meier, Barrowclough, et al., 2005). Finally, subjects were largely male and Caucasian, and were attending a private residential treatment program. Findings require replication in more ethnically and gender diverse samples, and in public treatment settings.

4.2 Conclusions

The present study makes a novel contribution to the sparse literature on processes of treatment-assisted recovery among young adults with SUD. Strengths of this study stem from the prospective nature of the data, which permitted a valid assessment of the change in common process variables over the course of treatment and the influence of the early therapeutic alliance. Although the magnitude of the effect was not large, findings suggest that a strong therapeutic alliance may be important in potentiating reductions in psychological distress during treatment. To the extent that the experience of lower psychological distress supports related recovery processes and facilitates additional

treatment gains, such as increased motivation, self-efficacy, or coping skills, this association may signal an important mechanism through which treatment is able to assist young adults in maintaining sobriety.

Acknowledgments

This study was supported by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) grant number R21AA018185, National Institute on Drug Abuse (NIDA) grant number K01DA027097, and an anonymous donation to the Hazelden Foundation in Minnesota. A limited portion of this manuscript was presented at the 34th Annual Scientific Meeting of the Research Society on Alcoholism in Atlanta, Georgia (June 25-29, 2011).

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Figure 1.
Moderation of during-treatment change in psychological distress by therapeutic alliance

Table 1

Baseline predictors of therapeutic alliance

Baseline Characteristic	Spearman correlation (ρ)
<i>Demographic:</i>	
Age	0.14 *
Gender	-0.11 †
Race	-0.05
Education	-0.02
<i>Psychological:</i>	
Distress	0.06
Motivation for abstinence	0.25 **
Abstinence self-efficacy	0.16 **
Abstinence-focused coping	0.24 **
Commitment to AA/NA	0.23 **
<i>Substance-related:</i>	
Percent days abstinent in past 3 months	0.02
Severity of adverse consequences	0.10 †
Past-year hospitalization for alcohol or other drugs	-0.02

†
p<.1*
p<.05**
p<.01

Table 2

Influence of therapeutic alliance on during-treatment changes

Independent variable	Distress			Motivation for abstinence			Abstinence self-efficacy			Abstinence-focused coping			Commitment to AA/NA		
	est ^a	se	z	est	se	z	est	se	z	est	se	z	est	se	z
<i>Model A:^b</i>															
Time (during-treatment change)	-5.02	0.26	-19.33**	1.09	0.04	2.41*	1.24	0.03	7.78**	3.13	0.28	10.90**	1.29	0.12	10.32**
Therapeutic alliance	0.03	0.04	0.86	1.01	0.00	3.05**	1.01	0.00	3.10**	0.21	0.04	4.77**	0.10	0.02	5.15**
Therapeutic alliance * Time	-0.08	0.02	-3.80**	1.00	0.00	0.63	1.00	0.00	-1.19	0.00	0.02	0.11	0.01	0.01	1.07
<i>Model B:^c</i>															
Time (during-treatment change)	-5.87	0.51	-11.45**	1.10	0.08	1.38	1.25	0.06	4.59**	3.34	0.54	6.15**	1.58	0.24	6.50**
Therapeutic alliance	-0.03	0.04	-0.77	1.01	0.00	2.05*	1.01	0.00	2.19*	0.07	0.04	1.72 [†]	0.05	0.02	2.50*
Therapeutic alliance * Time	-0.05	0.02	-2.38*	1.00	0.00	0.03	1.00	0.00	-1.94 [†]	0.03	0.02	1.55	0.02	0.01	1.87 [†]

[†] p<.1

* p<.05

** p<.01

^aParameter estimates are regression coefficients (distress, abstinence coping, and AA/NA commitment) or rate ratios (abstinence motivation and self-efficacy) from mixed effects models

^bModels adjusted for pre-treatment substance use and participant characteristics associated with missing the discharge assessment (age, race, and education)

^cModels adjusted for pre-treatment substance use, participant characteristics associated with missing the discharge assessment (race and education), and predictors of therapeutic alliance (age, gender, baseline values of process variables, and adverse consequences), and their interactions with time