

CHANGES IN COPING STRATEGIES AMONG WOMEN RECEIVING
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ABSTRACT

This study examined coping and change in coping among a sample of 158 women entering a randomized clinical trial of cognitive-behavioral therapy (CBT) for an alcohol use disorder (AUD). This is a secondary analysis of data collected as part of a larger two-armed trial of different models of individual and couples therapy for women with AUDs. Study aims were to describe the initial coping strategies -- including demographic, psychological, and substance use correlates -- of women entering treatment, examine change in coping during and following treatment, examine change in coping as a function of treatment attendance and engagement, and explore the relationship between coping and change in coping as predictive of longer-term drinking outcome. Participants were recruited from the community and were: at least 18 years old, in a stable relationship with a male partner, met DSM-IV AUD criteria, and had used alcohol in the 30 days prior to recruitment. Coping was assessed with the Coping Behaviours Inventory (CBI) (Litman et al., 1983) administered at four time points: at baseline, after 12 weeks of treatment, and at follow-up assessments six and twelve months after treatment. Women entered treatment with a comparatively high degree of *cognitive* versus *behavioral* coping strategies, and total coping followed a quadratic shape and increased during treatment. Attendance was positively associated with change in coping during treatment, while homework completion was not. Coping and change in coping was predictive of fewer drinking days at follow-up as well as greater likelihood of abstinence. However, for a portion of women still drinking, coping was also associated with greater drinks per drinking day. Implications and next steps are discussed.

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CHAPTER I

INTRODUCTION

Brief Introduction to the Study of Coping

The classification of coping in terms of cognitive and behavioral strategies to manage response to a stressor corresponded to the “cognitive revolution” and growth of cognitive and behavioral therapies of the 1960s and 1970s (Folkman & Moskowitz, 2004). One of the most broadly used definitions of coping proposed by Lazarus & Folkman conceptualizes coping as “thoughts and behaviors that people use to manage the internal and external demands of situations that are appraised as stressful,” (Folkman & Moskowitz, 2004, pp. 746-747.) The identification of cognitive and behavioral strategies for dealing with stress represented a transition from previous psychodynamic focus on defenses (see Folkman & Moskowitz, 2004).

Coping skills have been classified functionally as *problem-focused* or *emotion-focused* (Billings & Moos, 1981; Folkman & Moskowitz, 2004). *Problem-focused* strategies are those that aim to change a stressor’s effects, while *emotion-focused* strategies are those that attempt to manage a stressor’s effects in order to maintain “emotional equilibrium” (Billings & Moos, 1981). Problem-focused coping refers to taking steps to address a problem, while emotion-focused coping refers to seeking out

ways to alleviate distress associated with a problem (e.g., using drugs or alcohol, seeking social support) (Folkman & Moskowitz, 2004).

Other classification systems divide coping according to specific method (*cognitive* versus *behavioral*) and process (*active* versus *avoidant*) (Billings & Moos, 1981; Moos & Holahan, 2003; Moser & Annis, 1996). *Cognitive* methods refer to internal activities involving thoughts, such as cognitive reframing, recalling prior experiences with a stressor, and attempting to suppress thoughts related to the stressor. *Behavioral* methods typically require explicit action and might include seeking information or social support, engaging in activities for emotional relief, and escape activities. Coping researchers discuss the *active* versus *avoidant* distinction as reflecting intent of a coping activity, in that *active* strategies are aimed at dealing directly with the stressor, while *avoidant* strategies are aimed at reducing emotional arousal or distress associated with the stress.

Coping strategies traditionally have been measured by checklists or “inventories,” in which individuals are presented with a range of strategies and asked to recall and rate the degree to which they have used these strategies. Other, more recent, approaches include eliciting narratives of stressful events, or using ecological momentary assessment of coping to increase recall reliability (Folkman & Moskowitz, 2004). While use of an inventory to measure coping in response to a stressful situation has generated some debate (see, for example Lazarus, 2000) it represents a widely used method for measuring coping, and allows for a “first pass” assessment across large samples and a range of behavioral and cognitive strategies (Folkman & Moskowitz, 2004; Lazarus, 2000). Critics of some coping inventory-based research including Coyne & Racioppo (2000)

have cited the significant heterogeneity of stressors examined within broad stress-related coping questionnaires, one-time assessment points that overly simplify the coping process, and a lack of relevance or application of findings to clinical intervention. As such, longitudinal assessment across multiple timepoints has been proposed as a way to improve the usefulness of broad coping research (Lazarus, 2000). Additionally, linking coping explicitly to stressors that are a focus of clinical attention could address questions of clinical relevance.

Given various classifications of method and function of coping, a logical question is, “What type of coping is the most effective in reducing distress and promoting positive outcome subsequent to a stressor?” The literature indicates that coping strategies are contextual, and thus, seemingly maladaptive strategies may be effective depending on the demands of the situation; further, it may be that coping flexibility is a particularly important skill, as it reflects the ability to apply differing strategies as the need and context arises (Folkman & Moskowitz, 2004; Tamres, Janicki, & Helgeson, 2002). Nonetheless, several themes, across stressor types (e.g., health, employment, family, etc.) emerge. Generally, *problem-focused* and *active* strategies have been associated with better outcome (e.g., Beutler, Moos, & Lane, 2003; Billings & Moos, 1981), and strategies promoting *avoidance* or emotional discharge are associated with worse outcome (e.g., Beutler et al., 2003; Billings & Moos, 1981; Billings & Moos, 1984; Moos, Brennan, Fondacaro, & Moos, 1990).

Significance of Coping within AUD Literature

Alcohol-related Coping

For individuals with alcohol use disorders (AUD), coping with alcohol-related situations has been defined as “...a response to external circumstances or internal mood states to prevent, avoid, or control the resumption of heavy drinking.” (Litman, Stapleton, Oppenheim, & Peleg, 1983, p. 271).

Lack of General Coping Skills

Lack of ability to access a variety of effective coping skills has been proposed as a determining factor in the etiology and maintenance of an AUD (Marlatt & Gordon, 1985; Witkiewitz & Marlatt, 2004). Maisto, Connors & Zwiak (2000) discuss “coping skills deficit” models in which the individual is presumed to have few ways of coping to stress as well as a social environment conducive to substance use. As they and others discuss, alcohol use is viewed as a maladaptive coping response to stress, and thus, deficits in coping skills have been proposed one potential contributor to the development of addictive behaviors (Maisto, Connors & Zwiak, 2000; Monti, Kadden, Rohsenow, Cooney, & Abrams, 2002; Morgenstern & Longabaugh, 2000). According to this model, treatment is geared towards enhancing individuals’ coping skills (Marlatt & Gordon, 1985; Witkiewitz & Marlatt, 2004). Identification, development, and practice of effective coping repertoires are standard components of cognitive-behavioral treatment for AUDs (Carroll, 1999; Epstein & McCrady, 2009). Additionally, within the AUD literature,

coping has also been associated with treatment entry and retention, with *problem-focused, approach* strategies being associated with treatment entry, and *avoidance* strategies being associated with treatment dropout (see Beutler et al., 2003).

Alcohol-related Coping and AUD Treatment Outcome

Given that an increase in coping skills has generally been recognized as a fundamental goal of AUD treatment, a number of studies have examined the relationship between change in coping strategies and treatment/drinking outcome. Moser & Annis (1996) assessed coping in response to “relapse crises” (self-reports of threats to abstinence or actual drinking) among individuals recently discharged from AUD treatment. Subjects were recruited when enrolled in an inpatient or day treatment program for alcohol use disorders and were followed-up for three months post-discharge. Coping was assessed by interview and analyzed according to total strategies used, as well as by type, according to one of four category groupings: *active-behavioral* (i.e., explicit action to handle the problem including problem solving, seeking information/support, and engaging in alternative activities), *active-cognitive* (i.e., cognitive strategies to handle a problem or defuse emotional reaction, including cognitive reframing, positive self-talk, thinking of consequences, etc.), *behavioral-avoidance* (i.e., explicit action to avoid a problem or to defuse emotional reaction), and *cognitive-avoidance* (i.e., cognitive strategies to avoid thinking of the problem, including avoidance, or using willpower). For those individuals who reported a drinking episode following treatment, drinking was dichotomized to light versus heavy drinking (defined as 1-4 standard drinks versus >4 standard drinks, respectively), and coping strategies used to terminate this episode were assessed. The authors found that use of a greater number of coping strategies was

significantly associated with greater likelihood of abstinence (with use of one additional coping strategy resulting in a nearly eightfold increased likelihood of abstinence).

Further, for those individuals who did experience a drinking episode, number of coping skills was associated with a greater likelihood of a light versus heavy drinking episode.

The authors found that use of *active* strategies (versus *avoidance* strategies) significantly predicted abstinence regardless of whether *cognitive* or *behavioral*, and any coping strategy (*cognitive* or *behavioral*, *avoidance* or *active*) was better than no coping strategy at maintaining abstinence. Interestingly, among individuals who drank during the follow-up period, only *behavioral-avoidance* strategies (versus *active-cognitive*, *cognitive-avoidance* strategies and *active-behavioral* strategies) were significant predictors of cessation of the drinking episode before heavy drinking occurred) (Moser & Annis, 1996).

The study by Moser & Annis (1996) is often highlighted as support for the importance of *active* coping in maintaining good outcomes following AUD treatment. The study also generates a number of additional interesting questions, including the effect of treatment variables on coping, and change in coping during the treatment follow-up period. Details regarding treatment including length, components of, and engagement in, were not provided, and thus, it did not appear that treatment factors were included in the analysis of use of coping strategies. Additionally, the authors did not appear to control for gender as part of the light/heavy drinking episode classification (72% of participants were male), which may have contributed to the amount of alcohol consumed. The authors subsequently explored gender differences in coping situations (see below; Annis, Sklar, & Moser, 1998).

In another study, Maisto, Connors and Zwiak (2000) drew from social learning and stress and coping theories to test a model in which change in coping skills and self-efficacy mediates risk of relapse following AUD treatment. Their sample included 77 men and 65 women receiving AUD treatment across eight inpatient or outpatient sites. In this analysis, the authors defined six sets of variables, including demographics, baseline psychiatric functioning (as measured by the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), and Spielberger State-Trait Anger Scale (STAS)), alcohol use (including drinking patterns, disorder history, severity, and associated problems), treatment (including quantity and quality, as measured by client satisfaction), coping skills (as measured by the Coping Behaviours Inventory (CBI)), and self-efficacy (as measured by the Situational Confidence Questionnaire (SCQ)) (Maisto et al., 2000). Controlling for patient demographics, psychopathology, and treatment (including professional and Alcoholics Anonymous (AA) attendance and satisfaction), the authors found that change in coping skills and self-efficacy were independent predictors of drinking outcomes one year after treatment initiation. However, support for coping or self-efficacy as mediators of the relationship between treatment and outcome was not found. A limitation proposed by the authors as possibly contributing to this lack of mediational findings was the fact that treatment was not necessarily a standardized, skills-based CBT, but rather, was more broadly operationalized according to attendance, engagement, and global satisfaction. Treatment also spanned multiple sites and a range of intensity (i.e., both inpatient and outpatient) and thus, it is possible that there was significant variability in treatment protocols across sites. Additionally, the authors noted

that coping and self-efficacy constructs were measured only at the six-month point in the study, and thus, may not have been sensitive to more subtle changes.

Chung, Langenbucher, Labouvie, Pandina, & Moos (2001) analyzed change in *approach* versus *avoidance* coping skills (as measured by the Coping Response Inventory (CRI), which assesses coping in response to a recent stressor) as predicted by specific increases in cognitive and behavioral coping types, by alcoholism type (i.e., Babor, Hofmann, & DelBoca's (1992) Type A versus Type B), and by cognitive appraisal of the stressor. In turn, the authors tested the relationship between coping type and treatment outcome. The sample consisted of 133 individuals (80% men) with AUDs recruited from eight treatment sites. Treatment sites were both inpatient and outpatient, with 58% of individuals in this study coming from inpatient settings. The CRI classifies coping as *cognitive approach* (including activities classified under "logical analysis" and "positive reappraisal" subscales such as making plans and reframing), *cognitive avoidance*, (consisting of activities classified under "cognitive avoidance" and "resigned acceptance" subscales such as avoiding thinking about the problem or deciding that nothing can be done), *behavioral approach* (comprised of activities subsumed under "support seeking" and "problem solving" subscales such as seeking information and making direct action), and *behavioral avoidance* (consisting of activities classified under "seeking alternate rewards" and "emotional discharge" subscales such as venting and participating in other pleasurable activities). The CRI elicits coping activities linked to a specific and recent stressor provided by the respondent, which were coded by the researchers into four categories: interpersonal, financial, work, and other (including alcohol or substance use).

Chung, et al. (2001) found a reduction in the use of *avoidance* (both *behavioral* and *cognitive*) coping behaviors following treatment, and an increase in *behavioral approach* coping skills; the latter was also associated with reduced alcohol severity one year following intake, while decreases in *cognitive avoidance* coping was associated with reduced psychosocial problems as measured by the Addiction Severity Index. Of avoidance coping, *cognitive avoidance* (versus *behavioral*) was associated with more substance use and psychological problem severity. While Type B patients showed higher levels of *avoidance* coping than Type A patients, the former also showed higher levels of *approach* coping following treatment initiation. The authors note several factors affecting the generalizability of this study, including sample-specific factors: as noted above, the majority of patients were male. Additionally, the coping questionnaire used in this study links coping to specific stressors, only a few of which were relapse related, and thus, as the authors notes, results may be less translatable to individuals specifically facing an alcohol relapse situation (Chung et al., 2001).

The finding of an association between cognitive avoidance and negative treatment outcome is interesting in the context of a more recent study (Levin, Ilgen, & Moos, 2007), based on a different sample of 3,698 men receiving residential treatment for substance use disorders (SUDs). This study examined the potential moderating role of coping on the relationship between self-efficacy and alcohol use outcome. Like Chung et al. (2001), the authors found that *cognitive avoidance* coping, again as measured by the CRI was significantly associated with poor AUD outcome (i.e., alcohol dependence symptoms and drinking patterns) at a five-year follow-up, but only for those individuals

with low self-efficacy.

Another recent study used survival analysis and latent growth mixture modeling to study shared and individual drinking trajectories and risk factors, including coping behaviors and dependence severity, for lapse among individuals treated for AUDs (Witkiewitz & Masyn, 2008). The study consisted of 563 individuals (59% male) recruited across 15 community treatment programs in New Mexico, Rhode Island, and upstate New York. Individuals were assessed at baseline (i.e., treatment admission), and follow-up data were collected for the 12 months following admission. Growth models were constructed beginning the month following first lapse (i.e., first drink), and trajectories were modeled across the subsequent seven-month period. Coping was measured with the CBI at baseline and twice during the follow-up period. The authors identified three post-lapse drinking trajectories: heavy drinkers, prolapsers (initially heavy, but reducing over time), and moderate and infrequent drinkers (comprising 82% of the sample that relapsed). Total coping score at baseline was associated with lower risk of relapse, and longer time to first lapse. Further, a reduction in total coping score (i.e., reduced coping behaviors) from baseline onwards was associated with an increased likelihood of drinking. Additionally, a reduction in total coping from baseline to the month following a lapse was associated with subsequent increased drinking in both quantity and frequency following the first lapse¹. Higher alcohol severity and male gender were also associated with increased drinking following the first lapse. Thus, the authors identify increases in coping as being a positive prognostic indicator in terms of

¹ Change in coping between baseline and subsequent to the first lapse was used as a covariate in growth mixture models identifying post-relapse drinking trajectories, hence, the use of this time frame.

time to relapse, as well as drinking patterns, should a lapse occur; additionally, the authors advocate continued emphasis of coping skills training in alcohol treatment. Of note, the authors did not include treatment factors, such as dosage, or type received (i.e., inpatient/outpatient, manualized and coping-skills based versus not, etc.) as predictors of relapse or coping (Witkiewitz & Masyn, 2008).

Women with AUDs

Research on women and alcohol use suggests that females differ from males in reasons for alcohol initiation, drinking trajectories, and treatment outcome, including factors associated with relapse risk (Schneider, Kviz, Isola, & Filstead, 1995; Zweig, McCrady, & Epstein, 2009). For example, marriage and marital stress appears to be a risk factor for relapse among women, while being married may reduce men's risk of relapse (Walitzer & Dearing, 2006). Negative affect and interpersonal distress appear to precipitate relapse to substance abuse more frequently in women than in men (Walitzer & Dearing, 2006; Zweig et al., 2009). Although women generally report lower alcohol consumption (National Institute on Alcohol Abuse and Alcoholism, 2008) and rates of AUDs among women are lower than among men (Grant & Harford, 1995; Grant et al., 2004b), women tend to experience more health-related consequences compared to men (see review, Nolen-Hoeksema, 2004). Additionally, women experience physical sequelae on par with their male counterparts after a shorter duration of drinking (i.e., a "telescoping" effect)(Mann et al., 2005). This could, in part, be due to physiological and metabolic differences; for example, women reach a higher blood alcohol level (BAL) after consuming the same amount of alcohol as men (Mumenthaler, Taylor, O'Hara, & Yesavage, 1999). Further, women with AUDs have a higher rate of comorbid mood and

anxiety disorders, perhaps preceding AUD onset (Kessler et al., 1997), and the likelihood of meeting criteria for obsessive-compulsive, histrionic, and antisocial personality disorders is greater among women with alcohol dependence than their male counterparts (Grant et al., 2004a).

Research also suggests that women's treatment experiences are different from their male counterparts. Women are less likely to seek treatment for a substance use disorder in a specialty treatment center (Dawson, 1996; Greenfield, 2002). Among those who do seek treatment, treatment addressing a variety of women-specific needs (e.g., child care, women's-only programs, workshops covering issues specifically relevant to women) may be associated with better treatment experiences and outcome (Ashley, Marsden, & Brady, 2003; Nelson-Zlupko, Dore, Kauffman, & Kaltenbach, 1996).

Gender and Coping

Gender differences in coping strategies across general stressors (e.g., health, relationship, or occupation) and among nonclinical samples are fairly well established. While clearly situation specific, the literature consistently shows higher absolute rates of coping activities among women, but differences in types of strategies used (Eaton & Bradley, 2008; Ptacek, Smith, & Dodge, 1994; Tamres et al., 2002). In general, the literature suggests higher rates of *emotion-focused* coping (i.e., strategies to handle or diffuse an emotional response to a stressor) and *social-support seeking* among women versus men, and relatively higher rates of *problem-focused* coping among men (Billings & Moos, 1981; Billings & Moos, 1984; Ptacek et al., 1994). However, there is also some inconsistency in the literature: researchers have also reported greater *withdrawal* or *avoidance* coping among men versus women (Matud, 2004; Tamres et al., 2002), which

is generally classified as an “emotion-focused strategy,” given the purpose of avoiding or diffusing negative emotion. Older research has proposed that women engage in less effective coping strategies than men, such as increased *avoidance* coping (Billings & Moos, 1981), increased *emotion-focused* coping (Billings & Moos, 1984) and less *problem-solving* coping strategies than men (Hobfoll, Dunahoo, Ben-Porath, & Monnier, 1994). However, other studies indicate that use of *problem-solving* strategies are frequently endorsed by both men and women (Ptacek et al., 1994), and some have also argued that use of a broad category such as “problem-focused” disguises more aggressive strategies more frequently used by men versus assertive strategies more frequently used by women (Hobfoll et al., 1994). Researchers have also proposed an association between gender role identification (i.e., extent of masculinity/femininity) and coping behaviors, with higher gender role identification predicting use of strategies (i.e., *emotion-focused* for those with higher female role identification, *problem-focused* for those with higher male role identification) but have found inconsistent support for this hypothesis (Hobfoll et al., 1994; Ptacek et al., 1994).

There exist a number of hypotheses regarding the etiology of coping differences across genders. Some have argued (e.g., Billings & Moos, 1984) that gender differences in coping can be attributable to differences in exposure to stressors. Taken a step further, a “situational hypothesis” (Tamres et al. 2002) proposes that coping differences could reflect variations in stressful situations that males versus females experience as a result of different societal roles. Some have found that women report a higher *rate* of life stressors than men (Matud, 2004), and there is some evidence that when faced with the same number of stressors, women appraise them differently than men (Eaton & Bradley, 2008;

Matud, 2004; Tamres et al., 2002). This would be more consistent with a “dispositional hypothesis” of gender differences in coping, which incorporates research from the animal and developmental research base to highlight fundamental gender differences in emotional expressiveness and stress responses (Tamres et al., 2002). Additionally, researchers have demonstrated differences in the *type* of stressors experienced by women versus men (Billings & Moos, 1981; Matud, 2004). However, exposure and appraisal of stressor does not appear to entirely account for gender differences in coping (Eaton & Bradley, 2008; Ptacek et al., 1994): for instance, in an experimentally controlled stressor situation (i.e., teaching a lecture and being evaluated), Ptacek et al., (1994) found gender differences in amount and type of coping strategies used to deal with the stressor even after finding no statistical gender difference in cognitive appraisal of the threat situation.

Women with AUDs and Coping

Despite gender differences in AUDs as well as research supporting gender differences in general coping strategies, there has been comparatively limited research on alcohol-specific coping behaviors among women with AUDs. One study addressing coping strategies in women with AUDs (Michels et al., 1999) focused generally on women’s coping responses to unspecified stressors, as opposed to alcohol-use situations, specifically. That is, participants were instructed to respond to how they coped with problems generally, as well to consider the “most difficult thing that happened” in the previous year. Coping strategies were extracted from interviews with women currently receiving treatment for AUDs as well as a matched community sample of women without AUDs. Coping style was classified as *problem-solving* (including information- and social-support seeking), *emotion-focused* (including reframing), and *avoidance* (including

strategies aimed at emotional discharge and escape). Results indicated lower use of *problem-solving* coping skills, including less accessing of social support, and higher likelihood of *avoidance* coping skills (including use of alcohol and drugs and suicide attempts) among women with AUDs versus their nonclinical counterparts (Michels et al., 1999). One limitation of this study not addressed by the authors was that coping strategy category was not clearly operationalized, and classification did not always clearly map onto other standard classifications used. Specifically, *avoidance* and *emotion-focused* strategies both maintained the intent to diffuse emotions, but were classified differently, presumably according to strategies determined to be maladaptive (avoidant) versus adaptive (emotion-focused). Also of note, the authors did not appear to control for psychological distress, which may have contributed to specific coping style.

In another example of gender differences in coping, the study by Moser & Annis (1996) of coping in response to “relapse crises” was subsequently analyzed for gender differences (Annis et al., 1998). While there were no gender differences in relapse rates, women generally had more difficulty abstaining in response to a negative mood, while men evidenced more difficulty abstaining in social situations. Among both genders, use of multiple coping strategies was positively associated with abstinence, however, the authors did not find sex differences in types of coping endorsed. Of note, however, the ratio of males to females was nearly 3:1 (90 men, 35 women.) Additionally, coping was coded only as one of three categories (*behavioral*, *cognitive* and *combined*) and thus, did not include the additional active/avoidance classifications provided in the earlier, non-gender-specific analysis (Moser & Annis, 1996). As such, subtleties of gender differences in coping may have been difficult to identify.

Bischof, Rumpf, Meyer, Hapke, & John (2005) assessed gender differences in dependence severity, coping, and self-efficacy of patients recently detoxified and one week into a three-week inpatient program. Using a German translation of the CBI, the authors found significantly higher rates of coping activities among women versus men in terms of *positive thinking*, *negative thinking*, and *avoidance/distraction*. Gender differences in use of *social support* were nonsignificant, although again, this category of strategy was used at higher rates among women. A multivariate model indicated that women were significantly more likely than men to use *negative thinking* coping strategies after controlling for dependence, education, and high-risk situations. The authors acknowledged several limitations to the methodology, including assessment at a single time point early in treatment; also, the authors noted that comorbid psychopathology was not addressed.

In another recent study, Timko, Finney, & Moos (2005) assessed differences in coping and social support within the context of help-seeking over an eight-year follow-up period among individuals with AUDs. Coping was measured using the CRI, and thus, was linked to general stressors versus alcohol-specific stressors. Consistent with cited literature, women in this study were more likely to use *avoidance* coping measures at baseline than men, but evidenced greater increases in *approach* coping (equivalent to the active/problem-solving strategy definitions discussed above). Women also evidenced greater reductions in *avoidance* coping than men over the eight-year time period. Reductions in the use of *avoidance* coping was more predictive of better drinking outcomes (i.e., percent days abstinence and drinking related problems) among men than

women, however. Among women, *social support* (specifically, friendship resources) and *approach* coping was associated with more favorable drinking outcomes at the eight-year follow up. Alcoholics Anonymous attendance was associated with increases in *approach* coping and *social support*; however, women who did not seek professional treatment were more likely to use *approach* coping than those who did seek treatment. One limitation to this study is that AUDs were not assessed using structured interview diagnoses (i.e., the SCID); participants were referred to the study via detoxification centers or alcohol use information center. Thus, presumably, the authors did not have the capability to control for severity or other subtleties of the individual's AUD as would be obtained from structured assessment. Additionally, the authors did not provide detail on the type or standardization of professional treatment received, information that may have further elucidated a model of associations between treatment and coping.

In sum, cognitive-behavioral theories underscore the role of coping in the development, maintenance, and treatment of AUDs, and indeed, a major focus of CBT for AUDs is on building coping skills repertoires for continued abstinence. Generally, the scientific literature suggests that the number of coping skills used is directly associated with continued abstinence, and that problem-solving coping strategies are preferable to avoidance coping strategies in maintaining abstinence following treatment. Evidence for an increase in coping skills as a mediator of treatment outcome has been equivocal, but many studies have examined samples across a range of treatment settings with unclearly defined treatments. Additionally, the general coping literature highlights differences in the amount and type of coping skills used by women versus men, proposing both situational and developmental hypotheses to account for these differences. Research also

suggests significant between-gender differences in terms of AUD onset, course, treatment outcome, and risk of relapse. Despite this, few studies have assessed coping specifically among women with AUDs, and fewer still have examined coping as a function of treatment receipt for individuals receiving single-gender treatment.

The Current Study: Aims & Hypotheses

The aims of the current study were (a) to describe alcohol-specific coping strategies used among a sample of women entering cognitive-behavioral treatment for AUDs (research questions 1 & 2), (b) to quantitatively examine alcohol-related coping and the change in alcohol-related coping as a function of treatment (hypotheses 1 & 2), and (c) to examine baseline coping strategies and change in coping after treatment as predictors of drinking outcome (hypotheses 3 & 4). Aim A was intended to be descriptive and exploratory and did not involve hypothesis testing. As such, data analytic steps associated with aim A were termed “Research Questions 1-2.” Aims B and C were hypothesis-driven and corresponded to “Hypotheses 1-4.” The above questions were assessed vis-à-vis demographic, psychiatric, alcohol dependence severity, and treatment-specific moderating variables. This study aimed to answer questions regarding alcohol coping among women specifically, within the context of a well-controlled treatment trial emphasizing coping skills.

Research Questions and Hypotheses

Research Questions

The following descriptive research questions were tested:

1. Alcohol coping strategies of women entering AUD treatment will be described both in terms of absolute coping and in terms of relative use of various strategies. This research question does not involve hypothesis testing, but instead seeks to descriptively portray coping strategies at treatment entry.
2. Baseline total coping with alcohol use will vary according to demographic, psychological, alcohol use and treatment history variables. This is an exploratory research question and seeks to describe relationships between individual-level variables and coping strategies at baseline.

Hypotheses

1. Controlling for treatment arm, total coping will increase during and decrease after treatment. Specifically, the greatest increase in total coping will be seen for the time period of treatment receipt (i.e., baseline to month 3), with a slight drop off in total coping during the follow up period (month 3 to month 15).
2. Treatment attendance and engagement will predict total increases in coping during the three-month treatment period, controlling for treatment condition. Greater treatment dosage will also be associated with the extent to which quantity of coping skills is maintained throughout the follow-up period. Specifically,

greater treatment attendance and engagement will predict less of a reduction in total coping skills for the month 3-month 15, month 3-month 9, and month 9-month 15 time periods.

3. Total coping skills used by treatment end (month 3) will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15), controlling for baseline coping, treatment condition, and baseline alcohol use.
4. Change in total coping during the three-month treatment period will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15), controlling for baseline coping, treatment condition, and baseline alcohol use.

CHAPTER II

METHOD

Participants

Participants were 158 women enrolled in a randomized controlled trial of 12 weeks of individual or couple behavioral therapy for alcohol use disorders. The trial was a two-armed study in which women chose to be randomized within either an individual or couple therapy arm. Women indicating a preference for the individual therapy arm were randomized to either generic Cognitive-Behavioral Therapy for AUDs (CBT) or Female-Specific Cognitive-Behavioral Therapy for AUDs (FS-CBT). Women indicating a preference for the couple therapy arm were randomized to either Alcohol Behavioral Couples Therapy (ABCT) or a blended ABCT in which half of the sessions were individual and half included the partner. As women disproportionately chose the individual arm over the couple arm, recruitment into the individual arm was closed midway through the trial, and all women enrolled thereafter were randomized to one of the two couple conditions. Content of the treatment conditions is described below (see *Procedures*).

Inclusion criteria for the trial were age 18 or older, current DSM-IV TR (APA, 2000) alcohol abuse or dependence disorder, alcohol consumption within the past 30 days, and currently in a committed heterosexual relationship of at least six months. Exclusion

criteria included evidence of recent psychotic symptoms or organic brain deficit, physiological dependence on a substance other than alcohol or nicotine, concurrent treatment for an AUD, and, in the couple arm, domestic violence that would make participation with their partner dangerous.

Procedures

Women were recruited from local newspaper advertisements and community outreach. Following an initial telephone screen in which basic eligibility criteria were established, women indicated a preference for either individual or couple treatment. Potential eligibility was further assessed and informed consent administered at a subsequent two-hour clinical screen, attended by either the woman alone (if in the individual arm), or the woman and her partner (if in the couple arm). The final step in the assessment process consisted of a four-hour baseline interview to assess for recent alcohol use, psychosocial functioning, and psychiatric comorbidity. Urn randomization occurred following the baseline interview to balance for depression (as measured by Beck Depression Inventory-II), personal drinking goal (abstinence versus other) and partner drinking status (moderate to heavy versus light/nondrinker).

All treatments included alcohol psychoeducation, motivational enhancement, functional analysis, stimulus control, skills training, and relapse prevention topics. The FS-CBT also included topics that are particularly salient among women drinkers, such as assertiveness training, empowerment, mood and anxiety management. Emphasized throughout FS-CBT were two overarching themes of the woman's autonomy and her right to self-care over other-care. Couple conditions included a focus on the partner's support for the woman's abstinence and improving the couple's relationship.

Treatment was manualized, and all therapy was delivered by masters' or doctoral-level clinicians with specialized training in addictions and alcohol use disorders. Follow-up assessments were conducted immediately post-treatment (month 3 post-baseline follow-up), as well as six and 12 months post-treatment (month 9 and month 15 post-baseline follow-up, respectively).

Measures

Demographics

Demographic data including age, marital status, ethnicity, household income, etc., were collected via a self-report questionnaire administered at the clinical screen.

Substance Use

Substance use disorder diagnoses were determined based upon administration of Module E (Substance Use Disorders) of the Structured Clinical Interview for DSM-IV for Axis I Disorders (SCID-I) (First, Spitzer, Gibbon, & Williams, 1996) by trained research interviewers at the baseline interview. The SCID-I consists of a series of disorder modules, which are administered based upon responses to preliminary screening questions. The SCID-I has been shown to have good interrater and test-retest reliability for substance use disorders (Zanarini et al., 2000).

Longitudinal drinking and drug use data were collected at the Baseline Interview and at each follow-up interview using the Form 90 (Miller, 1996). The Form 90 uses a Timeline Follow Back (TLFB) methodology (Sobell & Sobell, 1992) in which calendars and significant events to assist with drinking recall. Test-retest reliability and concordance with collateral reports for the TLFB is good (Sobell & Sobell, 1992). At

baseline, the Form 90 elicits alcohol and drug use data for each of the 90 days preceding the most recent drink, allowing for calculation of standard drinks of alcohol and blood alcohol level on each drinking day, as well as percent days drinking/abstinent during an assessment period. The follow-up Form 90 was modified to assess for the time since the most recent assessment period.

Psychopathology

Non-alcohol Axis I and Axis II diagnoses were assessed for according to the SCID-I (First et al., 1996) and the Personality Diagnostic Questionnaire for the DSM-IV (PDQ-4) (Hyler, Skodol, Kellman, Oldham, & Rosnick, 1990) respectively, administered at the Baseline Interview. The SCID-I is a modular, structured clinical interview, administered in this study by Masters' and Doctoral-level clinicians using decision rules and a series of "skip outs" to facilitate generation of Axis I diagnoses (see above, *Measures: Substance Use*). The PDQ-4 is a self-report questionnaire designed to assess for Axis II personality disorders. Participants entered responses directly into a computer entry program, which subsequently scored and generated diagnoses.

Self-Efficacy

Participants' confidence in their ability to abstain from alcohol use in a series of potentially "high risk" contexts was assessed using the Situational Confidence Questionnaire (SCQ-8) (see Appendix A; Breslin, Sobell, Sobell, & Agrawal, 2000). This instrument asks individuals to anchor their degree of confidence in their ability to maintain abstinence along a scale ranging from 0% to 100%. The SCQ-8 has been shown to have good reliability (Breslin et al., 2000).

Coping Behaviors

The Coping Behaviours Inventory (CBI) (Litman et al., 1983) is a 36-item self-report questionnaire in which individuals are asked to identify the quantity and frequency of cognitive and behavioral strategies that they have used to cope with a drinking urge since previous administration. Coping strategies elicited were specific to alcohol use situations, rather than to general stress. Study participants completed the CBI at baseline, immediately post-treatment (month 3), and at each follow-up appointment (months 9 and 15). Within the general coping literature, multiple/longitudinal assessment of coping strategies has been identified as an important methodological feature of studies of coping in order to increase validity (Coyne & Racioppo, 2000; Lazarus, 2000).

Participants are instructed to indicate, on a four point Likert scale, how frequently they tried each of the strategies presented to them since prior administration. Responses to each item range from 0 (Never) to 3 (Usually), and scores are summed to create a “Total Coping Score,” ranging from 0 to 108. Higher scores indicate more coping; scoring on the CBI does not differentiate between “better” or “worse” coping strategies, and thus, items which may subjectively appear to be less beneficial than others (i.e., “Staying indoors -- hiding,” item 8) are counted in the positive direction. Factor analysis of the instrument (Litman, et al., 1983; Litman, Stapleton, Oppenheim, Peleg & Jackson, 1984) identified four categories of coping responses: *positive thinking* (14 items), *negative thinking* (6 items), *avoidance/distraction* (11 items), and *seeking social supports* (5 items). The scale authors combined positive and negative thinking items to create a *cognitive* category, and avoidance and social support items to create a *behavioral* category (see *Appendix B*). The CBI has been used in a number of recent studies of

alcohol-specific coping (e.g., Bischof et al., 2005; Maisto et al., 2000; Witkiewitz & Masyn, 2008) and has been recommended as a clinically valid and brief assessment of coping skills (Green, Worden, Menges, & McCrady, 2008; Rotgers, 2002).

The 36-item CBI was developed from an original 60-item questionnaire incorporating coping behaviors (type and effectiveness) and alcohol dependence severity developed based upon extensive interview and a series of sentence completions administered to current (at the time of measurement development) and former patients with AUDs. Discriminant analysis of the 60-item questionnaire indicated accurate identification of relapsers versus abstainers in 81% of cases (Litman, Eiser, Rawson, & Oppenheim, 1979). Highest loading and best discriminating items were maintained in development of the 36-item CBI (Litman et al., 1983). Litman et al. (1983) reported interfactor coefficients for the four subscales as .91, .81, .65, and .75. Cronbach's alpha coefficients for the total scale used in the current dataset were .93, .93, .92, and .95 for baseline, month 3, month 9, and month 15, respectively, suggesting good internal consistency.

Data Preparation

Variables tested as part of data preparation are outlined in *Table 1*, below. Frequency distributions, histogram plots, and descriptives were run to check for missing and out-of-range values, outliers, and skewness and kurtosis. Household income was substantially peaked and highly positively skewed (*kurtosis*=21.217, *skewness*=3.923) and thus was subject to logarithmic transformation, which significantly improved its distribution. Other variables by nature did not fit a normal distribution (i.e., percent abstinent days at follow-up; sessions attended) but had skewness and kurtosis values

approximately within acceptable levels of approximately |2-3| (E.Y., Mun, personal communication, February 9, 2011; Tabachnick & Fidell, 2007). In these cases, transformations did not generally improve the distribution of the data. However, when these non-normally distributed data were used as the dependent variable in an analysis (i.e., when assessing drinking outcomes), nonparametric tests were used, which do not assume a normal distribution. Categorical variables were not expected to meet normality assumptions, but were assessed for out-of-range values and outliers as well as equivalence of sample size.

Total coping score data were obtained from 100% of women at baseline, 84% of women at month 3, 70% of women at month 9, and 75% of women at month 15.

Inspection of missing data patterns suggested data were missing at random.

Table 1
Variables tested in initial data inspection

<u>Variable</u>	<u>Assessment Period</u>
<i>Demographics</i>	
Age	Intake
Ethnicity	Intake
Education	Intake
Marital Status	Intake
Number of Children	Intake
Occupational Status	Intake
Household Income	Intake
<i>Psychological</i>	
Axis I diagnosis classification (type & quantity)	Intake
Axis II diagnosis classification (type & quantity)	Intake
Self-efficacy score	Intake
Total coping score	Intake, M3, M9, M15
<i>Substance Use</i>	
AUD diagnosis classification	Intake
Percent days abstinent	Intake, M3, M9, M15
Number of drinking days	Intake, M3, M9, M15
Mean drinks per drinking day	Intake, M3, M9, M15
Number of DSM-IV AUD criteria met	Intake
Years of problem drinking	Intake

<i>Treatment</i>	
Number of prior treatment episodes	BL
Self-help attendance	BL
Number of sessions attended	M3
Percent homework completed	M3

BL=Baseline; M3=month 3; M9=month 9; M15=month 15.

Aim-Specific Data Analytic Plan

All analyses were completed using SPSS 18.0 (SPSS, 2007) unless otherwise noted.

Aim A: Alcohol-related Coping Strategies among a Sample of Women Entering Treatment for AUDs

Research question 1: What coping strategies are endorsed by women seeking cognitive-behavioral treatment for an AUD?

Coping behaviors were described according to quantity and frequency of each specific coping behavior, cognitive versus behavioral strategy subscales, and the four subfactors identified by Litman et al. (1983) (*positive thinking, negative thinking, avoidance, and social support*).

In order to make equivalent descriptive comparisons among subscales (which contain differing numbers of items), weighted averages of coping were calculated. Specifically, total intensity scores (ranging from 0= I have never tried this to 3= I have usually tried this) for each item were summed and divided by the number of items within an item's category. For instance, 20 items are included in Litman et al.'s (1983) *cognitive* subfactor, and thus, 20 served as the denominator of that item.

Additionally, relative coping scores (Vitaliano et al., 1987) were proposed as better demonstrating relationships among coping subscales, as they present subfactor coping in the context of overall coping (i.e., what proportion of total coping is dedicated to specific subscales). As such, the above subscales were calculated and displayed using relative coping ratios in addition to weighted averages. To calculate relative coping scores, the weighted average of each coping subscale was divided by the sum of the weighted averages of each of the other subscales. In addition, the number of different coping strategies endorsed at baseline, regardless of intensity, was calculated. Comparison of top and least endorsed strategies provided additional granularity to strategy use.

Research question 2: Does baseline total alcohol-related coping vary according to demographic, psychological, alcohol use and treatment history variables?

As noted above, this was a descriptive and exploratory research question and sought to identify relationships between individual-level variables and coping strategies at baseline. Demographic, psychological, and substance use variables collected at baseline were tested as they relate to use of coping behaviors. Variables tested followed an organizational structure used by Maisto, Connors & Zwiak (2000) based on previously found associations between outcome with individual and treatment factors and included: *demographic variables* (i.e., age, race, education, marital status, employment status, household income, number of children at home), *psychological variables* (i.e., presence of a comorbid mood, anxiety, or personality disorder and alcohol-related self-efficacy), *alcohol use variables* (i.e., drinking days and drinks per drinking day) and *treatment history variables* (i.e., number of prior treatment episodes and self-help attendance).

Baseline total coping scores were compared to each variable listed above using univariate *t*-tests, bivariate correlations, and ANOVA, depending on variable type.

Aim B: Alcohol-related Coping and Change in Alcohol-related Coping as a Function of Treatment

Hypothesis 1: Controlling for treatment arm, total coping will increase during and decrease after treatment. Specifically, the greatest increase in total coping will be seen for the time period of treatment receipt (i.e., baseline to month 3), with a slight drop off in total coping during the follow up period (month 3 to month 15).

Total coping scores at each time period (i.e., baseline, month 3, month 9, and month 15) were graphed. A model of coping trajectory over time was then constructed using latent growth curve models (LGCM) (Bollen & Curran, 2006). A base model of total coping score at each time point was constructed, and models with linear and quadratic slopes were estimated for best fit using Maximum Likelihood. Models were adjusted to account for length of time between follow-up periods. The best fitting model was chosen based on Comparative Fit Index (CFI), Akaike information criteria (AIC), Bayesian information criteria (BIC), and Root Mean Square Error of Approximation (RMSEA). A CFI>0.95 and RMSEA <0.05 were ideal, but values close to these were considered to be acceptable (Bollen & Curran, 2006; Muthén & Muthén, 2007). Once a good-fitting base model was constructed, a conditional model was tested in which baseline predictors of coping were entered as model covariates. All LGCMs were constructed using Mplus Version 5.2 (Muthén & Muthén, 2007).

Hypothesis 2: Treatment attendance and engagement will predict total increases in coping during the 3-month treatment period, controlling for treatment arm.

Greater treatment dosage will also be associated with the extent to which quantity of coping skills is maintained throughout the follow-up period. Specifically, greater treatment attendance and engagement will predict less of a reduction in total coping skills for follow-up time period (month 3-month 15).

Treatment attendance and percent homework completed were entered as independent variables in multiple regression models predicting change in total coping score from a) baseline to month 3, b) month 3 to month 15 (i.e., the full follow-up period), c) month 3 to month 9 (the first six months of follow up), and d) month 9 to month 15 (i.e., the second six months of follow-up). Due to a high degree of correlation ($r=0.815$, $p<0.001$), between the two treatment engagement variables -- attendance and percent homework completed -- each variable was tested separately in multivariable models.

Aim C: Coping and Change in Coping as Predictors of Drinking Outcome

Hypothesis 3: Total coping skills used at treatment end (month 3) will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15), and

Hypothesis 4: Change in total coping from baseline to treatment end (i.e., month 3) will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15)

In alcohol treatment research, drinking outcome frequently does not follow a normal distribution pattern; typically, a pattern is obtained in which a number of individuals cluster at either tail of the distribution curve. *Figure 1*, below, displays the frequency distributions for percent drinking days at baseline and month 3 and the month 9 and month 15 follow-up time periods; the non-normal distribution is evident in all. This information is also displayed by treatment arm (see *Appendix C*). Similarly, *Figure 2*, below, demonstrates a significantly skewed distribution of drinks per drinking day. Both patterns more closely follow a distribution within the Poisson family, a nonparametric distribution that is generally a better fit of count data such as drinking outcome (Hilbe, 2007).

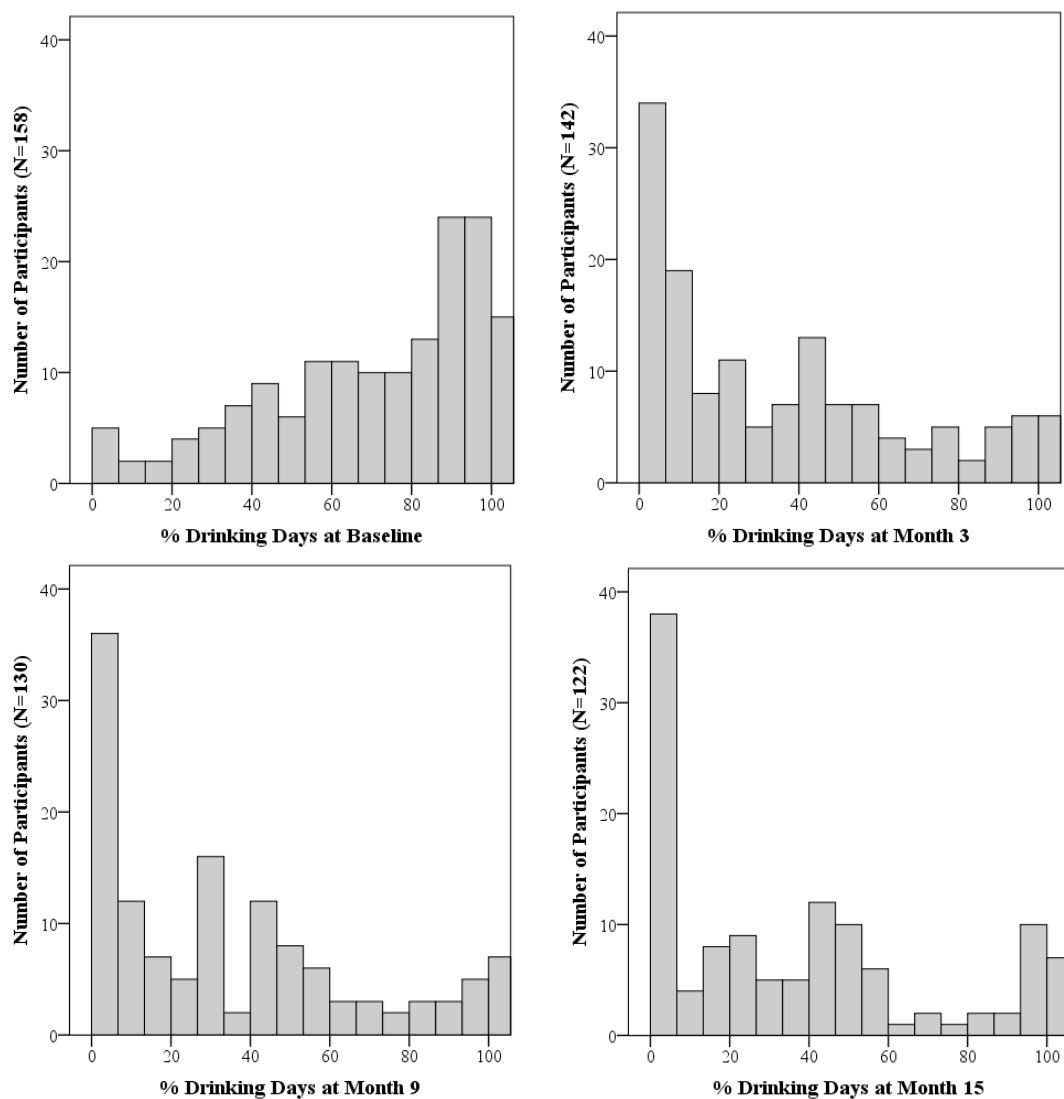


Figure 1. Frequency distribution of percent drinking days at baseline and months 3, 9 and 15.

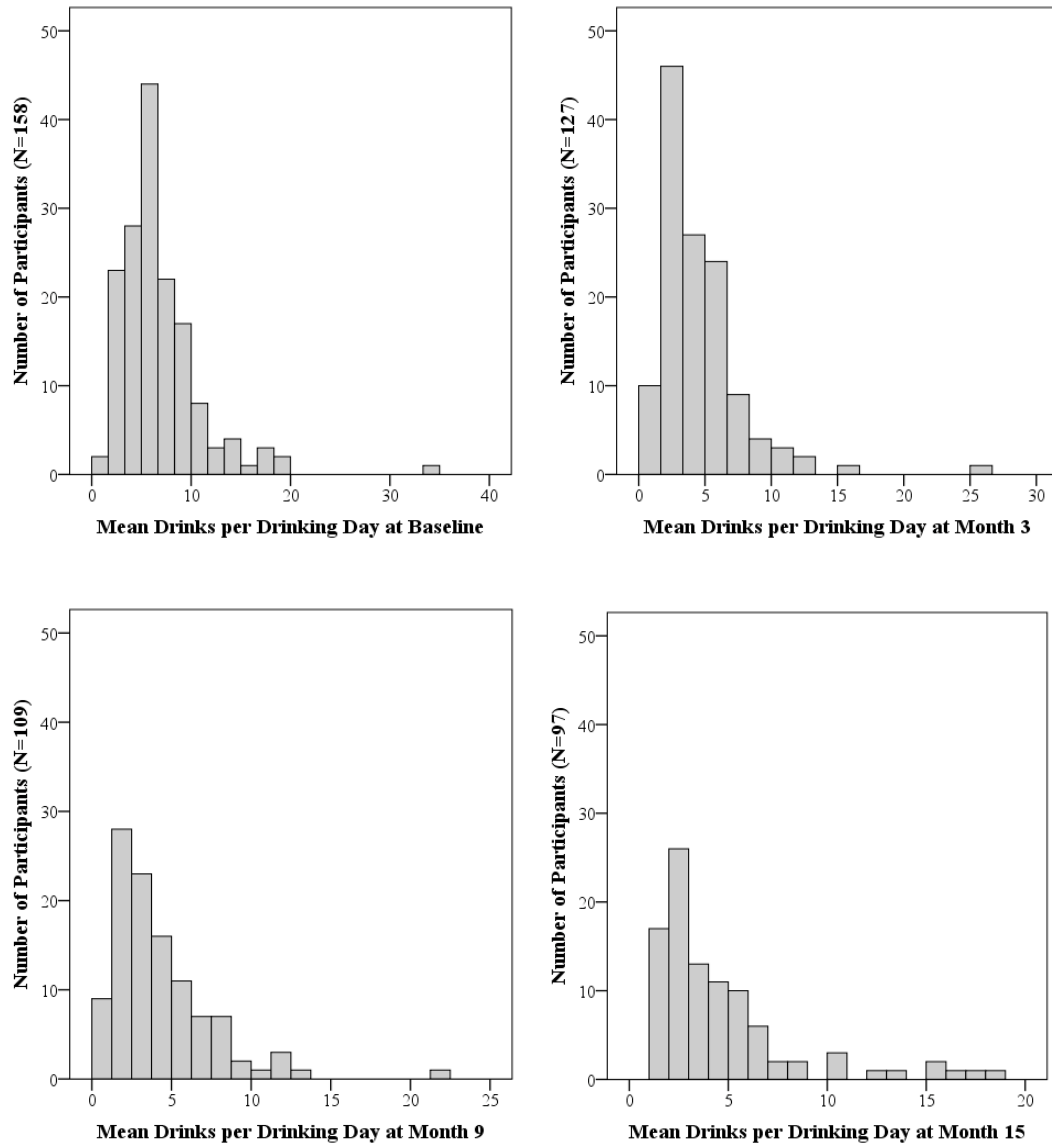


Figure 2. Frequency distribution of drinks per drinking day at baseline and months 3, 9 and 15.

Poisson regression and Negative Binomial regression are both subcategories of regression options for modeling Poisson-distributed data (Hilbe, 2007). Poisson distribution assumes that the dependent variable is equidispersed (i.e., variance equal to the mean), while Negative Binomial distribution more appropriately fits overdispersed data (i.e., data in which variance is much greater than the mean) (Hilbe, 2007). Drinking

outcomes tested (i.e., drinking days and mean drinks per drinking day) evidenced overdispersion based on visual inspection of variable means and variances, suggesting that Negative Binomial was the most appropriate distribution. Data were subsequently modeled using both Negative Binomial and Poisson regression; the former resulted in lower AIC/BIC statistics and was maintained.

Count regression can also be modeled to account for distributions with excess zeros, termed “zero inflation” (Hilbe, 2007). A zero-inflation parameter effectively combines a logistic distribution (predicting the likelihood of membership in the “0” group of non-abstinence versus not for the time period tested) with the general Poisson distribution modeling the count outcome (Hilbe, 2007). Negative binomial (NB) and zero-inflated negative binomial (ZINB) models were compared for all drinking outcomes to determine which model best fit the data. Based on AIC/BIC goodness-of-fit statistics, it was determined that ZINB regression best fit the outcome of the count of drinking days and NB regression best fit the outcome of drinks per drinking day.

Each model was also tested with and without the addition of an offset variable consisting of the log of follow-up time, to account for slight differences in the number of valid days in the follow-up time period (Hilbe, 2007). Follow-up time periods were 90 days for month 3 and 180 days each for the months 9 and 15 time periods. Although this was consistent in nearly all cases, two, one, and three participants had slightly shorter follow-up exposure time during month 3, month 9, and month 15 respectively due to time spent in controlled settings. To account for these cases, an offset of log of valid follow-up days was included as a covariate in each model and compared to a model without offset. Inclusion of the offset variable improved the model fit slightly for months 3 and 15, but

did not substantially change model coefficients; as such, the model including offset is reported for months 3 and 15 but not for month 9. Count, rather than percentage, data were used because Poisson regression was designed specifically to handle this type of data, which must also be in whole number, integer format. Given this, quantity variables of drinks per drinking day were rounded to the nearest whole number. All models were constructed using Mplus, version 5.2 (Muthén & Muthén, 1998-2007), using maximum likelihood estimation and robust standard errors.

Given a nonlinear relationship between a continuous predictor (such as total coping score) and count-dependent data (such as number of drinking days in each 180-day follow-up period), the following formula was used to interpret percent change in count outcome, whereby δ is equal to predictor units of change: $100(e^{\beta \times \delta} - 1)$ (Atkins & Gallop, 2007; Long, 1997). The NB regression coefficient can thus be understood as an “X%” increase in the outcome variable for each increase in unit of the predictor variable (Atkins & Gallop, 2007; Long, 1997). When a zero-inflated negative binomial model (ZINB) was used, the logistic coefficient was additionally exponentiated to assist with interpretation, resulting in an odds ratio of obtaining a “0” (in this model, the odds of no drinking days over follow-up) (Atkins & Gallop, 2007).

Change in coping for each time period was calculated by subtracting the total CBI score for the earlier time period from the total CBI score for the later time period, as described by Maisto et al. (2000).

CHAPTER III

RESULTS

Sample Characteristics

Table 2 displays basic demographic, psychological/psychopathological, substance use, and treatment history data collected at intake, as well as attendance and engagement during three months of treatment for the 158 participants who attended at least one treatment session. Participants were 25-69 years old ($M=47.17$, $SD=8.97$), and primarily Caucasian (96%). Four percent were young adult (under age 30), 37% were adult (ages 30-45), 47% were middle adult (ages 46-59) and 11% were older adult (age 60 and above). Most were married (80%) or living together as if married (11%). The sample included a range of education levels: 32% had obtained a high school diploma or GED, 23% had earned a technical or associate's degree, 34% had obtained a bachelor's degree, while an additional 10% had obtained a master's or doctorate degree. Household income varied substantially, ranging from \$10,000 to \$650,000 (*median*=\$96,000). The majority of the sample (68%) was employed either full-time (41.8%) or part-time (26.6%); the remainder was unemployed (11%), homemakers (8%), retired (7%), students (2%), on disability (2%), or other (2%).

All participants had an alcohol use disorder (current dependence: 98%). A substantial number in the sample also presented with at least one comorbid current Axis I

(42%) or II (34%) disorder. Of the Axis II disorders, the most frequently occurring cluster was C (33% with at least one diagnosis), although a number had diagnoses across several clusters.

On average, women abstained from alcohol approximately 29.4% ($SD=27.1$) of the days during the three months prior to the last drink before their baseline assessment (subsequently referred to as “percent days abstinent at baseline”). Women drank a mean of 6.8 ($SD=4.1$) standard drinks per drinking day in the three months prior to their most recent pre-baseline drink. At baseline, participants met a mean of 8.4 ($SD=1.8$) lifetime alcohol abuse and dependence criteria and reported an average of 19.0 ($SD=10.8$) years of problem drinking. Despite this significant drinking severity and length of problem drinking, relatively few women had received prior alcohol treatment (26%) or were actively attending Alcoholics Anonymous (18%) upon study enrollment.

Table 2

Basic demographic, psychological, substance use, treatment history, and treatment engagement variables

	Total Sample (N=158)	
	<i>M/%</i>	<i>SD</i>
<i>Demographics</i>		
Age (<i>SD</i>)	47.2	(9.0)
Ethnicity (% Caucasian)	96%	
Years of Education (<i>SD</i>)	15.2	(2.6)
Married (%)	80%	

Children (including step) at home (% yes)	63%
Employed (full time or part time) (% yes)	68%
Household income – median	\$96,000

Psychological variables

Any current comorbid Axis I diagnosis (% yes)	42%
Any Axis II diagnosis (% yes)	34%
Baseline self-efficacy for abstinence score (<i>SD</i>) (possible range=0-100)	46.4 (23.9)

Substance Severity

Percent days abstinent during 90 days preceding last drink before baseline interview (<i>SD</i>)	29.4 (27.1)
Mean drinks per drinking day (<i>SD</i>)	6.8 (4.1)
Baseline percent heavy drinking days (out of all valid days) (<i>SD</i>)	57.2 (31.1)
Lifetime alcohol abuse & dependence criteria met (<i>SD</i>)	8.4 (1.8)
Years of problem drinking (<i>SD</i>)	19.0 (10.8)

Treatment history

Prior alcohol treatment (% yes)	26%
Alcoholics Anonymous attendance at baseline (% yes)	18%

Within-treatment engagement

Sessions attended (<i>SD</i>)	8.8 (4.1)
Percent homework completed (<i>SD</i>)	66.4 (28.3)

Figure 3 displays frequency distributions for sessions attended and homework completed, respectively. Women attended an average of 8.8 ($SD=4.1$) sessions and completed a mean of 66.4% ($SD=28.3$) of assignments. One hundred twenty-five participants (79%) finished over 50% of assignments. Thirty-three women (21%) completed 50% or less of the assigned homework. Not surprisingly, there was a significant correlation between sessions attended and percent homework completed ($r=0.82$, $p<0.001$).

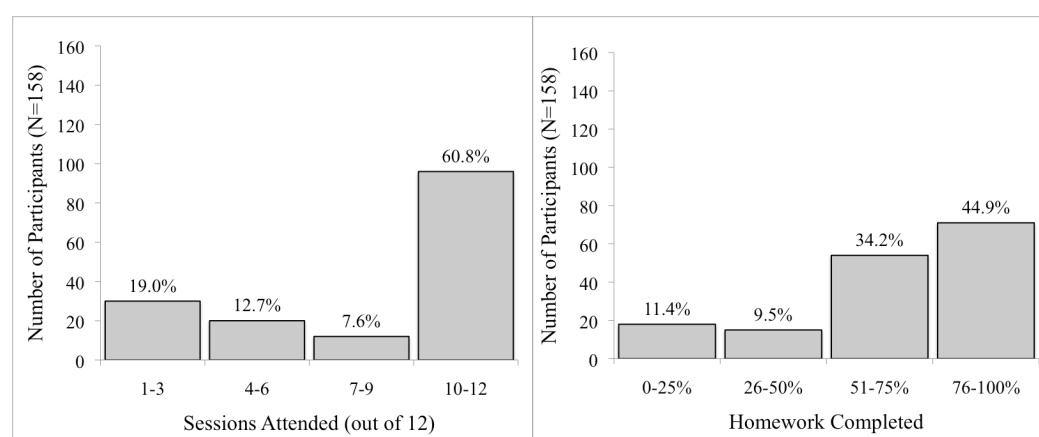


Figure 3. Participant count of treatment sessions attended (left) and homework completed (right).

Research Questions

Aim A: Alcohol-related Coping Strategies among a Sample of Women Entering Treatment for AUDs

As discussed above, the first study aim was descriptive, and sought to depict the general type of alcohol-related coping strategies used by women entering treatment for an AUD.

Research Question 1: What coping strategies are endorsed by women seeking cognitive-behavioral treatment for an AUD?

Table 3 displays the total (raw) score/*SD* for each coping category, the item mean (weighted average), and relative coping. Weighted average and relative coping scores allow for assessment of intensity of each coping effort individually and in comparison to other categories. As noted above, the scale can be examined according to *total* coping (row 1), *cognitive* versus *behavioral* strategies (rows 2-3) and *positive thinking*, *negative thinking*, *avoidance/distraction* and *seeking social supports* (rows 4-7). Relative scores of items within each of the subscale divisions (*cognitive/behavioral*) and *positive thinking/negative thinking/social support/avoidance*) respectively add up to 1.00. All scores in Table 3 reflect baseline levels.

Table 3
Total and subscale baseline coping scores for women entering treatment for AUDs
(N=158)

	<u>Average Total</u>	<u>t-/F-statistic</u>	<u>Weighted</u>	<u>Relative</u>
	<u>Score</u>		<u>Average</u>	<u>Coping</u>
			<u>(range: 0-3)</u>	
Total coping	36.88		1.02	1.00
(36 items; range=0-108)	(<i>SD</i> =16.85)		(<i>SD</i> =0.47)	
<i>Cognitive/Behavioral Subscale</i>		<i>t</i> =9.12**		
Cognitive coping ^a	25.21		1.26	0.63
(20 items; range=0-60)	(<i>SD</i> =11.73)		(<i>SD</i> =0.58)	(<i>SD</i> =0.14)

Behavioral coping ^b	11.70	0.73	0.37
(16 items; range=0-48)	(SD=6.95)	(SD=0.43)	(SD=0.14)
<i>Pos/Neg Thinking/Social</i>		<i>F=60.76***</i>	
<i>Support/Avoidance Subscale</i>			
Pos. thinking	17.00	1.21	0.32
coping ^c	(SD=8.16)	(SD=0.58)	(SD=0.11)
(14 items; range = 0-42)			
Neg. thinking	8.18	1.36	0.33
coping ^c	(SD=4.54)	(SD=0.76)	(SD=0.13)
(6 items; range = 0-18)			
Social support	2.82	0.56	0.14
coping ^d	(SD=2.47)	(SD=0.49)	(SD=0.12)
(5 items; range = 0-15)			
Avoidance coping ^e	8.87	0.81	0.21
(11 items; range = 0-33)	(SD=5.49)	(SD=0.50)	(SD=0.11)

** $p < 0.01$; *** $p < 0.001$

Note: Variables with different superscripts are significantly different from one another at $p < 0.001$ using Bonferroni post-hoc analysis.

Cognitive and behavioral subscales were significantly correlated ($r=0.611$) and significantly different from each other (independent samples $t(289.35)=9.118$, $p<0.01$). Specifically, cognitive coping tactics were used significantly more frequently at baseline than were behavioral tactics by women entering treatment for an AUD. One-way ANOVA results indicated that the four subfactor means (rows 4-7) were also significantly different from each other ($F(3, 628)=60.76$, $p<0.001$). Post-hoc Bonferroni analyses indicated that mean *negative thinking* and *positive thinking* subscale scores were significantly higher than mean scores on *social support* or *avoidance* subscales, the latter which was also significantly higher than the former, all at $p<0.001$. There was not a statistically significant difference between *positive* and *negative thinking* subscales. Of note, both the independent samples t -test and one-way ANOVA violated the assumption of homogeneity of variances, necessitating the use of corrected t - and F - statistics to account for this and suggesting significant variation between subscale scores.

While a detailed, micro-level description of specific coping strategies after baseline is beyond the aim of the current study, coping subscales (*Table 4*) and individual strategies endorsed at month 3 versus baseline (*Table 5* and *Table 6*) were briefly examined to provide context for baseline interpretation. As demonstrated in *Table 4*, below, relative rates of coping by subscales generally paralleled that at baseline, but amount of coping increased in all categories. Independent samples t -tests comparing month 3 *cognitive* and *behavioral* subscales indicated that, as at baseline, cognitive subscales were significantly higher than behavioral ($t(245.43)=9.66$, $p<0.001$). A one-way ANOVA with Bonferroni correction comparing the four subfactors again demonstrated that the four subfactor scores were significantly different from each other

($F(3, 524)=55.91, p<0.001$). Specifically, *positive thinking* and *negative thinking* were each larger than *social support* and *avoidance*, and *avoidance* was significantly larger than *social support*, but neither *thinking* score was significantly different from each other. As before, Levene's test for assumption of variance homogeneity was violated in both the *t*-test and ANOVA, and thus, *t*- and *F*-statistics adjusted to account for this violation were used.

Comparing month 3 scores to baseline scores demonstrated that month 3 total coping was significantly higher than baseline total coping (paired samples $t(131)=5.54, p<0.001$). Additionally, month 3 average *cognitive* coping was significantly higher than baseline average *cognitive* coping (paired samples $t(131)=5.28, p<0.001$) and month 3 average *behavioral* coping was significantly higher than baseline average *behavioral* coping (paired samples $t(131)=4.66, p<0.001$). Paired samples *t*-tests of weighted averages also demonstrated similar significant increases for each of the four subfactors: *positive thinking*: $t(131)=6.20, p<0.001$; *negative thinking*: $t(131)=2.27, p<0.05$; *social support*: $t(131)=4.13, p<0.001$; *avoidance*: $t(131)=3.90, p<0.01$). All month 3 subscales were significantly correlated with their baseline score.

Table 4
Total and subscale coping scores at month 3 (N=132)

	<u>Average</u>	<u>t-/F-statistic</u>	<u>Weighted</u>	<u>Relative</u>
	<u>Total Score</u>		<u>Average</u>	<u>Coping</u>
			<u>(range: 0-3)</u>	
Total coping	45.56		1.27	1.00
(36 items; range=0-108)	(SD=17.88)		(SD=0.50)	
<i>Cognitive/Behavioral Subscale</i>		<i>t=9.66***</i>		
Cognitive coping ^a	30.97		1.55	0.64
(20 items; range=0-60)	(SD=12.02)		(SD=0.60)	(SD=0.10)
Behavioral coping ^b	14.59		0.91	0.36
(16 items; range=0-48)	(SD=7.37)		(SD=0.46)	(SD=0.10)
<i>Pos/Neg Thinking/Social</i>		<i>F=55.91***</i>		
<i>Support/Avoidance Subscale</i>				
Pos. thinking coping ^c	22.02		1.57	0.34
(14 items; range = 0-42)	(SD=8.49)		(SD=0.61)	(SD=0.09)
Neg. thinking coping ^c	8.95		1.49	0.30
(6 items; range =	(SD=4.62)		(SD=0.77)	(SD=0.10)

0-18)

Social support	3.69	0.74	0.14
coping ^d	(SD=2.73)	(SD=0.55)	(SD=0.09)

(5 items; range =

0-15)

Avoidance coping ^e	10.90	0.99	0.21
(11 items; range =	(SD=5.55)	(SD=0.51)	(SD=0.07)

0-33)

*** $p < 0.001$

Note: Variables with different superscripts are significantly different from one another at $p < 0.001$ using Bonferroni post-hoc analysis.

Table 5 and *Table 6* provide a more detailed examination of individual strategies endorsed with most and least frequency. *Table 5* lists the strategies with the ten highest mean scores at both baseline and month 3, while *Table 6* lists the strategies with the ten lowest mean scores at both baseline and month 3. This comparison indicated a slightly shifted composition of both the top and least endorsed strategies during the treatment period, in addition to higher overall rates of endorsement. Specifically, two self-critical strategies, “remembering how I’ve let my friends and family down in the past,” and “thinking of the mess I’ve gotten myself into through drinking” were replaced or declined in intensity in the list of top endorsed strategies. Additionally, “going for a walk,” and “keeping in the company of nondrinkers,” left the group of ten least-endorsed strategies

and were replaced by “forcing myself to go to work,” and “knowing that by not drinking, I can show my face again without fear of what others will think.” (see *Table 6*). Mean scores for each item by *cognitive* and *behavioral* subscales can be found in *Appendix D*.

Table 5
Coping strategies endorsed with most intensity at baseline and month 3

	BL Coping Strategy	Mean Endorsement (<i>SD</i>)	M3 Coping Strategy	Mean Endorsement (<i>SD</i>)
1.	Health	1.80 (<i>SD</i> =0.92)	Better off	2.27 (<i>SD</i> =0.77)
2.	Better off	1.79 (<i>SD</i> =0.92)	Thinking positively	2.11 (<i>SD</i> =0.81)
3.	Thinking of mess	1.73 (<i>SD</i> =0.96)	Health	2.00 (<i>SD</i> =0.93)
4.	Effect on family	1.73 (<i>SD</i> =0.95)	Effect on family	1.84 (<i>SD</i> =0.96)
5.	Thinking positively	1.56 (<i>SD</i> =0.91)	Doing something in house	1.82 (<i>SD</i> =0.87)
6.	How affected family	1.49 (<i>SD</i> =1.03)	Good life without drink	1.73 (<i>SD</i> =0.96)
7.	Doing something in house	1.46 (<i>SD</i> =0.91)	<u>Not worth it</u>	1.73 (<i>SD</i> =0.96)
8.	Good life without	1.44 (<i>SD</i> =1.01)	Thinking of mess	1.68 (<i>SD</i> =1.04)
9.	<i>Let down family/friends</i>	1.30 (<i>SD</i> =1.01)	How affected family	1.68 (<i>SD</i> =1.09)
10.	<i>Stop playing games</i>	1.23 (<i>SD</i> =0.95)	<u>Alcoholic cycle</u>	1.57 (<i>SD</i> =0.95)

Note: Baseline *italicized* strategies are those that did not appear among the list of most endorsed strategies at month 3. Month 3 underlined strategies are those that did not appear among the list of most endorsed strategies at baseline.

Table 6
Coping strategies endorsed with least intensity at baseline and month 3

BL Coping Strategy	Mean Endorsement (<i>SD</i>)	M3 Coping Strategy	Mean Endorsement (<i>SD</i>)
1. Money at home	0.16 (<i>SD</i> =0.53)	Money at home	0.20 (<i>SD</i> =0.54)
2. Old drinking friends	0.18 (<i>SD</i> =0.49)	Old drinking friends	0.23 (<i>SD</i> =0.50)
3. Waiting it out	0.26 (<i>SD</i> =0.59)	A.A. meeting	0.44 (<i>SD</i> =0.78)
4. Telephoning friend	0.53 (<i>SD</i> =0.74)	Waiting it out	0.54 (<i>SD</i> =0.89)
5. AA meeting	0.56 (<i>SD</i> =0.79)	Staying indoors	0.61 (<i>SD</i> =0.91)
6. Buying something special	0.68 (<i>SD</i> =0.80)	<u>Force to go to work</u>	0.68 (<i>SD</i> =0.95)
7. People who have helped	0.70 (<i>SD</i> =0.89)	Telephoning friend	0.72 (<i>SD</i> =0.83)
8. <i>Going for a walk</i>	0.72 (<i>SD</i> =0.84)	<u>Show my face</u>	0.92 (<i>SD</i> =1.05)
9. Staying indoors	0.72 (<i>SD</i> =1.06)	Buying something special	0.99 (<i>SD</i> =0.90)
10. <i>Company of nondrinkers</i>	0.77 (<i>SD</i> =0.86)	People who have helped	1.10 (<i>SD</i> =0.94)

Note: Baseline *italicized* strategies are those that did not appear among the list of least endorsed strategies at month 3. Month 3 underlined strategies are those that did not appear among the list of least endorsed strategies at baseline

Relative coping scores at baseline and month 3 were also compared to provide context to relative coping at treatment entry. At baseline, *negative thinking* relative coping represented the greatest proportion of total coping (33.4%), followed by *positive thinking* (31.8%), *avoidance* (20.7%) and *social support* (14.1%). At month 3, *negative thinking* comprised 30.2% of coping efforts, while *positive thinking* comprised 34.5%, *avoidance* comprised 20.8%, and *social support* comprised 14.5%. *Negative thinking* relative coping percent was significantly lower at month 3 (paired samples $t(131)=1.98$, $p=0.050$), *positive thinking* relative coping was significantly higher (paired samples $t(131)=-3.35$, $p<0.01$), but baseline-month 3 differences were not significant for *avoidance* and *social support* subfactors.

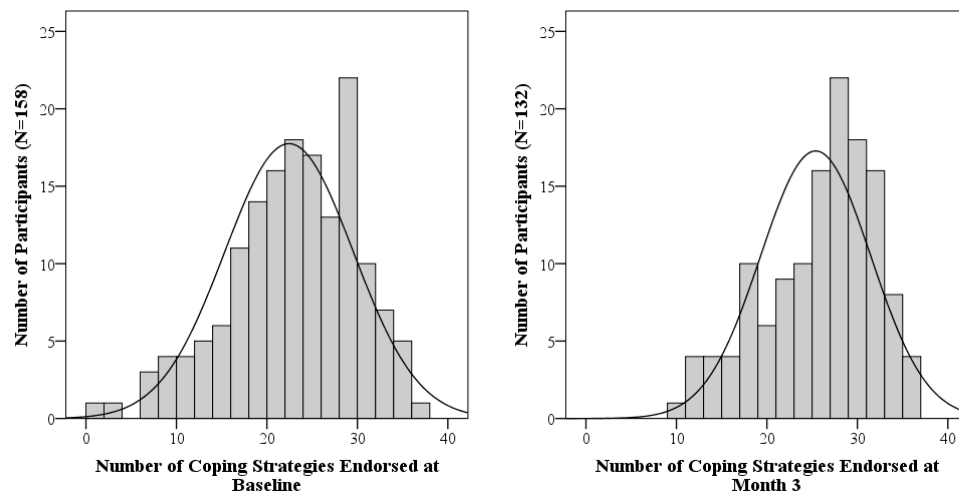


Figure 4. Number of different coping strategies endorsed (out of 36) at baseline and month 3.

Endorsement of any of the menu of 36 coping strategies, regardless of intensity, was summed. At baseline, women endorsed a mean of 22.4 strategies ($SD=7.1$). At the end of treatment, women endorsed a mean of 25.4 strategies ($SD=6.1$). This increase in number of strategies endorsed was statistically significant (paired samples t -test: $t(131)=5.65, p<0.001$)).

Research Question 2: Does baseline total alcohol-specific coping vary according to demographic, psychological, alcohol use and treatment history variables?

Baseline total coping score was compared to each demographic, psychological, baseline alcohol use, and treatment history variables. *Table 7* displays results from Pearson's r tests (for continuous variables) and *Table 8* displays results from independent samples t -tests (for binary/categorical variables); significant findings are discussed below.

Table 7
Pearson's correlation coefficient for continuous predictors of total coping at baseline
(N=158)

	Pearson's <i>r</i>
<i>Demographics</i>	
Age	0.025
Years of education	0.020
Household income ^a	-0.155 (<i>p</i> =0.054)
<i>Psychological variables</i>	
Baseline abstinence self-efficacy score	0.360***
<i>Substance Severity</i>	
Percent days abstinent at baseline	0.299***
Mean drinks per drinking day	0.166*
Baseline percent heavy drinking days	-0.074
Lifetime alcohol abuse & dependence criteria met	0.236***
Years of problem drinking	0.034

p* <0.05; **p*<0.001.

^a Household income data were subject to a logarithmic transformation due to substantial positive skewness.

Table 8
Independent-samples *t*-tests for categorical predictors of total coping at baseline (N=158)

	<u>Yes</u>		<u>No</u>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>
<i>Demographics</i>					
Ethnicity (% Caucasian)	37.05	16.70	33.29	21.01	-0.577
Married	36.29	16.37	39.32	18.78	0.898
Any children at home	36.51	16.89	37.52	16.90	0.366
Employed full or part time	35.73	17.14	39.38	16.10	1.269
<i>Psychological variables</i>					
Current Axis I diagnosis	41.21	16.28	33.70	16.64	-2.829**
Any Axis II diagnosis	37.91	17.02	36.35	16.82	-0.548
<i>Treatment history</i>					
Prior alcohol treatment	46.32	17.42	33.58	15.40	-4.402***
Baseline AA attendance	43.18	15.83	35.53	16.81	-2.205*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Psychological variables.

Total coping at baseline was significantly associated with total mean abstinence self-efficacy score ($r=0.360$, $p<0.001$), such that higher mean self-efficacy for abstinence was associated with greater total coping. Baseline self-efficacy for abstinence was not significantly associated with presence of current Axis I disorder (not shown).

Total coping score at baseline was significantly and positively associated with presence of a comorbid Axis I disorder ($M=41.21$, $SD=16.28$ vs. $M=33.70$, $SD=16.64$,

$t(156)=-2.829, p<0.01$), but not with presence of at least one comorbid Axis II disorder. Because the association between total coping at baseline and Axis I disorder was unexpected, further subscale analyses were completed: those participants with a comorbid Axis I disorder had significantly higher scores on baseline *negative thinking* ($M=9.13, SD=4.53$ vs. $M=7.48, SD=4.45, t(156)=-2.288, p=0.02$), *social support* ($M=3.28, SD=2.62$, vs. $M=2.48, SD=2.30, t(156)=-2.035, p=0.04$) and *avoidance* ($M=10.94, SD=5.32$, vs. $M=7.32, SD=5.12, t(155)=-4.305, p<0.001$) subscales but not on *positive thinking* ($M=17.85, SD=7.87$ vs. $M=16.38, SD=8.36, t(155)=-1.119, p=0.27$) subscales.

Substance severity.

Total baseline coping score was significantly positively correlated with percent days abstinent during the 90 days preceding the most recent pre-baseline drink ($r=0.299, p<0.001$), as well as with mean drinks per drinking day ($r=0.166, p<0.05$) and with number of lifetime alcohol abuse and dependence criteria met ($r=0.236, p<0.001$). Mean drinks per drinking day were significantly associated with number of lifetime alcohol abuse or dependence criteria met (not shown; $r=0.315, p<0.001$). Because of the association between mean drinks per drinking day and number of alcohol use disorder criteria met, the latter but not the former was entered into all subsequent multivariate models.

Because the positive relationship between total baseline coping score and both percent abstinent days and mean drinks per drinking day was unexpected and apparently contradictory, further tests examined the associations by coping subscale for these two drinking variables. Greater mean drinks per drinking day was significantly associated

with higher baseline *negative thinking* ($r=0.219, p<0.01$) and *social support* ($r=0.239, p<0.01$) subscales but not higher baseline *positive thinking* or *avoidance* subscales.

Greater percent days abstinent at baseline, in turn, was associated with significantly higher scores on all subscales (*positive thinking* $r=0.204, p=0.01$, *negative thinking* $r=0.293, p<0.01$, *social support* $r=0.284, p<0.01$, *avoidance* $r=0.249, p<0.01$).

Treatment history.

Receipt of prior alcohol treatment was associated with a higher baseline total coping score ($M=46.32, SD=17.42$ vs. $M=33.58, SD=15.40, t(156)=-4.402, p<0.001$). In addition, Alcoholics Anonymous meeting attendance during the 90-day time period prior to the baseline appointment was significantly associated with higher coping score at treatment start ($M=43.18, SD=15.83$ vs. $M=35.53, SD=16.81, t(156)=-2.205, p<0.05$).

Further analyses indicated that prior alcohol treatment and past 90 days Alcoholics Anonymous attendance were significantly correlated with each other ($\chi^2=7.427, p<0.01$) and thus, to avoid issues of multicollinearity, subsequent multivariable models including baseline significant predictors of coping were run twice: once with prior alcohol treatment and once with baseline Alcoholics Anonymous attendance as the *Treatment History* variable.

Hypotheses

Aim B: Alcohol-related Coping and Change in Alcohol-related Coping as a Function of Treatment

Hypothesis 1: Controlling for treatment arm, total coping will increase during and decrease after treatment. Specifically, the greatest increase in total coping will be seen for the time period of treatment receipt (i.e., baseline to month 3), with a slight drop off in total coping during the follow up period (month 3 to month 15).

Base Latent Growth Curve Model (LGCM).

Coping scores over time were first modeled assuming a linear trajectory. This resulted in a relatively poor fit of the data (RMSEA=0.267; 90% C.I.=0.210-0.329, CFI=0.712, Sample-size adjusted BIC=4360.824). Adding a quadratic term improved the model fit substantially (RMSEA=0.173; 90% C.I.=0.059-0.322, CFI=0.976, Sample-size adjusted BIC=4312.875) and also demonstrated no significant correlation between the intercept, slope, and quadratic term. This suggested that the overall rate of change in coping score was not significantly related to individuals' baseline level of coping or the extent to which change accelerated or decelerated over time. As such, a model in which slope, intercept, and quadratic term were set at zero correlation was tested, which resulted in the best fitting model (RMSEA=0.091; 90% C.I.=0.000-0.170, CFI=0.973, Sample adjusted BIC=4310.669); of note, although the final model fit well, it did result in a non-positive definite Psi matrix, suggesting possible covariance between several of the latent

variables (i.e., slope, intercept, and quadratic term), which was not corrected when parameter constraints were relaxed (i.e., when tested without zero correlation). As such, as appropriate with an exploratory study, both base and conditional (see below) LGCM results should be replicated in subsequent samples to confirm model fit.

Visual inspection of the graphed means at each time point as displayed in *Figure 5* was consistent with a quadratic rather than linear shape in which CBI changes were greater for earlier time periods (i.e., between baseline and month 3) as compared to later time periods (i.e., between months 9 and 15). This chart also demonstrated that the mean trajectory of participants in the individual condition was slightly higher than the mean trajectory of participants in the couples' condition; however, as subsequently demonstrated by the conditional LGCM, this difference did not approach statistical significance.

The model-derived intercept value of the zero correlated quadratic model was 37.737, which was similar to the observed baseline coping score of 36.9. The slope of the final zero-correlation quadratic model indicated that there was a significant increase in total coping score from baseline to the end of follow-up ($\mu_{\text{slope}}=2.531$, $SE=0.352$, $p<0.001$), which decelerated over time ($\mu_{\text{quadratic}}=-0.157$, $SE=0.021$, $p<0.001$). Additionally, evaluation of the variance components of the slope ($\text{variance}_{\text{slope}}=3.426$, $p=0.001$), intercept ($\text{variance}_{\text{intercept}}=142.039$, $p<0.001$), and quadratic ($\text{variance}_{\text{quadratic}}=0.019$, $p=0.005$) terms suggested significant variation in individual trajectories of baseline coping and linear and quadratic rate of change (Bollen & Curran, 2006).

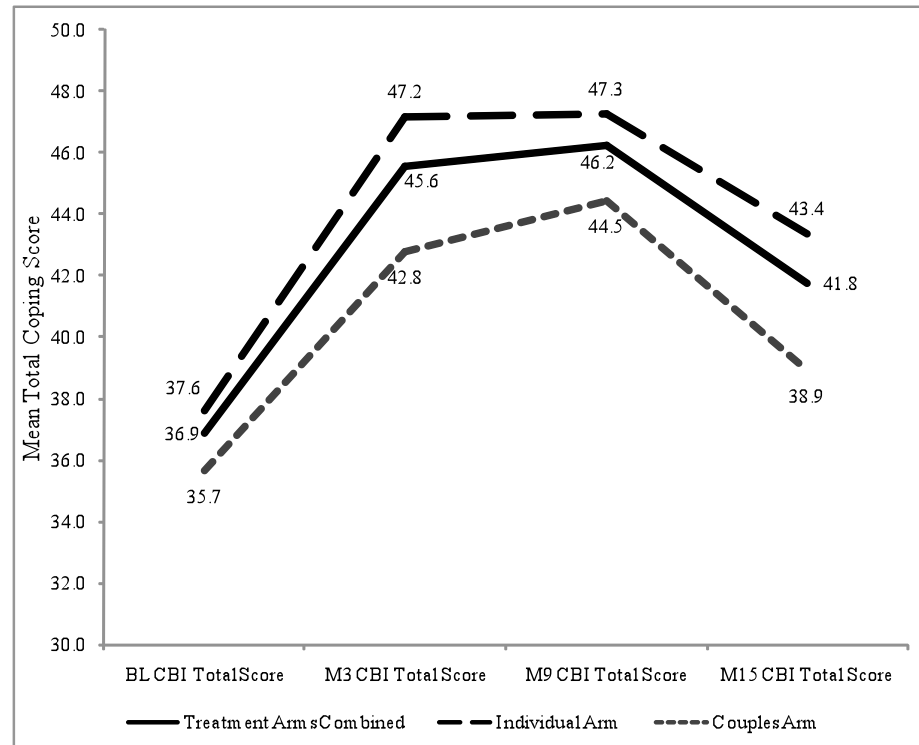


Figure 5. Total coping score at each assessment time period, treatment arms combined and separately (N=158 at baseline).

Conditional LGCM.

Adding treatment and baseline significant predictors of coping score (presence of current comorbid Axis I disorder, self-efficacy score, lifetime alcohol abuse and dependence criteria met, and receipt of prior treatment/baseline Alcoholics Anonymous attendance) as covariates to the zero-correlated quadratic model improved the model fit (model including prior treatment receipt: RMSEA=0.040; 90% C.I.=0.000-0.089, CFI=0.984, Sample-size adjusted BIC=8400.291/ model including baseline Alcoholics Anonymous attendance: RMSEA=0.050; 90% C.I.=0.000-0.091, CFI=0.970, Sample adjusted BIC=8349.019). Each covariate with the exception of treatment arm and baseline percent days abstinent significantly and uniquely predicted coping intercept.

Table 9 displays the coefficients of the conditional model of the base LGCM including baseline significant predictors of coping (including prior alcohol treatment). For the covariates current comorbid Axis I disorder, receipt of prior alcohol treatment, and number of alcohol abuse and dependence criteria met, the intercept was positive and significant, indicating that these variables predicted a higher level of coping at treatment start; however, current Axis I comorbidity did not significantly predict rate of change in total coping or rate of change over treatment and follow-up. The only covariate that was significantly associated with all three latent variables was baseline self-efficacy for abstinence. Specifically, baseline self-efficacy was associated with a negative coping slope, which accelerated slightly with time.

Table 10 displays conditional model coefficients of baseline significant predictors of coping when baseline Alcoholics Anonymous attendance was entered as a within-treatment variable instead of receipt of prior AUD treatment. Similar to the previous model, current Axis I comorbidity, baseline self-efficacy and alcohol and dependence criteria met were significantly related to intercept; however, self-efficacy was the only variable also associated with slope and quadratic term, such that higher score was associated with a negative change in coping slope over time.

Table 9
Conditional model coefficients including baseline significant predictors (with prior receipt of alcohol treatment)

	Intercept	<i>SE</i>	Slope	<i>SE</i>	Quadratic	<i>SE</i>
Treatment arm	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Current comorbid Axis I disorder	5.258	(2.312)*	-0.554	(0.715)	0.044	(0.044)
Baseline self-efficacy score	0.250	(0.047)**	-0.050	(0.015)**	0.003	(0.001)**
Percent days abstinent at baseline	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Lifetime alcohol abuse & dependence criteria	1.735	(0.653)*	0.048	(0.197)	0.009	(0.012)
Prior alcohol treatment	9.728	(2.545)**	-1.134	(0.779)	0.065	(0.048)

* $p < 0.05$; ** $p < 0.001$.

Note: Parameters that were nonsignificant at $p < 0.05$ were set to zero in final model.

Table 10
Conditional model coefficients including baseline significant predictors (with baseline AA attendance)

	Intercept	<i>SE</i>	Slope	<i>SE</i>	Quadratic	<i>SE</i>
Treatment arm	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Current comorbid Axis I disorder	5.845	(2.414)*	-0.619	(0.717)	0.043	(0.044)
Baseline self-efficacy score	0.261	(0.049)**	-0.051	(0.015)**	0.003	(0.001)**
Percent days abstinent at baseline	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Lifetime alcohol abuse & dependence criteria	2.069	(0.678)**	0.014	(0.197)	0.008	(0.012)
Any AA attendance at baseline	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)

* $p < 0.05$; ** $p < 0.001$.

Note: Parameters that were nonsignificant at $p < 0.05$ were set to zero in final model.

Figure 6 displays the baseline self-efficacy score median split (i.e., above or below a score of 48.63) by total coping score over time. The graphical display demonstrates the growth trajectory indicated by the LGCM coefficients as displayed in Table 9 and Table 10, above.

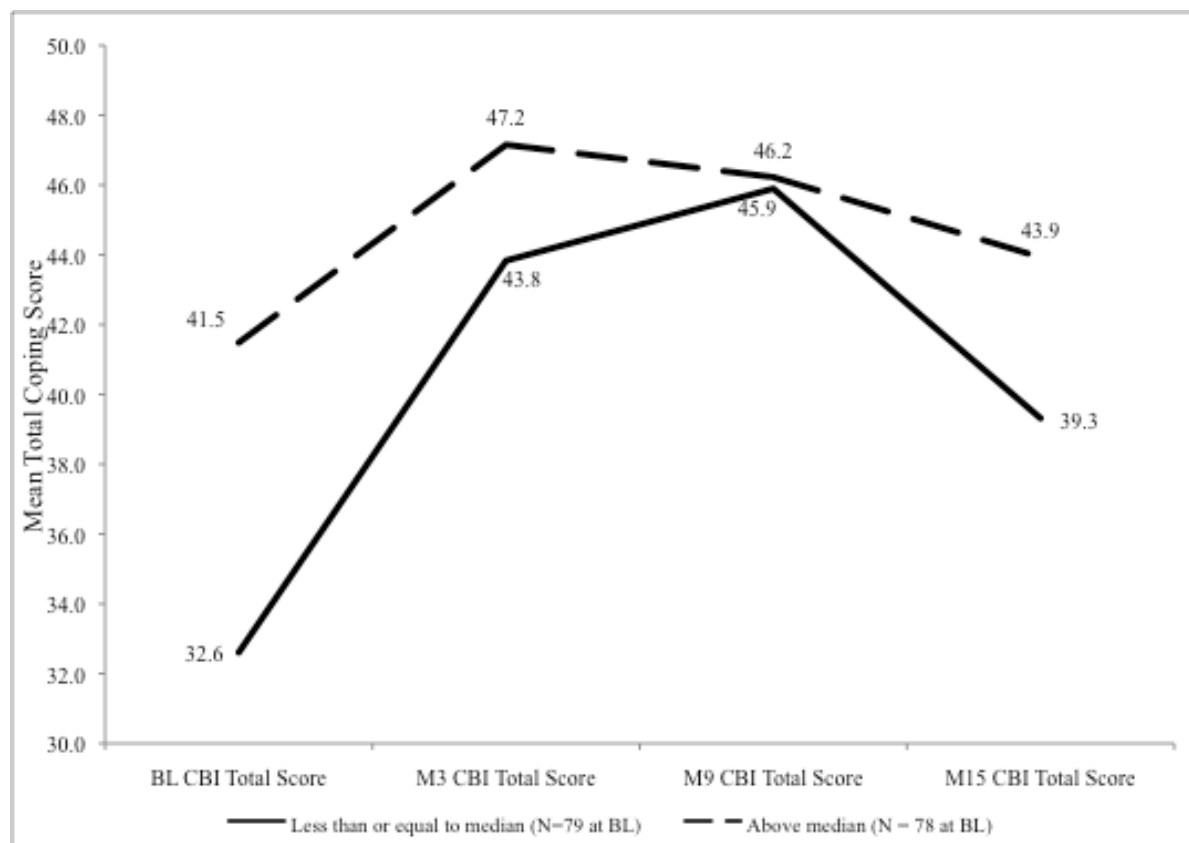


Figure 6. Median split of baseline abstinence self-efficacy score graphed by CBI mean total coping score at baseline (N=157), month 3 (N=131), month 9 (N=110) and month 15 (N=118).

Hypothesis 2: Treatment attendance and engagement will predict total increases in coping during the three-month treatment period, controlling for treatment arm. Additionally, treatment attendance and within-treatment engagement will predict less of a reduction in total coping score during the follow-up period (month 3-month 15).

Change in coping during treatment (i.e., baseline to month 3).

Across both treatment arms, total coping score increased an average of 8.5 points ($SD=17.6$, $range=-44.0-58.0$) from baseline to month 3. *Figure 7* displays the frequency distribution of month 3-baseline change in total CBI.

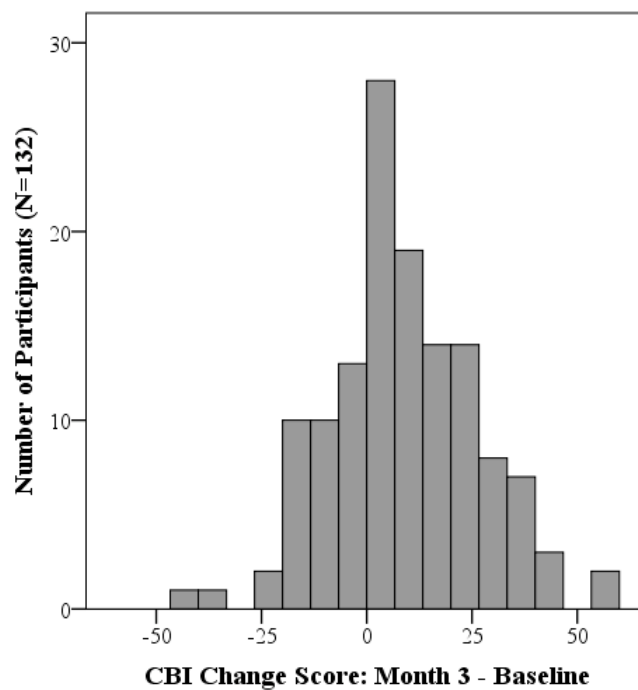


Figure 7. Frequency distribution of within-treatment (i.e., month 3 – baseline) change score.

Due to a significant correlation between treatment sessions attended and percent homework completed, each variable was tested independently as a predictor of within-treatment change in coping score. *Table 11* and *Table 12*, below, display results from a sequential regression analysis in which sessions attended predicted change in coping during treatment. Step 1 in both models tested attendance alone, and step 2 depicts the results when baseline significant predictors of coping were added. *Table 11* includes prior alcohol treatment received as a covariate, while *Table 12* depicts Alcoholics Anonymous attendance at baseline as a covariate. These “prior treatment” variables were not entered together due to a high degree of correlation.

General findings were consistent across both models including session attendance as a treatment engagement variable. Sessions attended was significantly associated with change in coping during treatment both alone and when controlling for baseline predictors of coping, such that greater attendance was positively associated with change in coping during treatment (*Table 11*, Step 2: $\beta=0.231$, $p<0.01$; *Table 12*, Step 2: $\beta=0.229$, $p<0.01$). In both models, baseline total coping score was significantly associated with change in coping during treatment (consistent with a “ceiling” effect, such that the amount of change possible is limited by starting point). Number of alcohol abuse and dependent criteria met remained independently associated with coping change during treatment even after controlling for baseline total coping (with which this variable was significantly correlated) (*Table 11*: $\beta=0.169$, $p<0.05$; *Table 12*, Step 2: $\beta=0.172$, $p<0.05$). Both overall models were significant and explained nearly 30% of the variance in change in coping during treatment [*Table 11* Final Model: $F(8,122)=6.263$, $p<0.001$, $R^2=0.291$; *Table 12* Final Model: $F(8,122)=6.245$, $p<0.001$, $R^2=0.291$].

Table 11
Sequential regression analysis of sessions attended predicting total change in coping during treatment (BL to month 3) controlling for baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	1.260	(0.424)	0.253	2.972**
Step 2				
Sessions attended	1.152	(0.386)	0.231	2.985**
Treatment arm	-3.797	(2.780)	-0.106	-1.366
Baseline total coping score	-0.478	(0.094)	-0.460	-5.074**
Current comorbid Axis I disorder	-3.731	(2.856)	-0.105	-1.306
Baseline self-efficacy score	-0.029	(0.063)	-0.040	-0.463
Baseline percent days abstinent	0.001	(0.054)	0.002	0.028
Lifetime alcohol abuse & dependence criteria	1.679	(0.818)	0.169	2.053*
Prior alcohol treatment	1.069	(3.243)	0.027	0.330

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.064$ for Step 1; $R^2\Delta=0.291$ for Step 2 ($p<0.001$).

Table 12
Sequential regression analysis of sessions attended predicting total change in coping during treatment (BL to month 3) controlling for baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	1.260	(0.424)	0.253	2.972**
Step 2				
Sessions attended	1.142	(0.385)	0.229	2.964**
Treatment arm	-3.719	(2.797)	-0.104	-1.329
Baseline total coping score	-0.470	(0.091)	-0.452	-5.185**
Current comorbid Axis I disorder	-3.700	(2.856)	-0.104	-1.295
Baseline self-efficacy score	-0.031	(0.063)	-0.043	-0.497
Baseline percent days abstinent	0.005	(0.055)	0.007	0.086
Lifetime alcohol abuse & dependence criteria	1.706	(0.844)	0.172	2.021*
Baseline AA attendance	-0.272	(4.070)	-0.006	-0.067

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.064$ for Step 1; $R^2=0.291$ for Step 2 ($p < 0.001$).

Table 13 and Table 14, below, display results from a sequential regression analysis in which percent homework completed was tested as a predictor of change in coping during treatment. Step 1 in both models tests percent homework completed alone, and Step 2 depicts the results when baseline significant predictors of coping were added. Table 13 includes prior alcohol treatment received as a covariate, while Table 14 depicts

Alcoholics Anonymous attendance at baseline as a covariate. As above, these “prior treatment” variables were not entered together due to a high degree of correlation.

General findings were again consistent across both models including percent homework completed as a treatment engagement variable. Percent homework completed was not significantly associated with change in coping during treatment when entered alone or when controlling for baseline predictors of coping at $\alpha=0.05$, (*Table 13*, Step 2: $\beta=0.148, p=0.062$; *Table 14*, Step 2: $\beta=0.147, p=0.063$). Consistent with models testing attendance as a treatment engagement variable associated with change in coping during treatment, baseline total coping score was significant associated with change in coping during treatment in both models. However, number of alcohol abuse and dependent criteria met was no longer significantly associated with coping change during treatment at $\alpha=0.05$. Both overall models were significant, and both explained approximately 26% of the variance in change in coping within treatment [*Table 13* Final Model: $F(8,122)=5.384, p<0.001, R^2=0.261$; *Table 14* Final Model: $F(8,122)=5.381, p<0.001, R^2=0.261$].

Table 13
Sequential regression analysis of percent homework completed predicting total change in coping during treatment (BL to month 3) controlling for baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	0.117	(0.068)	0.150	1.729† (<i>p</i> =0.09)
Step 2				
Percent homework completed	0.115	(0.061)	0.148	1.887† (<i>p</i> =0.06)
Treatment arm	-3.255	(2.840)	-0.091	-1.146
Baseline total coping score	-0.495	(0.096)	-0.477	-5.153**
Current comorbid Axis I disorder	-3.634	(2.917)	-0.102	-1.246
Baseline self-efficacy score	-0.028	(0.065)	-0.038	-0.432
Baseline percent days abstinent	0.012	(0.054)	0.019	0.226
Lifetime alcohol abuse & dependence criteria	1.558	(0.834)	0.157	1.869† (<i>p</i> =0.06)
Prior alcohol treatment	0.507	(3.302)	0.013	0.153

†*p*<0.10; ***p*< 0.01.

Note: $R^2=0.023$ for Step 1; $R^2=0.261$ for Step 2 (*p*<0.001).

Table 14

Sequential regression analysis of percent homework completed predicting total change in coping during treatment (BL to month 3) controlling for baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	0.117	(0.068)	0.150	1.729† (<i>p</i> =0.09)
Step 2				
Percent homework completed	0.114	(0.061)	0.147	1.879† (<i>p</i> =0.06)
Treatment arm	-3.259	(2.859)	-0.091	-1.140
Baseline total coping score	-0.491	(0.092)	-0.472	-5.323**
Current comorbid Axis I disorder	-3.613	(2.915)	-0.101	-1.239
Baseline self-efficacy score	-0.030	(0.065)	-0.041	-0.464
Baseline percent days abstinent	0.012	(0.056)	0.019	0.218
Lifetime alcohol abuse & dependence criteria	1.548	(0.859)	0.156	1.803† (<i>p</i> =0.07)
Baseline AA attendance	0.317	(4.147)	0.007	0.076

†*p*<0.10; ***p*< 0.01.

Note: $R^2=0.023$ for Step 1; $R^2=0.261$ for Step 2 (*p*<0.001).

Change in coping over the full follow-up period (i.e., month 3 to month 15).

During the follow-up period (month 3- month 15), total coping changed by an average of -4.9 points ($SD=15.6$, $range=-36.0-50.0$). *Figure 8* displays the frequency distribution of the change in total CBI over the full follow-up period (i.e., month 15 – month 3).

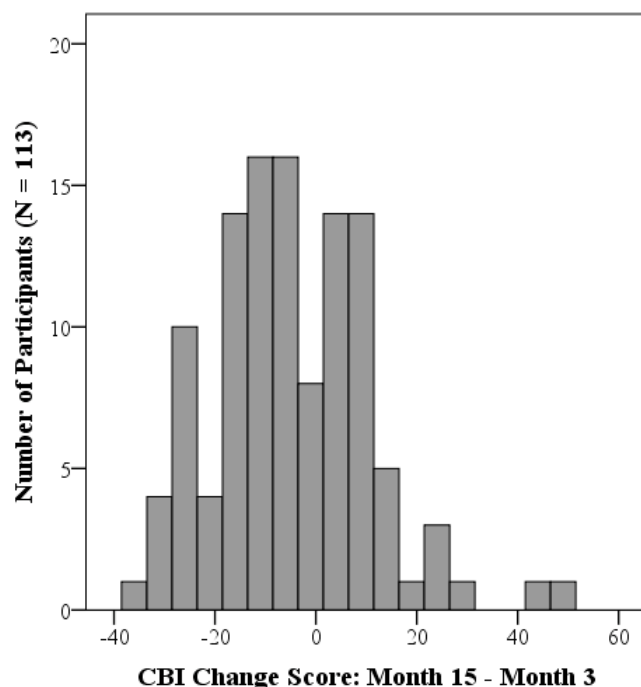


Figure 8. Frequency distribution of CBI change score over the full follow-up period (i.e., month 15 – month 3).

Table 15 and *Table 16*, below, display results from a sequential regression analysis in which sessions attended predicted change in coping following treatment (i.e., from month 3 to month 15). Step 1 in both models tested attendance alone, and step 2 depicts the results when baseline significant predictors of coping and month 3 total coping were added. *Table 15* includes prior alcohol treatment received as a covariate, while *Table 16* depicts Alcoholics Anonymous attendance at baseline as a covariate.

Across both models, sessions attended was significantly associated with change in coping during the full follow-up period, both alone and when controlling for month 3 coping and baseline predictors of coping, such that greater attendance was associated with greater reduction in coping following treatment (*Table 15*, Step 2: $\beta=-0.235$, $p<0.01$; *Table 16*, Step 2: $\beta=-0.234$, $p<0.001$). This finding must be viewed in conjunction with the previous finding that greater attendance was positively associated with change in coping during treatment. In addition, in both models, month 3 total coping score was significantly associated with change in coping after treatment (consistent with a “ceiling” effect, such that the amount of change possible is limited by starting point). Further, number of alcohol abuse and dependence criteria met at baseline was independently associated with coping change during the full follow-up period, such that those individuals with a greater number of criteria had a larger change in total coping following treatment (*Table 15*, Step 2: $\beta=0.212$, $p<0.05$; *Table 16*, Step 2: $\beta=0.244$, $p<0.05$). Additionally, both overall models were significant and explained over 20% of the variance in change in coping during treatment [*Table 15* Final Model: $F(8,103)=3.720$, $p=0.001$, $R^2=0.224$; *Table 16* Final Model: $F(8,103)=3.867$, $p=0.001$, $R^2=0.231$].

Table 15
Sequential regression analysis of sessions attended predicting total change in coping following treatment (month 3 to month 15) controlling for month 3 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-1.349	(0.393)	-0.310	-3.430**
Step 2				
Sessions attended	- 1.023	(0.393)	-0.235	-2.603**
Treatment arm	1.855	(2.819)	0.058	0.658
Month 3 total coping score	-0.259	(0.086)	-0.288	-3.006**
Current comorbid Axis I disorder	2.536	(2.936)	0.078	0.864
Baseline self-efficacy score	0.077	(0.064)	0.113	1.200
Baseline percent days abstinent	0.061	(0.055)	0.107	1.108
Lifetime alcohol abuse & dependence criteria	1.821	(0.823)	0.212	2.211*
Prior alcohol treatment	2.477	(3.242)	0.069	0.764

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.100$ for Step 1; $R^2=0.224$ for Step 2 ($p < 0.05$).

Table 16
Sequential regression analysis of sessions attended predicting total change in coping following treatment (month 3 to month 15) controlling for month 3 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-1.375	(0.394)	-0.316	-3.492**
Step 2				
Sessions attended	-1.017	(0.390)	-0.234	- 2.606*
Treatment arm	2.133	(2.814)	0.067	0.758
Month 3 total coping score	-0.249	(0.085)	-0.278	-2.924**
Current comorbid Axis I disorder	2.502	(2.923)	0.077	0.856
Baseline self-efficacy score	0.095	(0.065)	0.140	1.456
Baseline percent days abstinent	0.083	(0.055)	0.146	1.512
Lifetime alcohol abuse & dependence criteria	2.099	(0.840)	0.244	2.498*
Baseline AA attendance	-5.150	(4.201)	-0.119	-1.226

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.100$ for Step 1; $R^2=0.231$ for Step 2 ($p < 0.05$).

Figure 9, below, graphically depicts the total coping score trajectory for those individuals attending fewer than 12 sessions and those attending the full course of treatment. This graph demonstrates the positive relationship between attendance and total coping within treatment as well as the greater reduction in coping during follow up for those with greater attendance.

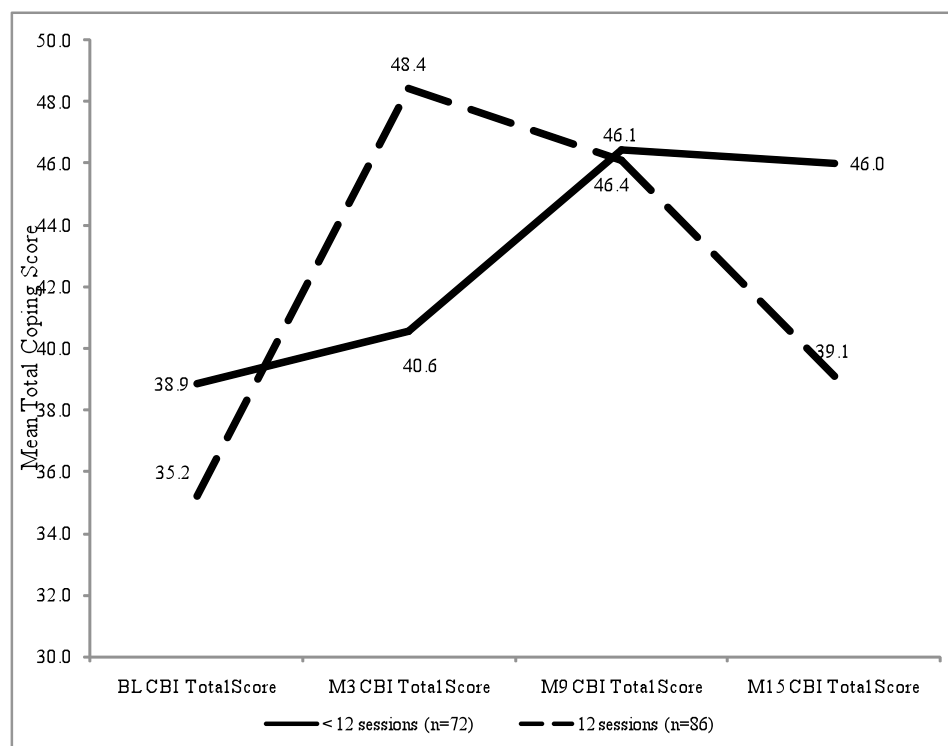


Figure 9. Sessions attended by CBI total coping score at baseline (N=158), month 3 (N=132), month 9 (N=111) and month 15 (N=119).

Table 17 and *Table 18*, below, display results from a sequential regression analysis in which percent homework completed was tested as a predictor of change in coping during treatment. Step 1 in both models tested percent homework completed alone, and Step 2 depicts the results when month 3 coping and baseline significant predictors of coping were added. *Table 17* includes prior alcohol treatment received as a covariate, while *Table 18* depicts Alcoholics Anonymous attendance at baseline as a covariate. As above, these “prior treatment” variables were not entered together due to a high degree of correlation.

Percent homework completed was significantly associated with change in coping following treatment when entered alone (*Table 17*, Step 1: $\beta=-0.222$, $p<0.05$; *Table 18*, Step 1: $\beta=-0.222$, $p<0.05$). However, percent homework completed was no longer significant when controlling for baseline predictors of coping and month 3 coping. Consistent with models testing attendance as a treatment engagement variable associated with change in coping during treatment, month 3 total coping score and number of alcohol abuse and dependence criteria met were both significantly associated with change in coping during treatment in both models. Both overall models were significant, and both explained approximately 20% of the variance in total coping score [*Table 17* Final Model: $F(8,103)=3.188$, $p<0.05$, $R^2=0.198$; *Table 18* Final Model: $F(8,103)=3.329$, $p<0.05$, $R^2=0.205$].

Table 17
Sequential regression analysis of percent homework completed predicting total change in coping following treatment (month 3 to month 15) controlling for month 3 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.147	(0.062)	-0.222	-2.391*
Step 2				
Percent homework completed	-0.107	(0.059)	-0.162	-1.804† (<i>p</i> =0.07)
Treatment arm	1.277	(2.863)	0.040	0.446
Month 3 total coping score	-0.289	(0.086)	-0.321	-3.360**
Current comorbid Axis I disorder	2.561	(2.984)	0.079	0.858
Baseline self-efficacy score	0.083	(0.065)	0.122	1.279
Baseline percent days abstinent	0.056	(0.056)	0.099	1.012
Lifetime alcohol abuse & dependence criteria	2.020	(0.830)	0.235	2.433*
Prior alcohol treatment	2.949	(3.285)	0.082	0.898

†*p*< 0.10; **p*< 0.05; ***p*< 0.01

Note: $R^2=0.049$ for Step 1; $R^2=0.198$ for Step 2 (*p*<0.05).

Table 18
Sequential regression analysis of percent homework completed predicting total change in coping following treatment (month 3 to month 15) controlling for month 3 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.147	(0.062)	-0.222	-2.391*
Step 2				
Percent homework completed	-0.107	(0.059)	-0.161	-1.805† (<i>p</i> =0.07)
Treatment arm	1.584	(2.859)	0.049	0.554
Month 3 total coping score	-0.278	(0.085)	-0.309	-3.258**
Current comorbid Axis I disorder	2.529	(2.971)	0.078	0.851
Baseline self-efficacy score	0.103	(0.066)	0.152	1.553
Baseline percent days abstinent	0.081	(0.056)	0.143	1.458
Lifetime alcohol abuse & dependence criteria	2.326	(0.846)	0.270	2.750**
Baseline AA attendance	-5.584	(4.263)	-0.129	-1.310

†*p* < 0.10; **p* < 0.05; ***p* < 0.01

Note: $R^2=0.049$ for Step 1; $R^2=0.205$ for Step 2 (*p*<0.05).

Figure 10, below, depicts total coping score means at each time point for those completing <75% of homework assignments versus $\geq 75\%$.

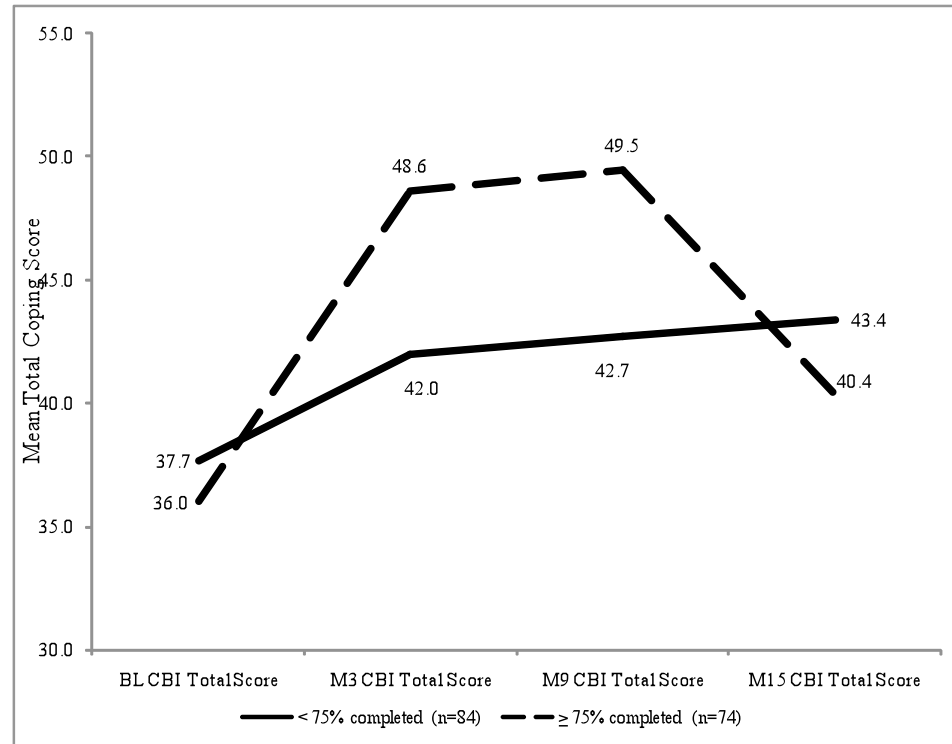


Figure 10. Percent homework completed by CBI mean total coping score at baseline (N=158), month 3 (N=132), month 9 (N=111) and month 15 (N=119).

Change in coping over the first six months of follow up (i.e., month 3 to month 9).

During the first six months of follow up (i.e., month 3 to month 9), total coping increased by an average of 1.4 points ($SD=13.1$, $range=-34.0-36.0$). *Figure 11* displays the frequency distribution of total change in CBI during the first follow-up period.

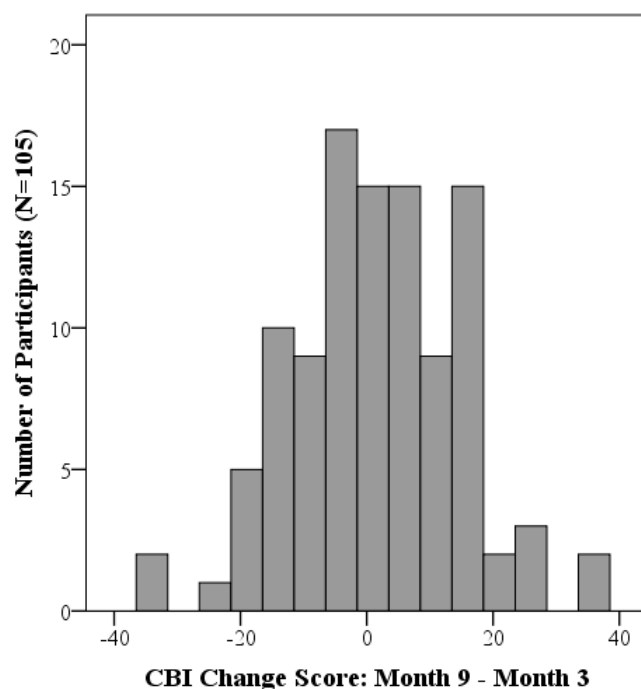


Figure 11. Frequency distribution of CBI change score during the first six months of follow up (i.e., month 9 – month 3).

As above, treatment sessions attended and percent homework completed were entered separately as predictors of change in coping score during the first six months of follow up. *Table 19* and *Table 20*, below, display results from a sequential regression analysis in which sessions attended predicted change in coping during the first six months of follow up (i.e., from month 3 to month 9). Step 1 in both models tested attendance alone, and step 2 depicts the results when baseline significant predictors of coping and

month 3 total coping were added. *Table 19* includes prior alcohol treatment received as a covariate, while *Table 20* depicts Alcoholics Anonymous attendance at baseline as a covariate. As above, these “prior treatment” variables were not entered together due to a high degree of correlation.

Sessions attended was again significantly associated with change in coping during the first portion of follow-up both alone and when controlling for month 3 coping and baseline predictors of coping, such that greater attendance was associated with greater reduction in coping during the first part of follow up (*Table 19*, Step 2: $\beta=-0.206$, $p<0.05$; *Table 20*, Step 2: $\beta=-0.220$, $p<0.05$). In addition, in both models, month 3 total coping score was again significantly associated with change in coping during the first portion of follow up (consistent with a “ceiling” effect, such that the amount of change possible is limited by starting point). Overall models were significant and explained 25-27% of the variance in change in coping during the first follow-up period [*Table 19* Final Model: $F(8, 95)=3.929$, $p<0.001$, $R^2=0.249$; *Table 20* Final Model: $F(8, 95)=4.339$, $p<0.001$, $R^2=0.268$].

Table 19

Sequential regression analysis of sessions attended predicting total change in coping in the first six months of follow-up (month 3 to month 9) controlling for month 3 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-0.947	(0.350)	-0.259	-2.705**
Step 2				
Sessions attended	- 0.753	(0.342)	-0.206	- 2.200*
Treatment arm	1.441	(2.431)	0.054	0.593
Month 3 total coping score	-0.310	(0.074)	-0.403	-4.183**
Current comorbid Axis I disorder	1.286	(2.561)	0.047	0.502
Baseline self-efficacy score	-0.059	(0.053)	-0.108	-1.127
Baseline percent days abstinent	0.084	(0.048)	0.173	1.767†
Lifetime alcohol abuse & dependence criteria	0.346	(0.742)	0.046	0.467
Prior alcohol treatment	-0.153	(2.864)	-0.005	-0.053

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.067$ for Step 1; $R^2=0.249$ for Step 2 ($p < 0.05$).

Table 20

Sequential regression analysis of sessions attended predicting total change in coping in the first six months of follow-up (month 3 to month 9) controlling for month 3 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-0.947	(0.350)	-0.259	-2.705**
Step 2				
Sessions attended	-0.806	(0.336)	-0.220	-2.400*
Treatment arm	1.335	(2.398)	0.050	0.557
Month 3 total coping score	-0.308	(0.073)	-0.400	-4.210**
Current comorbid Axis I disorder	1.265	(2.514)	0.046	0.503
Baseline self-efficacy score	-0.070	(0.053)	-0.127	-1.340
Baseline percent days abstinent	0.063	(0.048)	0.129	1.318
Lifetime alcohol abuse & dependence criteria	0.122	(0.746)	0.016	0.163
Baseline AA attendance	5.496	(3.497)	0.152	1.571

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2 = 0.067$ for Step 1; $R^2 = 0.268$ for Step 2 ($p < 0.01$).

Table 21 and *Table 22*, below, display results from a sequential regression analysis in which percent homework completed was tested as a predictor of change in coping during the first half of the follow-up period. As before, step 1 in both models tested percent homework completed alone, and Step 2 depicts the results when month 3 coping and baseline significant predictors of coping were added. *Table 21* includes prior alcohol treatment received as a covariate, while *Table 22* depicts Alcoholics Anonymous attendance at baseline as a covariate. As above, these “prior treatment” variables were not entered together due to a high degree of correlation.

Percent homework completed was not significantly associated with change in coping during the first follow-up period, either when entered alone or when controlling for baseline predictors of coping and month 3 coping. Consistent with models testing attendance as a treatment engagement variable associated with change in coping during treatment, month 3 total coping score was significantly associated with change in coping during the first follow-up period in both models. While both overall models were significant, the explained variance in both was just over 20% [*Table 21* Final Model: $F(8, 95)=3.167, p<0.01, R^2=0.211$; *Table 22* Final Model: $F(8, 95)=3.421, p<0.01, R^2=0.224$].

Table 21
Sequential regression analysis of percent homework completed predicting total change in coping in the first six months of follow-up (month 3 to month 9) controlling for month 3 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.046	(0.054)	-0.083	-0.842
Step 2				
Percent homework completed	-0.009	(0.051)	-0.016	-0.177
Treatment arm	1.009	(2.488)	0.038	0.405
Month 3 total coping score	-0.342	(0.075)	-0.446	-4.564**
Current comorbid Axis I disorder	1.064	(2.623)	0.039	0.405
Baseline self-efficacy score	-0.048	(0.054)	-0.088	-0.899
Baseline percent days abstinent	0.072	(0.049)	0.147	1.480
Lifetime alcohol abuse & dependence criteria	0.605	(0.754)	0.080	0.802
Prior alcohol treatment	0.782	(2.905)	0.026	0.269

** $p < 0.01$.

Note: $R^2 = 0.007$ for Step 1; $R^2 = 0.211$ for Step 2 ($p < 0.01$).

Table 22

Sequential regression analysis of percent homework completed predicting total change in coping in the first six months of follow-up (month 3 to month 9) controlling for month 3 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.046	(0.054)	-0.083	-0.842
Step 2				
Percent homework completed	-0.012	(0.051)	-0.022	-0.242
Treatment arm	0.922	(2.467)	0.034	0.374
Month 3 total coping score	-0.342	(0.074)	-0.445	-4.597**
Current comorbid Axis I disorder	1.122	(2.588)	0.041	0.434
Baseline self-efficacy score	-0.057	(0.054)	-0.103	-1.059
Baseline percent days abstinent	0.057	(0.049)	0.116	1.153
Lifetime alcohol abuse & dependence criteria	0.441	(0.759)	0.059	0.580
Baseline AA attendance	4.641	(3.583)	0.128	1.295

** $p < 0.01$.

Note: $R^2=0.007$ for Step 1; $R^2=0.224$ for Step 2 ($p < 0.01$).

Change in coping over the second half of follow-up (i.e., month 9 to month 15).

During the second half of the follow-up period (month 9 to month 15), total coping decreased by an average of -6.6 points ($SD=14.2$, $range=-40.0-51.0$). *Figure 12* displays the frequency distribution of the change in total CBI score over the second half of follow up.

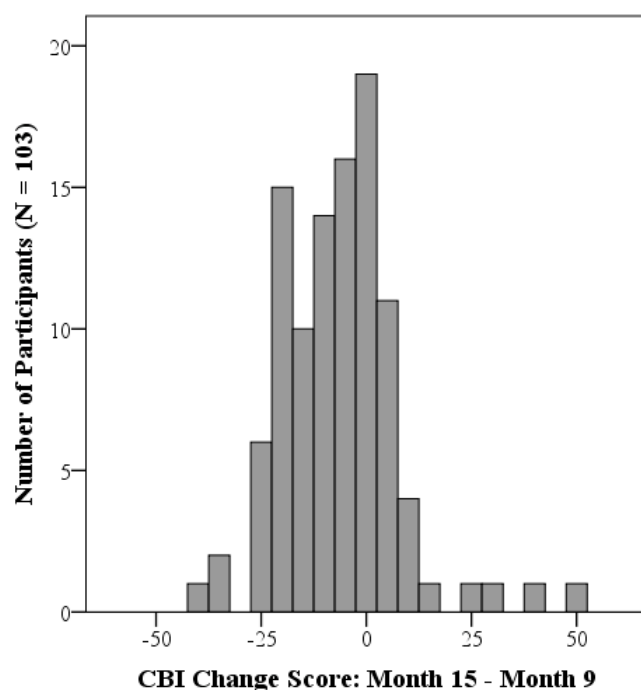


Figure 12. Frequency distribution of CBI change score over the second half of follow up (i.e., month 15 – month 9).

As above, treatment sessions attended and percent homework completed were entered separately as predictors of post-treatment change in coping score. *Table 23* and *Table 24*, below, display results from a sequential regression analysis in which sessions attended predicted change in coping during the second half of follow up (i.e., from month 9 to month 15). As before, step 1 in both models tested attendance alone, and step 2

depicts the results when baseline significant predictors of coping and month 9 total coping were added. *Table 23* includes prior alcohol treatment received as a covariate, while *Table 24* depicts Alcoholics Anonymous attendance at baseline as a covariate.

In neither model were sessions attended significantly associated with change in coping during the second half of the follow up period, either alone or when controlling for month 9 coping and baseline predictors of coping. In both models, month 9 total coping score was significantly associated with change in coping in the second half of the follow-up period (again consistent with a “ceiling” effect). Further, number of alcohol abuse and dependent criteria met was independently associated with coping change during the second half of follow up, such that those individuals meeting a greater number of criteria had a larger change in total coping during the second half of follow up (*Table 23*, Step 2: $\beta=0.219$, $p<0.05$; *Table 24*, Step 2: $\beta=0.252$, $p<0.05$). Both overall models were significant and explained approximately 15-17% of the variance in change in coping during the second half of the follow-up period [*Table 23* Final Model: $F(8, 93)=2.025$, $p=0.05$, $R^2=0.148$; *Table 24* Final Model: $F(8, 93)=2.414$, $p<0.05$, $R^2=0.172$].

Table 23

Sequential regression analysis of sessions attended predicting total change in coping in the second half of follow-up (month 9 to month 15) controlling for month 9 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-0.297	(0.379)	-0.078	-0.785
Step 2				
Sessions attended	-0.220	(0.373)	-0.058	-0.591
Treatment arm	1.561	(2.832)	0.055	0.551
Month 9 total coping score	-0.289	(0.083)	-0.355	-3.493**
Current comorbid Axis I disorder	0.104	(2.952)	0.004	0.035
Baseline self-efficacy score	0.077	(0.063)	0.126	1.220
Baseline percent days abstinent	0.029	(0.057)	0.055	0.510
Lifetime alcohol abuse & dependence criteria	1.738	(0.840)	0.219	2.070*
Prior alcohol treatment	0.724	(3.375)	0.022	0.214

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.006$ for Step 1; $R^2=0.148$ for Step 2 ($p < 0.05$).

Table 24
Sequential regression analysis of sessions attended predicting total change in coping in the second half of follow-up (month 9 to month 15) controlling for month 9 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Sessions attended	-0.297	(0.379)	-0.078	-0.785
Step 2				
Sessions attended	-0.187	(0.366)	-0.049	-0.511
Treatment arm	1.563	(2.792)	0.054	0.560
Month 9 total coping score	-0.276	(0.082)	-0.340	-3.371**
Current comorbid Axis I disorder	0.195	(2.906)	0.007	0.067
Baseline self-efficacy score	0.102	(0.064)	0.165	1.584
Baseline percent days abstinent	0.053	(0.056)	0.100	0.945
Lifetime alcohol abuse & dependence criteria	2.000	(0.843)	0.252	2.372*
Baseline AA attendance	-6.946	(4.230)	-0.174	-1.642

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.006$ for Step 1; $R^2=0.172$ for Step 2 ($p < 0.05$).

Table 25 and *Table 26*, below, display results from a sequential regression analysis in which percent homework completed was tested as a predictor of change in coping during the second half of the follow-up period. As before, step 1 in both models tests percent homework completed alone, and Step 2 depicts the results when month 3 coping and baseline significant predictors of coping and month 9 coping score are added. *Table 25* includes prior alcohol treatment received as a covariate, while *Table 26* depicts Alcoholics Anonymous attendance at baseline as a covariate.

Percent homework completed was significantly associated with change in coping following treatment when entered alone (*Table 25*, Step 1: $\beta=-0.195$, $p<0.05$; *Table 26*, Step 1: $\beta=-0.195$, $p<0.05$). However, in both models, percent homework completed was no longer significant when controlling for baseline predictors of coping and month 9 coping. Month 9 total coping score and number of alcohol abuse and dependence criteria met were both significantly associated with change in coping during treatment in both models. Both overall models were significant [*Table 25* Final Model: $F(8, 93)=2.273$, $p<0.05$, $R^2=0.164$; *Table 26* Final Model: $F(8, 93)=2.668$, $p<0.05$, $R^2=0.187$].

Table 25

Sequential regression analysis of percent homework completed predicting total change in coping in the second half of follow-up (month 9 to month 15) controlling for month 9 coping and baseline significant predictors of coping (with prior alcohol treatment)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.110	(0.055)	-0.195	-1.992*
Step 2				
Percent homework completed	-0.078	(0.055)	-0.138	-1.430
Treatment arm	1.144	(2.819)	0.039	0.406
Month 9 total coping score	-0.275	(0.083)	-0.338	-3.321**
Current comorbid Axis I disorder	0.122	(2.923)	0.004	0.042
Baseline self-efficacy score	0.077	(0.063)	0.125	1.222
Baseline percent days abstinent	0.027	(0.056)	0.051	0.472
Lifetime alcohol abuse & dependence criteria	1.647	(0.830)	0.207	1.985*
Prior alcohol treatment	0.750	(3.321)	0.022	0.226

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.038$ for Step 1; $R^2=0.164$ for Step 2 ($p < 0.05$).

Table 26
Sequential regression analysis of percent homework completed predicting total change in coping in the second half of follow-up (month 9 to month 15) controlling for month 9 coping and baseline significant predictors of coping (with baseline Alcoholics Anonymous attendance)

	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1				
Percent homework completed	-0.110	(0.055)	-0.195	-1.992*
Step 2				
Percent homework completed	-0.075	(0.054)	-0.133	-1.396
Treatment arm	1.165	(2.780)	0.040	0.419
Month 9 total coping score	-0.262	(0.082)	-0.322	-3.207**
Current comorbid Axis I disorder	0.220	(2.878)	0.007	0.076
Baseline self-efficacy score	0.101	(0.064)	0.164	1.585
Baseline percent days abstinent	0.051	(0.055)	0.096	0.914
Lifetime alcohol abuse & dependence criteria	1.901	(0.832)	0.239	2.284*
Baseline AA attendance	-6.868	(4.184)	-0.172	-1.641

* $p < 0.05$; ** $p < 0.01$.

Note: $R^2=0.038$ for Step 1; $R^2=0.187$ for Step 2 ($p < 0.05$).

Baseline self-efficacy was not a significant predictor of amount of change in coping in any within- or post-treatment linear regression model, despite a significant association with coping trajectory in growth curve models. Graphing each time period's change score by low (i.e., below or at the median) versus high baseline self-efficacy (see *Figure 13*, below) demonstrated a (nonsignificant at $\alpha=0.05$) relationship between baseline self-efficacy and change in coping such that baseline self-efficacy score above

the median demonstrated less coping change during treatment and follow-up (when examined not controlling for other covariates). However, unlike the LGCM in which coping change was analyzed across multiple time periods, examining each of these time periods in isolation did not result in a statistically significant relationship between self-efficacy and change in coping. Although a linear, two-point difference score in which total coping at a later measurement is subtracted from an earlier measurement has been used by coping researchers in the past (e.g., Chung et al., 2001, Maisto et al., 2000), several methodological factors may have accounted for the present study's significant findings in one model but not the other. These include differential findings as a result of modeling rate of change in LGCMs versus amount of change in regression, and the LGCM as providing greater power to detect differences, in part due to its ability to handle missing data and account for significant individual variation in coping change. Each of these is considered further in the *Discussion*.

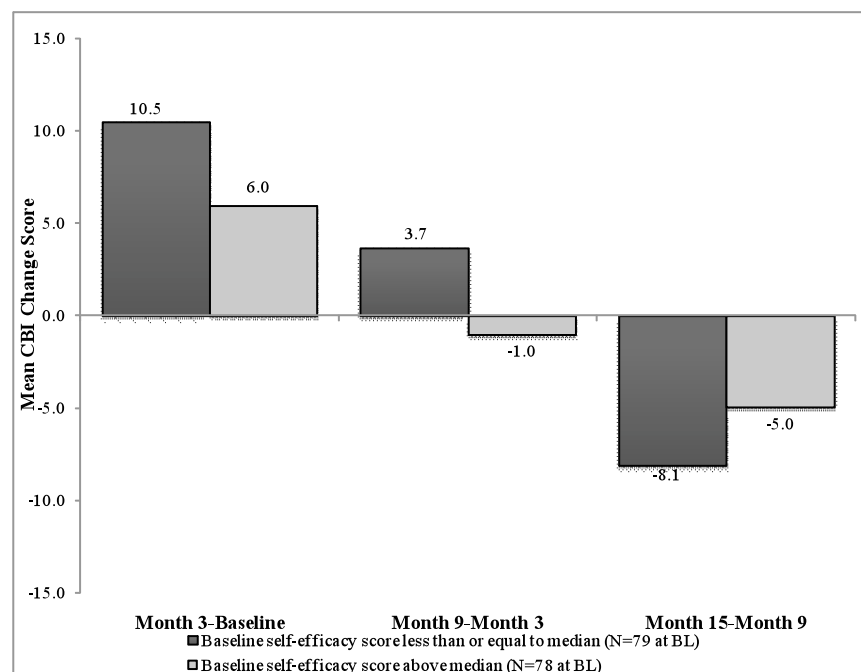


Figure 13. Mean CBI change score within-treatment (N=132), and for the first (N=105) and second (N=103) six months of follow-up by baseline self-efficacy median split.

Note: Because the difference score sample size was based on the smaller of the two variables from which it was composed, sample sizes do not exactly match those in *Figure 6*, above.

Aim C: Coping and Change in Coping as Predictors of Drinking Outcome

Hypothesis 3: Total coping skills used at treatment end (month 3) will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15), controlling for treatment arm and baseline coping, and demographic, substance use, and psychopathology significant predictors of total coping.

To provide context for subsequent analyses, *Table 27*, below, presents percent drinking days and drinks per drinking day at baseline and each follow-up point for the combined sample and by treatment arm.

Table 27
Drinking outcomes by total sample and treatment arm

	Baseline		Month 3		Month 9		Month 15	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Combined sample – Percent Drinking Days ¹	70.58 (N=158)	(27.11)	35.15 (N=142)	(32.05)	34.07 (N=130)	(32.10)	36.22 (N=122)	(34.23)
Combined sample – Percent Days Abstinent	29.42	(27.11)	64.86	(32.05)	65.93	(32.10)	63.78	(34.23)
Combined sample – Drinks per Drinking Day	6.76	(4.14)	4.50 (N=127)	(3.23)	4.31 (N=109)	(3.14)	4.56 (N=97)	(3.77)
Individual arm – Percent Drinking Days ¹	68.58 (n=99)	(28.83)	33.98 (n=91)	(31.39)	32.60 (n=84)	(31.31)	36.42 (n=79)	(33.31)
Individual arm – Percent Days Abstinent	31.42	(28.83)	66.02	(31.39)	67.40	(31.31)	63.58	(33.31)
Individual arm – Drinks per Drinking Day	6.81	(3.93)	4.50 (n=82)	(3.65)	4.28 (n=68)	(3.54)	4.54 (n=63)	(3.70)
Couples arm – Percent Drinking Days ¹	73.94 (n=59)	(23.82)	37.22 (n=51)	(33.40)	36.75 (n=46)	(33.67)	35.84 (n=43)	(36.27)
Couples arm – Percent Days Abstinent	26.06	(23.82)	62.78	(33.40)	63.25	(33.67)	64.16	(36.27)
Couples arm – Drinks per Drinking Day	6.66	(4.50)	4.50 (n=45)	(2.31)	4.35 (n=41)	(2.38)	4.60 (n=34)	(3.96)

¹ Percent drinking days versus drinking days count is presented for comparison across different follow-up time period lengths

(90 days for baseline, 90 days for month 3, and 180 days each for months 9 and 15).

Number of drinking days.

Comparison of AIC and BIC goodness-of-fit statistics indicated that zero-inflated negative binomial regression provided a better model than non-inflated negative binomial regression models of month 3 coping as associated with month 3 drinking days and predicting drinking days at follow-up (months 9 and 15). *Table 28* displays the model coefficients and standard errors for the zero-inflated negative binomial model of total coping score at treatment end as associated with drinking at treatment end and predicting the number of drinking days at months 9 and 15.

As displayed in *Table 28*, greater total coping during treatment (measured at treatment end) was associated with fewer drinking days at treatment end. Each one-unit increase in CBI score at month 3 was associated with 0.90% fewer drinking days at treatment end, and an odds ratio of 1.03 of zero days of drinking at month 3. For the count component of the model, this translates to 8.61% fewer drinking days at treatment end for each ten-unit increase in CBI score at month 3 [based on $100(e^{-0.009*10}-1)$].

Greater total coping at treatment end also significantly predicted number of drinking days at both follow-up time periods. Specifically, each one-unit increase in CBI score at month 3 predicted 1.09% fewer drinking days for the month 3 to month 9 time period and 1.29% fewer drinking days for the month 9 to month 15 time period. Each ten-unit increase in CBI score at month 3 predicted a reduction in 10.4% drinking days for month 3 to month 9 [based on $100(e^{-0.011*10}-1)$] and a reduction of 12.2% drinking days for month 9 to month 15 [based on $100(e^{-0.013*10}-1)$]. For the logistic component of the model, each unit of coping score was associated with an odds ratio of 1.03 of zero days of drinking at month 15.

Table 28

Zero-inflated negative binomial regression models with month 3 total coping score as associated with number of drinking days at treatment end (month 3, N=132) and follow-up (months 9, N=121 and 15, N=116), controlling for treatment arm

	Count component			Logistic component		
	<i>B</i>	<i>SE</i>	<i>Z</i>	<i>B</i>	<i>SE</i>	<i>Z</i>
Month 3 drinking days ¹	-0.009	(0.004)	-2.263*	0.027	(0.012)	2.152*
Month 9 drinking days	-0.011	(0.005)	-2.204*	0.022	(0.014)	1.567
Month 15 drinking days ¹	-0.013	(0.004)	-3.258**	0.028	(0.013)	2.134*

* $p < 0.05$; ** $p < 0.01$

¹ Due to slight variance in valid days included in the follow-up period, model included an offset of log(follow-up time). The inclusion of this term resulted in slightly better model fit, but did not substantially change model coefficients.

Figure 14, below, depicts the relationship between month 3 coping and drinking days at months 3, 9, and 15. For those equal or above the median split in month 3 total coping (*median*=46.00), percent drinking days at month 3 and each of the follow-up periods was between 24% and 26%, while for those below the median split in month 3 total coping score, percent drinking days at months 3 and each of the follow-up periods was between 44% and 48%.

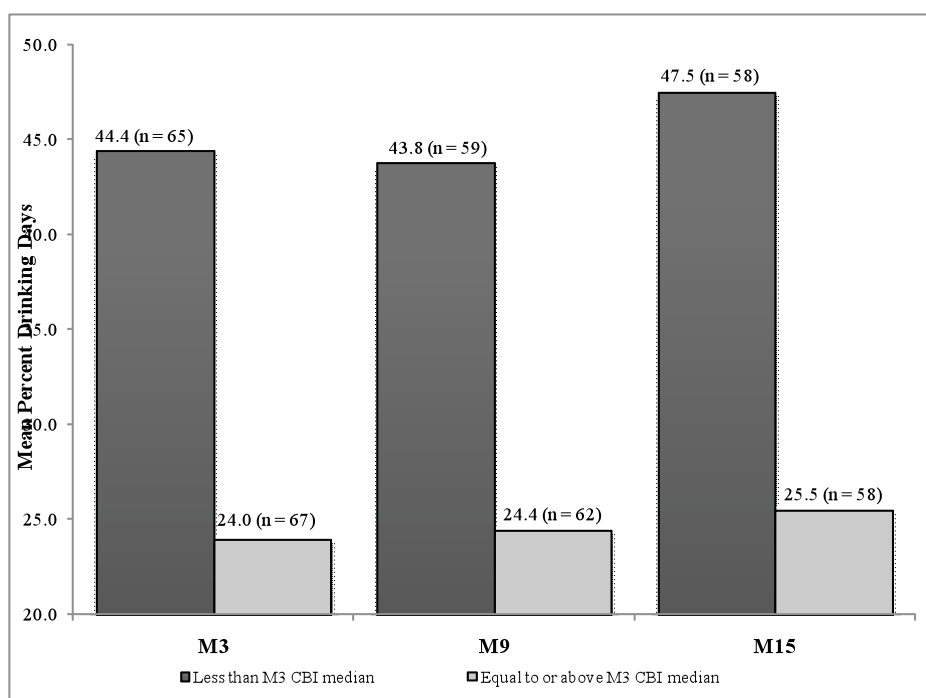


Figure 14. Percent drinking days at months 3 (N=132), 9 (N=121), and 15 (N=116) by month 3 CBI median split.

Drinks per drinking day.

For the dependent variable drinks per drinking day at months 3, 9, and 15, a negative binomial model resulted in lower AIC and BIC statistics than the zero-inflated

negative binomial regression model, suggesting that the former was the more appropriate fit. *Table 29* displays the model coefficients and standard errors for the negative binomial regression of total coping score during treatment (measured at treatment end) as associated with drinks per drinking day at treatment end and predicting drinks per drinking day at each follow-up time period, controlling for treatment arm. As displayed in *Table 29*, for those individuals who had at least one drinking day during the assessment period and for whom month 3 coping data were obtained (N=118 at month 3, N=102 at month 9, N=93 at month 15), greater coping at treatment end was associated with higher drinks per drinking day at month 15. Specifically, each unit increase in total CBI score at treatment end was associated with an approximately 0.9% increase in mean drinks per valid day for the month 9 to month 15 time period, controlling for treatment arm. This translates into a 9.4% increase in mean drinks per drinking day for those not abstinent between the month 9 to month 15 time period [based on $100(e^{(0.009*10)}-1)$] for every ten-point increase in total CBI score at month 3.

Table 29

Negative binomial regression models with month 3 total coping score predicting drinks per drinking day at treatment end (month 3, N=118) and follow-up (months 9, N=102 and 15, N=93), controlling for treatment arm

	<i>B</i>	<i>SE</i>	<i>Z</i>
Month 3 drinks per drinking day ¹	0.001	(0.003)	0.542
Month 9 drinks per drinking day	0.007	(0.005)	1.340
Month 15 drinks per drinking day ¹	0.009	(0.004)	2.332*

* $p < 0.05$

¹ Due to slight variance in valid days included in the follow-up period, model included an offset of log(follow-up time). The inclusion of this term resulted in slightly better model

fit, but did not substantially change model coefficients.

Figure 15, below, depicts the relationship between month 3 coping and mean drinks per drinking day at months 3, 9, and 15 for those not abstinent at each time point. For those equal or above the median split in month 3 total coping (*median*=46.00), mean drinks per drinking day at month 3 and each of the follow-up periods ranged from 4.2 and 4.8 while for those below the median split in month 3 total coping score, mean drinks per drinking day at months 3 and each of the follow-up periods was between 3.9 and 4.2.

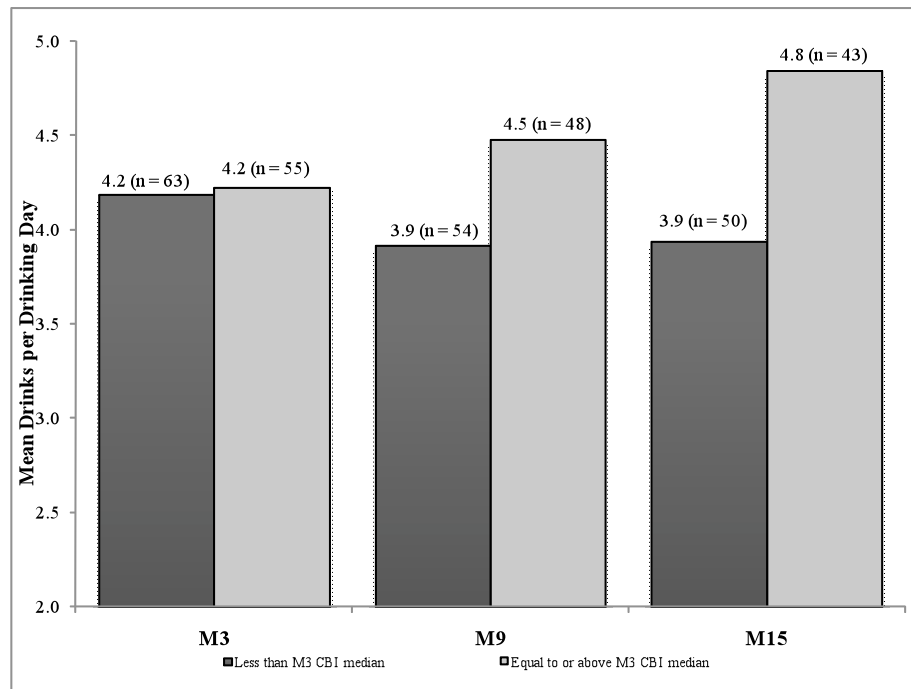


Figure 15. Mean drinks per drinking day at months 3 (N=118), 9 (N=102), and 15 (N=93) by month 3 CBI median split.

Hypothesis 4: Change in total coping from baseline to treatment end (i.e., month 3) will predict drinking outcome at treatment end (month 3) and follow-up (months 9 and 15).

Number of drinking days.

Table 30 displays the results of zero-inflated negative binomial regression models of change in coping during treatment predicting the number of drinking days at follow-up, controlling for baseline coping score and treatment arm. Change in coping during treatment approached but did not reach significance as a predictor of abstinence odds at month 3 and drinking days at month 9, and was a significant predictor of both count of drinking days at month 15 and probability of inclusion in the group of those with “0” drinking days at month 15. For month 15, an increase of one coping point during treatment was associated with 1.09% fewer drinking days at month 15 follow-up, and a 1.04 odds ($e^{0.037}$) of “0” drinking days at follow-up.

Table 30

Zero-inflated negative binomial regression models with change in total coping score during treatment predicting number of drinking days at treatment end (month 3, N=132) and follow-up (months 9, N=121 and 15, N=116), controlling for treatment arm and baseline coping

	Count component			Logistic component		
	<i>B</i>	<i>SE</i>	<i>Z</i>	<i>B</i>	<i>SE</i>	<i>Z</i>
Month 3 drinking days ¹	-0.006	(0.005)	-1.209	0.027	(0.015)	1.738†
Month 9 drinking days	-0.011	(0.007)	-1.698†	0.021	(0.016)	1.377
Month 15 drinking days ¹	-0.011	(0.005)	-1.950*	0.037	(0.015)	2.430*

† $p < 0.10$; * $p < 0.05$.

¹ Due to slight variance in valid days included in the follow-up period, model included an offset of log(follow-up time). The inclusion of this term resulted in slightly better model fit, but did not substantially change model coefficients.

Figure 16, below, depicts the relationship between change in total coping between baseline and month 3 and drinking days at months 3, 9, and 15. For those whose total coping score declined or remained the same between baseline and month 3, percent drinking days at month 3 and each of the follow-up periods was between 40% and 47%, while for those whose coping score increased from baseline to month 3, percent drinking days at months 3 and each of the follow-up periods was between 29% and 32%.

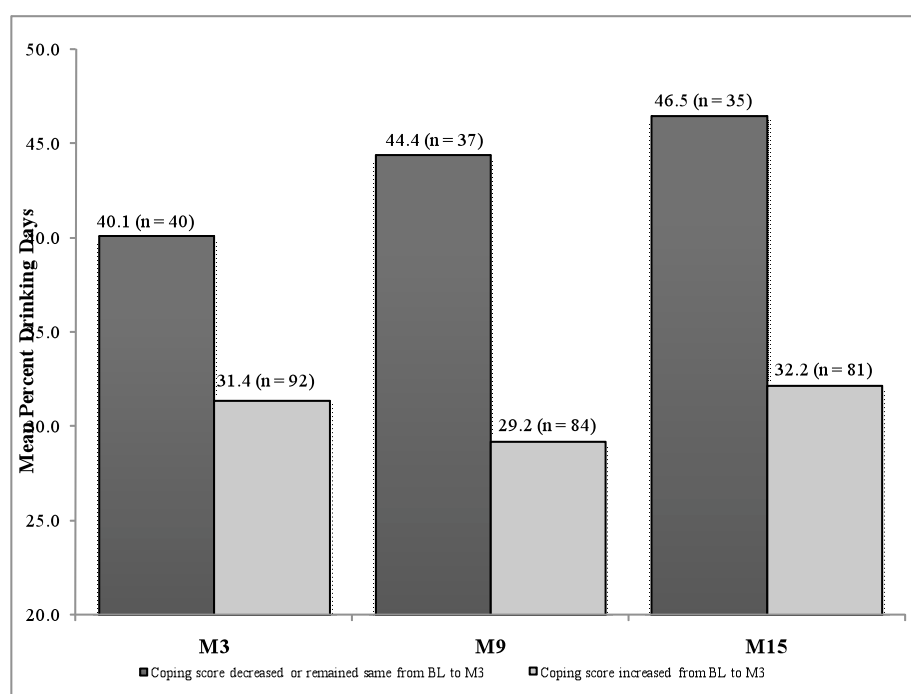


Figure 16. Mean percent drinking days at months 3 (N=132), 9 (N=121), and 15 (N=116) by those whose coping score decreased or remained the same (n=40) versus those whose coping score increased from baseline to treatment end (n=92).

Drinks per drinking day.

Table 31 displays coefficients and standard errors for the negative binomial regression model of change in total coping score from baseline to treatment end as

associated with drinks per drinking day at treatment end and predicting drinks per drinking day at each follow-up time period, controlling for baseline coping and treatment arm. For those who were not abstinent, change in total coping during treatment was not significantly associated with drinks per drinking day at treatment end, nor did it predict drinks per drinking day at during either follow-up time period.

Table 31

Negative binomial regression models with change in total coping score from baseline to treatment end predicting drinks per drinking day at treatment end (month 3, N=118) and follow-up (months 9, N=102 and 15, N=93), controlling for treatment arm and baseline coping

	<i>B</i>	<i>SE</i>	<i>Z</i>
Month 3 drinks per drinking day ¹	0.001	(0.003)	0.346
Month 9 drinks per drinking day	0.008	(0.006)	1.312
Month 15 drinks per drinking day ¹	0.008	(0.005)	1.543

¹ Due to slight variance in valid days included in the follow-up period, model included an offset of log(follow-up time). The inclusion of this term resulted in slightly better model fit, but did not substantially change model coefficients.

Figure 17, below, depicts the relationship between month 3 change in coping and mean drinks per drinking day at months 3, 9, and 15. For those who were not abstinent and whose total coping score remained the same or decreased during the baseline to month 3 time period (n=38 at month 3), mean drinks per drinking day at month 3 and each of the follow-up periods was between 4.3 and 4.8. For those who were not abstinent but whose total coping score increased between baseline and month 3 (n=80 at month 3), mean drinks per drinking day at months 3 and each of the follow-up periods was approximately 4.1 standard drinks.

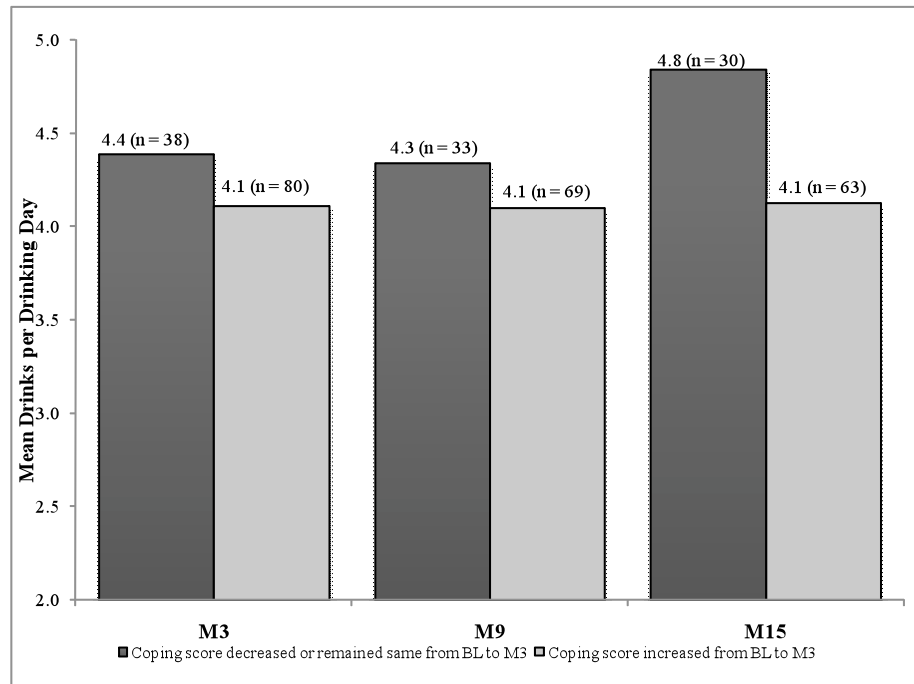


Figure 17. Mean drinks per drinking day at months 3 (N=118), 9 (N=102), and 15 (N=93) by those whose coping score decreased or remained the same versus those whose coping score increased from baseline to treatment end.

CHAPTER IV

DISCUSSION

The aims of the current study were to describe alcohol-specific coping strategies used among a sample of women entering cognitive-behavioral treatment for AUDs, to examine alcohol-related coping and the change in alcohol-related coping as a function of coping skills-based treatment attendance and engagement, and to examine the relationship between baseline coping, within-treatment change in coping, and drinking outcome. With the exception of the descriptive aim, the coping variable was understood as total coping, rather than coping by subscale or individual strategy. Broadly, women entered and finished treatment relying primarily on a high degree of *cognitive* versus *behavioral* strategies, particularly negative and guilt-themed thinking. However, coping changed during treatment, both in individual strategy composition and in total coping. Growth in coping generally followed a quadratic shape, with the steepest increase during treatment and a gradual deceleration over follow-up. Across both treatment arms, total coping during treatment increased as a function of treatment attendance but not homework completion. Greater total coping at treatment end predicted fewer drinking days over follow-up and greater likelihood of abstinence, in addition to more drinks per drinking day at the final follow-up period for non-abstinent women.

Descriptive Coping Portrait

At treatment entry, mean endorsement across all 36 strategies was 1.02 ($SD=0.47$) on a scale of 0 (“I have never tried this”) to 4 (“I have usually tried this”), and on average, women endorsed any use (regardless of intensity) of 22 strategies. By treatment end, total coping had increased significantly to 1.27 ($SD=0.50$), and number of strategies employed, regardless of intensity, had also increased significantly to 25. At baseline, this sample reported using *cognitive* strategies (such as thinking about the harm drinking has caused) significantly more than *behavioral* strategies (such as accessing or changing social support or avoiding triggers). Comparison of women’s baseline coping scores with their scores after the treatment period suggested that strategy subdivisions remained generally proportional (i.e., proportion of effort in *cognitive* versus *behavioral* strategies), but that coping was greater across all categories. As such, women recalled relying more heavily on “thinking” versus “doing” strategies, but increased in number and intensity of strategy use as a whole. Moreover, a brief comparison of the top and bottom ten individual strategies used at baseline and month 3 demonstrated some shift in composition from pre- to post-treatment, suggesting that in the future, a strategy-level comparison perhaps by individual and treatment-level characteristics might provide additional insight into what type of coping worked best for whom.

A theme at treatment entry involved endorsement of guilt items and items implying feelings of past failure in role obligations (e.g., “thinking of the mess I have made,” “remembering how it has affected my family,” “remembering how I’ve let family and friends down”). These results appear to be consistent with other literature on women with AUDs and treatment entry. In a German sample using the CBI, higher *negative*

thinking (as well as higher scores on *positive thinking* and *avoidance*) at treatment start emerged as a significant gender difference in alcohol-related coping (Bischof et al., 2005). Women entering treatment may experience particularly high guilt and shame, particularly regarding caretaking roles (Gomberg, 1999; Nelson-Zlupko et al., 1996). Thus, endorsement of *negative thinking* items pertaining to role breakdowns may have reflected a thinking pattern particularly relevant to women.

Baseline Predictors of Coping

Baseline total coping was not significantly associated with any of the basic demographic variables tested (e.g., age, education, children at home, employment status, etc.), but was associated with a number of psychological, alcohol use and prior treatment variables. Specifically, higher coping at treatment start was related to higher baseline self-efficacy, greater baseline abstinence, prior alcohol treatment, and Alcoholics Anonymous attendance at baseline. To some extent, some of these findings were not unexpected. The literature highlights a complicated and significant relationship between coping and self-efficacy, and thus, these variables are discussed further below. Regarding the relationship between baseline abstinence and coping, one would expect that motivated individuals who reported higher use of alcohol-related coping strategies would experience some success from these strategies and subsequently, more alcohol abstinence even before beginning treatment. Further, a number of the individual strategies (e.g., “telephone a friend,” “go to an Alcoholics Anonymous meeting,” “keeping away from people who drink,”) are consistent with themes emphasized across many substance use

disorder treatments regardless of orientation and as such, it follows that those with prior treatment exposure or recent twelve-step attendance might report strategy use more frequently or intensely than those without.

There were also a number of unexpected relationships between baseline total coping and background variables: higher coping score at treatment start was associated with a greater number of mean drinks per drinking day as well as number of DSM-IV lifetime alcohol abuse and dependence criteria met. Additionally, higher coping was associated with increased likelihood of a current comorbid Axis I mood or anxiety disorder. These findings were both surprising and apparently contradictory to some of the previously reported associations with coping (e.g., coping as associated with greater baseline percent days abstinent). Subscale analyses provided some elucidation on these relationships: specifically, those starting treatment with a higher degree of abstinence reported greater use of coping skills across all four subscales, while those beginning treatment while drinking at a greater quantity reported higher scores on *negative thinking* and *social support* subscales versus other subscales. It may be that the strategies used by those individuals drinking at a higher intensity when treatment started were attempting to employ potentially effective strategies, but were not applying them in a successful manner (e.g., using social support, but connecting to friends who were also heavy drinkers). Similarly, those with a current Axis I diagnosis scored higher on *negative thinking*, *avoidance*, and *social support* subscales but not on *positive thinking*, calling into question the extent to which some coping strategies – particularly *negative thinking* –

might have overlapped with co-occurring disorder (most frequently major depressive disorder or dysthymia) diagnostic criteria (e.g., feelings of worthlessness or excessive guilt as part of a major depressive episode, low self-esteem as part of dysthymia).

Self-efficacy

The relationship between higher self-efficacy and coping is interesting to consider in the context of current literature. Maisto et al., (2000) found that coping and self-efficacy were independent predictors of drinking outcome, but did not find a mediating relationship between the latter and the former. Levin et al. (2007) found that self-efficacy moderated treatment outcome such that there was a negative relationship between use of *avoidance* coping and drinking, but only for those with low self-efficacy. In this study, baseline self-efficacy was significantly and positively associated with baseline coping and predicted rate of change in coping, specifically, a negative slope and more gradual change in overall coping trajectory. Although self-efficacy as a moderator of coping acquisition was not specifically tested in this study, it nonetheless appeared that higher baseline self-efficacy acted as a “buffer” for coping acquisition: coping for those with high self-efficacy started at a higher level but also increased and decreased less than for those for whom self-efficacy was lower. Future studies examining the relationship between self-efficacy and coping, including covariance of self-efficacy with coping at months 3, 9, and 15 time points with coping might contribute to the understanding of mechanisms of change in this sample.

Although baseline self-efficacy was a significant predictor of baseline coping and coping trajectory when modeled across multiple time points, this variable was not a significant predictor of amount of change in coping when the latter was modeled as a

two-point difference score using linear regression. This may have reflected methodological differences in modeling change using growth curve models versus more traditional approaches such as difference scores. Growth curve models take into account individual as well as group change trajectories (Bollen & Curran, 2006; Stull, 2008), while more conventional methods, such as standard multiple regression, treat individual variation as error (Stull, 2008). As such, while the former captures individual change (of which there was significant variation in trajectory in this sample), the latter measures group change as a whole. Given significant individual variation, more traditional methods may not have been sensitive enough to pick up significant relationships between certain parameters. An additional factor reducing the sensitivity of difference score techniques versus growth curve modeling deals with the handling of missing data in these two procedures: because they consider multiple time points, growth curve models are generally able to maintain and account for cases that contain some missing data on individual time points, while missing data in difference score analyses generally is handled via listwise deletion (Speer & Greenbaum, 1995). Thus, while the full sample was used for LGCMs, sample sizes for difference score analyses ranged from 103 to 132, which reduced statistical power. Indeed, Stull (2008) modeled the same data using both growth curve models and difference scores and found a significant effect size when using the former but not latter procedures, suggesting greater risk of type II error for more traditional procedures such as difference-score analyses. Despite this, two-point difference score analyses using regression and coping change trajectory analyses in this study also reflected related but slightly different questions: the growth curve models in this study measured rate of change in coping overall, while difference score regressions

measured amount of change at discrete time points, specifically as related to treatment engagement variables of attendance and engagement. Accordingly, results from each analysis provided valuable information relevant to the associated research question. However, the finding of slightly different significant predictors of amount of change and rate of change highlights the value of examining data using multiple methods as well as replicating analyses.

Coping Trajectory

In this study, total coping increased during the treatment and follow-up period, but decelerated over time. While, to the best of our knowledge, this is one of the few studies to model coping growth trajectory using growth curve models, substance-specific coping which increases during treatment has been found by other researchers in the context of alcohol use treatment (Litt et al., 2003) as well as skills-based treatment for marijuana use (Litt, Kadden, Kabela-Cormier, & Petry, 2008), dual diagnosis (Moggi, Ouimette, Moos & Finney, 1999) and pathological gambling (Petry, Litt, Kadden, & Ledgerwood, 2007). Several have also reported a slight decline in coping over follow-up (Litt et al., 2008, Moggi et al., 1999) and have questioned whether the drop-off in coping skills after treatment reflects a need to use such skills less given reduced substance use versus a need for better coping development during treatment (Litt et al., 2008). Others (e.g., Moggi et al., 1999) have proposed that this drop-off warrants continuing care to address the decline after treatment. In this study, participants demonstrated a slight increase in drinking days and drinks per drinking day at the tail end of follow-up corresponding to the time during which coping growth declined. This, combined with the

significant association between coping at treatment end and reduced drinking at the same time period (discussed below) provide support for the potential value of coping-focused booster sessions well after therapy finishes to maintain gains made during treatment.

Coping trajectory did not vary significantly across treatment arms, which could reflect the fact that both arms consisted of cognitive-behavioral therapies with significant skill-building components. Some studies (e.g., Litt et al., 2003) have also reported increases in coping regardless of treatment condition. In this study, it was notable that coping at the end of follow-up was, on average, higher than it was at treatment initiation, suggesting that this variable increased on the whole throughout the treatment and follow-up period. Another interesting finding was that of significant individual variation in growth curve trajectory over time, as discussed above: subsequent class analyses to identify patterns of coping change within this broader trajectory could be helpful in understanding unique coping patterns.

Treatment Attendance, Homework and Coping

Treatment attendance was a robust predictor of change in coping during the three-month treatment period, even after controlling for treatment condition and a number of baseline predictors of coping. It is feasible that the increase in coping associated with attending a greater number of sessions might have been, in part, a result of greater time and opportunity to strengthen existing coping strategies and incorporate new skills in treatment. Alternatively, increases in coping and good attendance could both reflect an underlying motivational variable. Despite substantial interest in alcohol-specific coping as a mediator of treatment outcome, few researchers have measured the role that treatment dosage factors such as attendance and engagement specifically play in

increasing this variable. Forys, McKellar & Moos (2007) conducted one of the few studies explicitly examining the relationship between therapeutic dosage and coping in a sample of male veterans receiving residential substance abuse treatment. In this study, number of life skills trainings and 12-step meetings was associated with greater alcohol-specific coping one year after treatment, but the researchers did not find an association between treatment orientation (i.e., CBT, 12-step, therapeutic community, or eclectic) and greater alcohol-specific coping. The present study demonstrated that there is clearly a positive relationship between treatment attendance and coping in this sample.

Percent homework completed was not significantly associated with change in coping during treatment, and those relationships between greater homework and less coping change over follow-up that were found lost significance after controlling for baseline demographic and substance use variables. Homework completion has generally been found to be associated with positive outcome in CBT trials across a range of disorders (Kazantzis, Whittington & Dattilio, 2010), however, most studies have focused on non substance use disorder treatment trials. Among substance use disorder treatment outcome studies, one of the few studies examining the relationship between these variables, a trial for cocaine dependence, found that homework completion did predict coping quantity and quality (Carroll, Nich & Ball, 2005). The lack of effect in the present study may have reflected the fact that coping skills measured were broad strategies consistent with themes emphasized throughout treatment. For instance, “thinking the whole alcoholic cycle through,” would be a coping strategy relevant to number of homework assignments including completion of functional analyses, review of a card of negative consequences, and monitoring of “seemingly irrelevant decisions” which could

lead to relapse. Additionally, homework assignments were reviewed extensively in session and often included completion of activities begun together with the therapist. For those individuals not completing their homework, assignments were frequently completed together at the subsequent session. Thus, in this trial, the lack of association between homework completion and coping change could have reflected applicability of the coping skills measured to a number of therapy themes without specificity. Alternatively, good attendance may have provided the necessary therapeutic space to introduce, encourage, and facilitate increase in coping skills outside of session.

Drinking Outcomes and Coping

Greater coping score at month 3 was associated with fewer drinking days at the end of treatment and both follow-up periods, as well as increased likelihood of abstinent group membership at months 3 and 15. Change in coping during treatment was a less robust predictor of drinking frequency and likelihood of abstinent group membership at treatment end and month 9, but was associated with reduced frequency and greater likelihood of abstinence at month 15. Thus, across the whole sample, greater coping and greater change in coping during treatment were associated with reduced frequency of drinking and greater likelihood of abstinence.

However, among the subset of individuals who were still drinking at treatment end and follow up, coping was not significantly associated with fewer drinks per drinking day. Among this group, higher coping score at treatment end was associated with greater drinks per drinking day at month 15. While this result seems initially disparate with the finding that higher coping was associated with fewer drinking days, it may indicate a more nuanced relationship between coping and drinking outcome: across the whole

sample, coping was generally associated with the desired drinking outcome of reduced frequency and greater likelihood of abstinence, but predicted greater drinks per drinking day for a subset of the sample that had not reached abstinence. Perhaps the coping skills measured were most effective at helping individuals stop daily drinking but were less effective at stopping a binge. Witkiewitz & Marlatt (2004) refer to the concept of “self-regulation fatigue,” or the exhaustion of self-regulatory ability in the context of significant stress. Applied to this sample, perhaps for some women, the quantity of coping is less important than finding a skill that will work reliably across situations and with relative ease. Extended, for some in the sample, alcohol self-efficacy could be a moderator of the relationship between coping and drinking such that women reporting high use of coping and subsequent greater drinking intensity might also have been those with particularly low alcohol self-efficacy. In turn, strategies may have been applied indiscriminately, or ineffectively among this group, perpetuating negative beliefs regarding one’s ability to stop drinking. Subsequent analyses by specific strategies might also reveal coping-type differentiation in predicting drinking outcome similar to the results reported by Moser & Annis (1996), who found that only one type of coping -- *behavioral-avoidance* – was a significant predictor of drinking cessation once a slip had occurred, despite an association between other types of coping and abstinence. As such, subsequent analysis might explore potential self-efficacy moderators as well as strategy-level differences in the relationship between coping and drinking intensity in this subsample of non-abstinent women.

Limitations

There were some limitations to this study. The sample was primarily Caucasian and relatively high functioning (i.e., 68% were employed full-time or part-time, all were in a committed relationship), and thus, results might not be generalizable to all samples of women with AUDs. For one of the study arms, male partners were included in treatment, but in this analysis, neither partner substance use nor partner coping was incorporated into analyses. It is possible that coping change and impact on drinking outcome was affected by partner substance use or substance use change, although treatment arm differences were not found, and arm was controlled for in all analyses. Additionally, this analysis focused on total coping score only, and only descriptively examined other variants of coping indicators, such as number of strategies used and mean coping intensity for individual strategies.

Other limitations reflect difficulties inherent in the measurement of coping and the difficulty of understanding whether increased coping was appropriate coping in context. The category of *avoidance* coping strategies provides a good illustration of this criticism: in the literature (e.g., Chung et al., 2001), *avoidance* coping strategies (e.g., “waiting it out,” engaging in other activities as distraction) are considered to be less effective than more *active* strategies (i.e., strategies aimed at addressing a problem directly), however, in this study, total coping increased across strategies during treatment, which generally appeared to be a positive change in regards to drinking outcome. *Avoidance* strategies have been found to be predictive of earlier drinking cessation once an initial lapse has occurred (Moser & Annis, 1996), suggesting that in certain contexts, some stereotypically maladaptive strategies may fit better than others. Indeed, the coping

strategies measured in this study involving avoidance (e.g., “waiting it out,” “doing something in the house,” “avoiding places where I drank,”) complemented some of the strategies discussed in treatment through activities such as self-management planning to cope with triggers. As such, some strategies that may generally be assumed to be less preferable than others may be exactly what are needed given a particular situation. Traditional methodologies are rarely able to directly connect strategy to context. In a study of cognitive-behavioral versus interactional group therapy for individuals with AUDs, Litt et al. (2003) reported a similar finding in which total coping, including strategies classified as *avoidance*, were associated with good drinking outcome and cited a similar critique of coping study methodologies.

Strengths

This study also had a number of strengths. This analysis was the first to examine coping changes specifically among female problem drinkers in a well-controlled, randomized clinical trial of a coping skills-based cognitive behavioral treatment. Additionally, this study used coping as measured over multiple time points, allowing for an understanding of coping trajectory not possible in cross-sectional designs. To the best of our knowledge, this study was one of the first to use growth curve analyses to model alcohol-specific coping trajectory. Growth curve models demonstrated the quadratic nature of coping, which would not have been evident in regression models in which change in coping was modeled linearly. Moreover, despite the interest in coping skill acquisition as a mediator of cognitive-behavioral therapy, this is one of the few studies to

explicitly examine the relationship between treatment engagement variables (i.e., homework completion and attendance) and change in coping as part of a well-controlled treatment trial.

Next steps

A number of findings such as the significant variation in individual coping growth trajectories and differential association between higher coping and drinking outcome for the entire sample versus those who became abstinent suggest that further analysis of coping change by individual characteristics would be illuminating. This analysis might involve identification of clusters of coping growth patterns through procedures such as latent class analysis.

Additionally, as this analysis established coping as a predictor of drinking outcome, subsequent analyses might include a number of additional individual-level variables important to the process of change. For instance, research has recently demonstrated that a significant number of individuals seeking treatment for AUDs begin the change process before their first therapy session, during the pre-session assessment period (Epstein et al., 2005). Some researchers (Litt et al., 2003) have also proposed a “critical period” during which individuals are motivated to change as accounting for a lack of consistent difference in coping change by treatment modality. Given this, linking the process of coping change during treatment to drinking change variables relevant to the period before treatment starts might contribute additional valuable understanding regarding the relationship between coping and drinking change. Over the longer term, replication of these analyses with other samples will strengthen these findings and significantly add to the literature base on women and alcohol-specific coping.

Conclusions

Alcohol-related coping as involved in AUD etiology, maintenance, and treatment has a rich history in the alcohol field, with early relapse prevention models (e.g., Marlatt & Gordon, 1985) contributing to development of significant interest in coping as a mechanism of change in alcohol treatment. Coping skills-deficit models played a significant theoretical role in informing CBT treatments for AUDs, which have garnered considerable empirical support. Despite this, few studies have been able to demonstrate alcohol-related coping as a treatment mediator (Morgenstern & Longabaugh, 2000). This study found that coping played an important role in the treatment process, varying as a function of treatment attendance and predicting drinking outcome. Additionally, this study found significant variation in total coping, both in terms of factors predicting baseline levels and in growth over time.

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APPENDIX A

Situational Confidence Questionnaire

Listed below are 8 types of situations in which some people experience a drinking problem.

Imagine yourself as you are right now in each of the following types of situations. Indicate on the space provided how confident you are **right now** that you will be able to resist drinking in each situation by writing in a number from 0% “Not At All Confident” to 100% “Totally Confident.”

Right now I would be able to resist the urge to drink in situations involving . . .

1. **UNPLEASANT EMOTIONS** (e.g., If I were depressed about things in general; If everything was going badly for me).

I feel . . . _____ % Confident

2. **PHYSICAL DISCOMFORT** (e.g., If I would have trouble sleeping; If I felt jumpy and physically tense).

I feel . . . _____ % Confident

3. **PLEASANT EMOTIONS** (e.g., If something good would happen and I would feel like celebrating; If everything were going well).

I feel . . . _____ % Confident

4. **TESTING CONTROL OVER MY USE OF ALCOHOL** (e.g., If I would start to believe that alcohol was no longer a problem for me; If I would feel confident that I could handle a few drinks).

I feel . . . _____ % Confident

5. **URGES AND TEMPTATIONS** (e.g., If I would suddenly have an urge to drink; If I would be in a situation in which I was in the habit of having a drink).

I feel . . . _____ % Confident

6. **CONFLICT WITH OTHERS** (e.g., If I had an argument with a friend; If I were not getting along well with others at work).

I feel . . . _____ % Confident

7. **SOCIAL PRESSURE TO DRINK** (e.g., If someone would pressure me to “be a good sport” and have a drink; If I would be invited to someone’s home and they would offer me a drink).

I feel . . . _____ % Confident

8. **PLEASANT TIMES WITH OTHERS** (e.g., If I wanted to celebrate with a friend; If I would be enjoying myself at a party and wanted to feel even better).

I feel . . . ____ % Confident

APPENDIX B

Coping Behaviours Inventory

The Coping Behaviours Inventory (CBI)

Instructions: If there are times when you want to start drinking again, how do you try to stop yourself? Here is a list of ways some people have tried to stop themselves. Which of these ways have you tried? There are four boxes ‘Usually, often, sometimes, and never.’ Please circle the number which comes closest to how *often* you have used these ways to stop yourself from starting to drink again. There are no right or wrong answers or trick questions. We want to know what *you* have tried.

		I have usually tried this	I have often tried this	I have sometimes tried this	I have never tried this
1	Thinking about how much better off I am without drink	3	2	1	0
2	Telephoning a friend	3	2	1	0
3	Keeping in the company of non drinkers	3	2	1	0
4	Thinking positively	3	2	1	0
5	Thinking of the mess I’ve got myself into through drinking	3	2	1	0
6	Stopping to examine my motives and eliminating the false ones	3	2	1	0
7	Thinking of the promises I’ve made to others	3	2	1	0
8	Staying indoors – hiding	3	2	1	0
9	Pausing and really thinking the whole alcoholic cycle through	3	2	1	0

10	Leaving my money at home	3	2	1	0
11	Recognizing that life is no bed of roses but drink is not the answer	3	2	1	0
12	Going to an AA meeting	3	2	1	0
13	Knowing that by not drinking I can show my face again without fear of what others will think	3	2	1	0
14	Cheering myself up by buying myself something special instead	3	2	1	0
15	Facing up to my bad feelings instead of trying to drown them	3	2	1	0
16	Working harder	3	2	1	0
17	Realizing it's just not worth it	3	2	1	0
18	Waiting it out until everything is shut	3	2	1	0
19	Remembering how I've let my friends and family down in the past	3	2	1	0
20	Keeping away from people who drink	3	2	1	0
21	Going for a walk	3	2	1	0
22	Looking on the bright side and trying to stop making excuses for myself	3	2	1	0
23	Realizing it's affecting my health	3	2	1	0

24	Start doing something in the house	3	2	1	0
25	Considering the effect it will have on my family	3	2	1	0
26	Reminding myself of the good life I can have without drink	3	2	1	0
27	Getting in touch with old drinking friends who are better now	3	2	1	0
28	Making up my mind that I'm going to stop playing games with myself	3	2	1	0
29	Eating a good meal	3	2	1	0
30	Avoiding places where I drank	3	2	1	0
31	Thinking about all the people who have helped me	3	2	1	0
32	Saying I am well and wish to stay so	3	2	1	0
33	Going to sleep	3	2	1	0
34	Remembering how it has affected my family	3	2	1	0
35	Forcing myself to go to work	3	2	1	0
36	Trying to face life instead of avoiding it	3	2	1	0

APPENDIX C

Percent drinks per drinking day by treatment arm and treatment condition

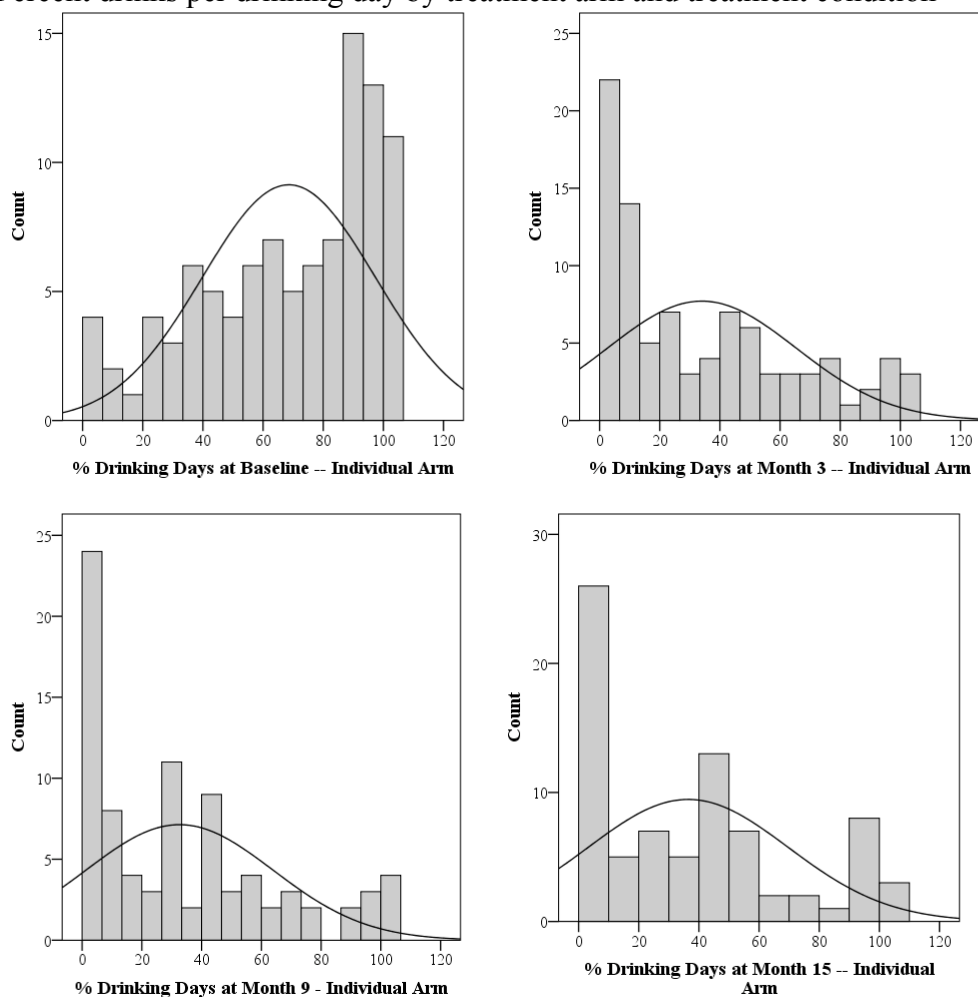


Figure 18. Count of percent drinking days at baseline (N=99), month 3 (N=91), month 9 (N=84) and month 15 (N=79) – Individual Arm.

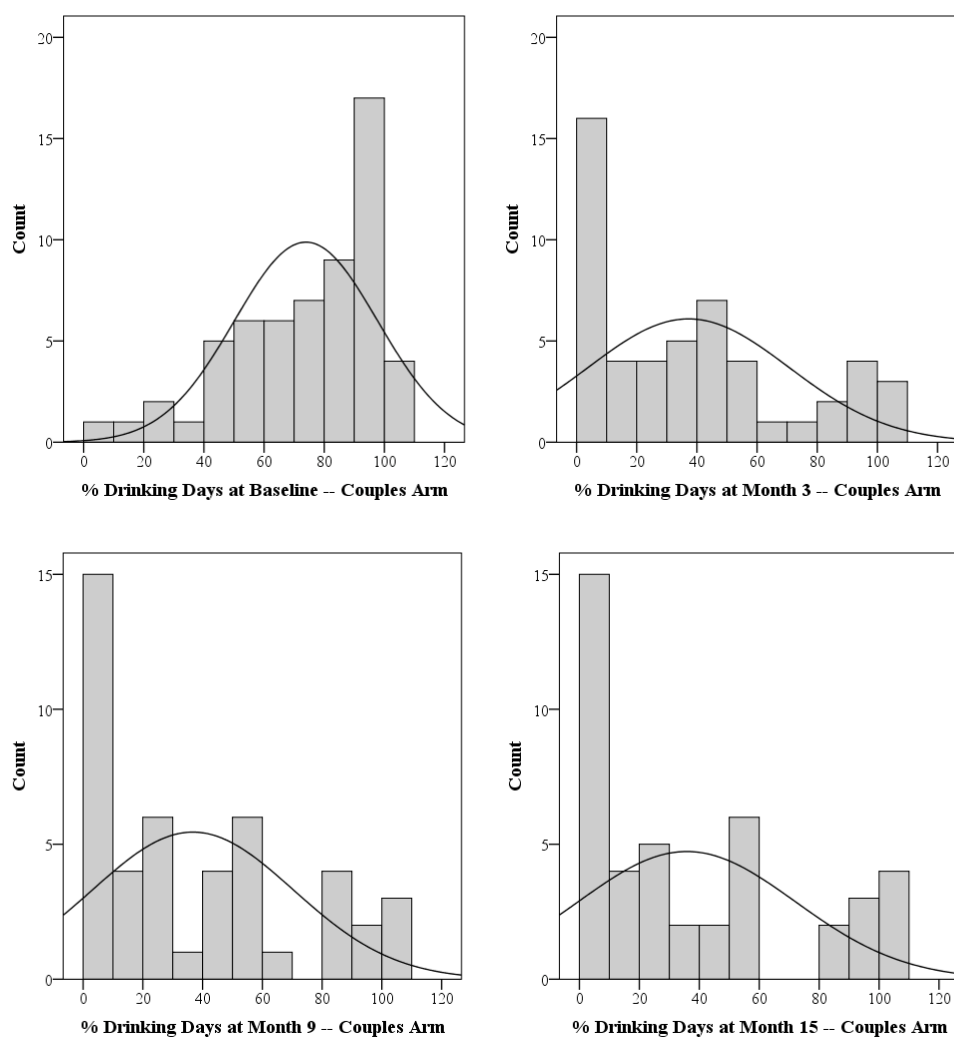


Figure 19. Count of percent drinking days at baseline (N=59), month 3 (N=51), month 9 (N=46) and month 15 (N=43) – Couples Arm.

APPENDIX D

Table 32

Mean item baseline coping scores for women entering treatment for AUDs (N=158)

	Average Score
Total coping (36 items; range=0-108)	36.88 (SD=16.85)
<i>Cognitive Subscale</i>	
Thinking about how better off (1)	1.79 (SD=0.92)
Thinking positively (4)	1.56 (SD=0.91)
Thinking of the mess (5)	1.73 (SD=0.96)
Examining motives, eliminating false ones (6)	0.99 (SD=0.95)
Thinking of promises have made to others (7)	1.22 (SD=1.06)
Thinking alcoholic cycle through (9)	1.08 (SD=0.92)
Life is no bed of roses but drink not answer (11)	1.20 (SD=0.93)
Knowing I can show my face without fear (13)	0.85 (SD=0.96)
Facing bad feelings instead of trying to drown (15)	0.87 (SD=0.80)
Realizing it's not worth it (17)	1.18 (SD=0.87)
Remembering how I've let family and friends down (19)	1.30 (SD=1.01)
Looking on bright side, not making excuses (22)	1.08 (SD=0.86)
Realizing it's affecting health (23)	1.80 (SD=0.92)
Considering effect will have on family (25)	1.73 (SD=0.95)
Reminding self of good life without (26)	1.44 (SD=1.01)
Making up mind to stop playing games (28)	1.23 (SD=0.95)
Thinking of people who have helped me (31)	0.70 (SD=0.89)
Saying I am well and wish to remain so (32)	0.80 (SD=0.91)
Remembering how it has affected family (34)	1.49 (SD=1.03)
Trying to face life instead of avoid (36)	1.13 (SD=0.91)
<i>Behavioral Subscale</i>	
Telephoning friend (2)	0.53 (SD=0.74)
Company of nondrinkers (3)	0.77 (SD=0.86)
Staying indoors – hiding (8)	0.72 (SD=1.06)
Leaving money at home (10)	0.16 (SD=0.53)
Going to an AA meeting (12)	0.56 (SD=0.79)
Cheering self up by buying something special (14)	0.68 (SD=0.80)
Working harder (16)	1.18 (SD=1.02)
Waiting it out (18)	0.26 (SD=0.59)
Keeping away from people who drink (20)	0.78 (SD=0.83)
Going for a walk (21)	0.72 (SD=0.84)
Start doing something around the house (24)	1.46 (SD=0.91)
Getting in touch with old friends who are better (27)	0.18 (SD=0.49)
Eating a good meal (29)	0.89 (SD=0.98)
Avoiding places where drank (30)	0.80 (SD=0.93)
Going to sleep (33)	1.16 (SD=0.93)
Forcing self to go to work (35)	0.84 (SD=1.07)