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Cue Exposure With Coping Skills Treatment for Male Alcoholics
A Preliminary Investigation

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ABSTRACT

Although early investigations were promising, no controlled follow-up studies have investigated the effectiveness of cue exposure treatment for alcoholics. In this study, inpatient alcoholics received either cue exposure integrated with urge coping skills training (CET, *n* = 22) or a contrast condition (CC) involving daily contact with assessment only (*n* = 18) in addition to standard treatment. Comprehensive assessment measures were used to investigate change in process and outcome variables. In the second 3 months after treatment, the CET group included more patients who were completely abstinent, had a higher percentage of abstinent days, and tended to report fewer drinks per day than did patients in the contrast condition. The significantly greater use of coping skills during follow-up by the CET group and the significant relationship of these coping skills to decreased drinking suggest that treatment effects were due, at least in part, to the coping skills training, consistent with recent formulations. Theoretical and treatment implications are discussed.

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Social learning and conditioning theories suggest that alcoholics are likely to have conditioned reactions to stimuli associated with heavy drinking and that these may be extinguished through exposure to alcohol stimuli while preventing drinking (Abrams & Niaura, 1987 ; Monti, Abrams, Kadden, & Cooney, 1989 ; Rohsenow, Niaura, Childress, Abrams, & Monti, 1990—91). Alcoholics react more to the sight and smell of an alcoholic beverage than do nonalcoholics on measures such as salivation, urge to drink, and skin resistance (e.g., Cooney, Baker, Pomerleau, & Josephy, 1984 ; Monti, Binkoff, et al., 1987). Furthermore, cue reactivity (CR) does not vary as a function of time during the first week of detoxification (Monti et al., 1993) and is predictive of drinking (Rohsenow et al., in press).

The promising literature on CR has led some clinical researchers (e.g., Heather & Bradley, 1990 ; Niaura et al., 1988 ; Rohsenow et al., 1990—91) to suggest that alcoholics' treatment may be supplemented by exposing them to drinking cues while preventing drinking. However, research evidence supporting this approach is scant. Few cue exposure treatment studies are reported in the alcoholism research literature, and, with one exception (Rankin, Hodgson, & Stockwell, 1983), most of these are case studies (Blakey & Baker, 1980 ; Hodgson & Rankin, 1976). Also, as Drummond, Cooper, and Glautier (1990) have recently pointed out in a critical commentary on cue exposure treatment, not one controlled follow-up study has been conducted in the alcohol field. Nevertheless, promising treatment findings have been reported with some other addictive disorders (Childress, 1993 : Childress, Ehrman, Rohsenow, Robbins, & O'Brien, 1992), and these studies, along with the growing literature on alcohol CR, have been encouraging.

Urges to drink have been shown to diminish significantly during 18 min of continuous exposure to a preferred alcoholic beverage (Monti et al., 1993); yet it is doubtful that exposure per se is adequate for enhancing treatment outcome (Hammersley, 1992). Although extinction of conditioned responses is one mechanism by which cue exposure treatments may reduce drinking, other mechanisms may include breaking the chain of operant drinking, disconfirming expectations, and strengthening efficacy expectations (Wilson, 1981). Indeed, if exposure procedures simply extinguish a conditioned response, spontaneous recovery or a paradoxical increased sensitization effect may result (Hammersley, 1992 ; Marlatt, 1990). Researchers have suggested that a comprehensive program of relapse prevention would combine cue exposure techniques with coping skills training in high-risk situations (e.g., Marlatt, 1990 ; Monti et al., 1989).

The relationship between coping skills and alcohol CR has been a focus of several studies. In an early investigation, alcoholics who showed more CR to their preferred alcoholic beverage in a laboratory-based CR assessment session also showed more disruption in the effectiveness of their skill in refusing the beverage (Binkoff et al., 1988). This suggests that skills training in the presence of alcohol cue exposure may be important to reduce the disruptive effect of the cues on the performance of coping skills. Monti et al. (1990) found that alcoholics' performance in alcohol-relevant role play situations predicted posttreatment drinking, whereas only latency to response predicted drinking in more geneal situations, also suggesting that the presence of alcohol cues is particularly disruptive for alcoholics and that this disruption affects drinking after treatment. In a third study (Goddard, Rubonis, Rohsenow, Monti & Abrams, 1990), responses to role plays that included imaginal alcohol cues predicted posttreatment drinking, whereas responses to high-risk role plays without such cues did not. Clearly, presence of alcohol cues or alcohol-relevant stimuli could be an important component in the design of coping skills treatment strategies. In particular, skills training in the presence of alcohol may be important to inoculate against the disruptive effects of alcohol cues on effective coping. This study

integrated cue exposure with coping skills techniques, thus using a strategy to first determine the effectiveness of the combined approach before testing the effects of the separate procedures.

Method

Subjects

The subjects were 40 men in the inpatient alcohol service of a Department of Veterans Affairs medical center. The men on this 30-bed unit had a mean age of 42.9 ± 12.7 years and a mean education of 11.3 ± 2.2 years; 44.5% were married. Subjects' mean age was 40.2 ± 8.5 years (range, 27 to 65); their mean education was 12.6 ± 2.5 years; 33.3% were married or cohabiting, 94% were White, and 6% were Black. Subjects' mean score on the Alcohol Dependence Scale (ADS; Skinner & Allen, 1982) was 20.7 ± 9.0, and on the Short Michigan Alcoholism Screening Test (SMAST; Selzer, Vinokur, & van Rooijen, 1975) it was 9.97 ± 2.42. In the Time-Line Follow-Back Interview (TLFB; Sobell & Sobell, 1980), during the 6 months prior to treatment, the subjects consumed a mean of 12.1 ± 12.3 drinks per possible drinking day (days not in jail or hospital), were abstinent 47% ± 38% of possible drinking days, and drank heavily (more than six standard drinks per day) on 45% ± 39% of possible drinking days.

Patients were included if they met *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM-III-R* ; American Psychiatric Association, 1987) criteria for alcohol dependence by physician diagnosis and if they drank heavily within the week prior to admission. Patients were excluded for acute psychosis, major organic impairment, terminal illness, or HIV positive diagnoses; for use of cocaine or opiates in the 7 days prior to admission or more than four times in the past month; for withdrawal from a substance other than alcohol; and for use of antianxiety medications or medications that inhibit salivation. The five patients detoxified on medication were not studied for at least 2 days after their last dose, except for two patients who received Tranxene on the day of their pretreatment assessment and were therefore excluded from analyses involving pretreatment cue reactivity.

Following admission, potential patients were informed about the study and their consent was solicited. Patients who agreed to participate were randomly assigned to either cue exposure treatment (CET; n = 22) or a contrast condition (CC; n = 18) in addition to the standard treatment program. Because many alcoholics do not react to alcohol cues with increased urge to drink (Monti et al., 1987 , 1993), stratified random assignment was used to ensure that conditions were balanced for proportion of urge reactors. Urge reactors are defined as patients whose urge to drink alcohol in the alcohol trial was 1 or more points higher than their urge to drink alcohol during the water trial of the CR assessment.

CET.

Patients were told that the purpose of the treatment was to reduce craving or urge to drink by learning effective coping in the situations that gave them the strongest urge to drink. Treatment included continuous exposure to the open beverage throughout each session, focus on the sight and smell of the beverage for part of each session, focus on imaginal drinking cues for part of each session, and guided practice in using coping skills to reduce urge to drink during the in vivo and imaginal exposures. CET was conducted in six individual treatment sessions. The 55-min treatment sessions along with the assessment sessions were administered within a 2-week period.

Treatment was provided by one of five clinical psychologists. For standardization of procedures, a training manual was developed that provides guidelines for each session, and the first patient seen by each therapist was observed throughout by a senior therapist (D. J. Rohsenow). Weekly group supervision sessions were used to further standardize treatment methods. Detailed process notes were

collected on the details of the exposure and the strategies used in each session, and these were reviewed in weekly supervision sessions to ensure integrity of therapeutic procedures.

We began each session by having the patients first complete *daily urge ratings* . Next, we presented them with their usual alcoholic beverage, prepared as they preferred to drink it with the commercially labeled container present in the size that the patient usually bought. If the patient had more than one usual beverage, the most frequently consumed beverage was presented for at least three sessions, then other beverages were presented as well. We presented beverages in the manner that seemed to result in the patients experiencing their strongest urge to drink. For example, if opening and pouring the beverage increased the urge to drink for an individual, then this was done. Patients were encouraged to experience the highest urge to drink that they could. The beverage stayed open in front of the subject throughout each session.

Next, patients were asked to imagine being in situations that they had identified during an earlier assessment session as *drinking trigger situations* . A hierarchy of these situations was constructed, and the first situation the patient was asked to imagine during each session was the situation that they identified as likely to result in the strongest urge to drink. During the course of treatment, all situations described as drinking triggers by the subject were presented, including new situations reported during treatment. While imaging situations, patients were asked to let their urge to drink build by focusing on aspects of the situation that would strengthen their urge. Patients were asked to continuously report their urge on a 10-point Likert scale and to say when it reached maximum.

Urges continued to be monitored by verbal self-report after their peak. Intensive beverage exposure and imaginal scenes were terminated when urge diminished to at least half of peak urge (the criterion) for purposes of standardization. If the patient reported no urge to drink, 5 min of exposure was conducted. Therapists probed for skills that the patients imagined using, either in response to therapist direction or on their own, and for the extent to which the coping method was effective in reducing the urge. At the end of the session, the beverage was removed, the patients' reactions to the session were elicited in an openended manner, and an end-of-session urge rating was recorded.

Coping skills were taught in a graduated fashion. During the first session, therapists simply called the patients' attention to the fact that the urge decreased by itself after enough time had passed and noted any feelings that might have replaced the urge, such as boredom. If patients used their own methods to bring down their urge to drink, these were noted and reinforced by the therapist. Starting with the second session, therapists taught five specific cognitive strategies for coping with urge to drink, including delay tactics using self-instruction, imagining negative consequences of returning to drinking, imagining positive consequences of sobriety, using imagery recommended by Marlatt (1985) to reduce urges (e.g., slashing it with a sword), and substituting alternative activities or consumption. Only one strategy was used at any given time initially, and careful attention was paid to tailoring the strategy to the individual needs of the patient in the context of his high risk for relapse situations. Patients practiced using each strategy during exposure to each drinking trigger, with the practice terminating when the urge had been reduced to the criterion. To insure compliance and understanding, therapists discussed in detail after each scene the nature and effectiveness of the strategy that the subject used during imaginal rehearsal. During weekly supervision, none of the therapists reported that clients had difficulty understanding the coping strategies. In the last two sessions, patients were encouraged to combine and select their preferred strategies.

CC.

This was designed to control for daily contact. Patients received standard treatment, participated in all pre-, post- and follow-up assessment protocols, and, on a daily basis weekdays in the context of a 10-

min interview, gave a treatment provider daily urge ratings. Other assessment data collected during this brief interview are not pertinent to this study.

Assessment

An assessment battery was administered pretreatment within the first week after admission, and CR assessment was administered at pre- and posttreatment or after an equivalent length of time. CC patients were matched to CET patients with respect to amount of time that separated pre- and posttesting (*M* = 7.79 days for each group). Patients were only assessed when their withdrawal symptoms had abated as indicated by the Clinical Institute Withdrawal Assessment for Alcohol (CIW-A; Shaw, Kolesar, & Sellers, 1981). Follow-up interviews were conducted at 3 and 6 months following discharge.

Assessment of drinking.

The principal dependent measures were derived from the TLFB, which was administered at pretreatment for the 180 days prior to admission and at follow-ups. TLFB measures include the number of days abstinent from alcohol, amount consumed on drinking days, days in jail, and days in inpatient treatment. Drinking information was converted to standard-sized drinks (.48 ounces of 100% ethanol). Breath analysis was conducted to ensure that no one had a positive blood alcohol concentration when interviewed, patients were assured that clinical staff would not be told of their drinking status, and a family member or close friend was interviewed to provide confirmation.

Individual differences assessment battery.

In addition to the TLFB pretreatment, an interviewer administered a series of questionnaires including demographics, the ADS, drug use in the previous 30 days, the SMAST, the Beck Depression Inventory (BDI; Beck, 1978), and a Drinking Triggers Interview (DTI). In the DTI, patients listed the situations or events associated with frequent heavy drinking, relapse, or strong urges to drink. They then rated their confidence that they could handle each situation without drinking if they were out of the hospital and in the situation "today" (as a measure at self-efficacy) and their urge to drink in each situation. All ratings were made on 10-point anchored Likert scales. Patients rank-ordered the situations for frequency with which they occur. A hierarchy of the triggers was then formed on the basis of anticipated urge to drink in the situation, with ties broken by frequency of occurrence. Urge and confidence ratings for each trigger were repeated at posttreatment. The mean urge and confidence ratings across the four highest ranked triggers were used as the data for analyses.

CR assessment.

CR assessment was based on procedures developed by Monti et al. (1987) . Patients abstained from nicotine and caffeinated beverages at least 45 min before the first CR measurement. At 1:00 p.m., each patient brushed his teeth and was escorted to the assessment room where, after the procedures were fully explained and demonstrated (about 45 min total time), he completed a mood rating scale. The experimenter then left and observed through a one-way mirror.

The patient set at a table adjacent to a one-way mirror and speaker. Beverages were hidden from view under two inverted opaque containers, and vials containing cotton rolls were in front of the containers. Under one container was a glass of cold water and a commercially labeled bottle of spring water. Under the other container was a glass of the patient's most frequently consumed alcoholic beverage prepared the way he normally drank it and the commercial container. Instructions during the exposure trials were presented on audiotape. The methodology was modified as reported in Monti et al. (1993) to make use

of signaled sniffing.

Each patient was asked to relax for 3 min and then to insert cotton rolls into his mouth. Next, the patient uncovered the water and held and sniffed the glass of water when signaled, for 3 min, then covered the beverage, put the cotton rolls back in their vial, sealed the vial, and completed several questionnaires. The patient then relaxed for another 3 min. Next, he inserted new cotton rolls, uncovered the alcoholic beverage, held and sniffed the glass on signal, then covered the beverages, replaced the cotton rolls, and completed some questionnaires. During the subsequent 15 min, the alcoholic beverage was continuously uncovered, the patient engaged in signaled sniffing, and he completed three brief ratings every 3 min (data from these 15 min will not be presented herein). Finally, the patient covered the beverage, completed some questionnaires, and was debriefed.

Salivation was measured as described in Monti et al. (1987) . Urge to drink alcohol, urge to drink water, and attention paid to either the sight or smell of the alcohol were reported on 10-point Likert scales following each 3-min beverage trial.

Daily urge ratings.

Patients in both conditions completed daily urge ratings on each business day as described earlier. Ratings includded (a) highest urge to drink alcohol in the last 24 hr, (b) urge to drink at the start of the session or interview, and (c) percentage of time they experienced any urge to drink in the last 24 hr, all rated on 10-point Likert scales.

Urge-Specific Strategies Questionnaire.

At each follow-up, subjects were asked to described every strategy they had tried to prevent themselves from drinking when they had an urge to drink. Strategies were coded into the five types taught in CET. At the 6-month follow-up, in addition to the aforementioned open-ended questions, these five strategies were described, and subjects were asked to rate how often they used each strategy when they had an urge and were trying to keep from drinking. These frequency ratings were made on a scale of *never* (0) to *every time* (10).

Results

Chi-square analyses used Yates correction or Kendall's tau B, where appropriate, based on observed or expected cell frequency. At pretreatment, *t* tests and chi-square tests showed that the two groups did not differ on age, education, employment status, quantity and frequency of alcohol use on the TLFB, alcohol dependence on the ADS, number of days hospitalized or in jail during the previous 6-months or the BDI (all p s > .20). A trend was found for more married or cohabiting patients in CC (47%) than CET (22%), tau B = .26, $p < .08$.

Six patients (15%) dropped out of the study after pretreatment assessment and before completing half of the treatment sessions (4 of 22 in CET) or after the equivalent length of time–that is, within 4 days of pretreatment assessment (2 out of 18 in CC)–and were therefore not included. Of the remaining sample of 34 patients, 3 (9%) did not complete postassessment (1 in CET, 2 in CC) but were included in all other analyses. Of the 18 remaining CET subjects, 17 completed all six sessions and one completed four sessions. Thirty-two patients (94%) completed the 3-months assessment (18 in CET, 14 in CC). Thirty patients (88%) completed the 6-month assessment (16 in CET, 14 in CC). Chi-square analyses showed no significant differences between groups in attrition at either interval.

Self-report drinking data were compared with the reports from a family member or close friend (significant other; SO) as to the subjects' drinking. The agreement between subject and SO reports was 89% for the subject drinking at all during the follow-up. One SO (who reported not being confident about his knowledge) said the subject drank when the subject claimed abstinence. Two SOs claimed that the subject was abstinent when the subject said he drank. In all other cases, there was agreement. SO reports significantly correlated with subject reports for number of drinking days (first 3 months, $r = .50$, $p < .008$; second 3 months, $r = .45$, $p < .01$) and number of heavy drinking (more than six drinks per day) days (first 3 months, $r = .51$, $p < .007$; second 3 months, $r = .51$, $p < .007$). When data from SOs who said they were not very confident about their knowledge of the subject's drinking were eliminated from analyses (3 people), the correlations generally improved for number of drinking days (first 3 months, $r = .59$, $p < .002$; second 3 months, $r = .60$, $p < .001$) and number of heavy drinking days (first 3 months, $r = .58$, $p < .003$; second 3 months, $r = .49$, $p < .008$). The subject reported more drinking in 28 cases, the SO reported more drinking in 30 cases, and the reports agreed in 40 cases. No significant differences between subject and SO reports were found in *t* tests.

Intercorrelations Among Measures of Reactivity

To examine covariation among the various measures of CR, we calculated the correlations among salivation, self-reported urge to drink alcohol, and amount of attention paid to the sight and smell of the alcohol during the first alcohol trial at pretreatment. Salivation was not significantly correlated with urge to drink or either attention measure. However, urge to drink was significantly correlated with attention to the sight of the alcohol ($r = .42$, $p < .01$) and attention to the smell of the alcohol ($r = .31$, $p < .05$). Attention to the sight and smell of the alcohol were significantly correlated with each other ($r = .62$, $p < .001$). Urge and salivation were retained as independent CR measures.

Change in Process Measures During Treatment

Repeated-measures analyses of covariance (ANCOVAs) were used to investigate the effects of time and treatment condition on process measures. Separate 2 × 2 (Time × Treatment) analyses were conducted for each process measure.

Urge to drink alcohol.

Change in urge to drink during CR assessment as a function of treatment was investigated two ways. First, the data from all patients were entered into the analyses. However, previous studies have found that only 47% to 70% of alcoholics are urge reactors (i.e., reported greater urge to drink during alcohol than water exposure; Monti et al., 1987 , 1993). Similarly, only 65% of alcoholics have been found to be salivary reactors (i.e., salivated more to alcohol than water exposure; Monti et al., 1993). See Rohsenow et al. (1992) for differences between reactors and nonreactors. Alcoholics who are nonreactive to alcohol cues at pretreatment are not hypothesized to show any decrease in urge to drink from pre- to post-treatment. As they did not have an elevated urge to drink at pretreatment, their urge cannot be expected to decrease (Monti et al., 1993), and inclusion of their data may obscure the ability to detect change. Therefore, the same analyses were repeated after selecting only urge reactors.

For all patients, urge to drink alcohol during the first 3 min of alcohol exposure during the pretreatment CR assessment (CR1) and the posttreatment assessment (CR2) was entered as the repeated measure, with treatment condition as the between-groups variable. Urge to drink during the 3 min of water exposure during CR1 and CR2 served as a covariate at each corresponding time. A main effect was found for time, as patients in both conditions reported less urge to drink alcohol in CR2 than in CR1, $F(1, 25) = 12.38$, $p < .003$. There was no significant Treatment Group × Time interaction. (see Figure 1).

This analysis was repeated after selecting only urge reactors at pretreatment. An equivalent proportion of each group consisted of reactors (14 of 18 in CET and 13 of 16 in CC). A significant main effect was found for time, with patients in both conditions reporting less urge to drink alcohol in CR2 than in CR1, F (1, 15) = 27.83, $p < .001$. In addition, a significant Group × Time interaction was found, with urge to drink alcohol decreasing more from CR1 to CR2 for patients in CET than for patients in CC, F (1, 15) = 6.05, $p < .03$. As seen in Figure 1 , there were initial group differences in reactivity at CR1, and an ANCOVA of pretreatment urge to drink alcohol during the alcohol trial (covarying urge to drink alcohol during the water trial) found this pretreatment difference to be significant, F (1, 17) = 7.35, $p < .02$. The CET group reactors were more reactive at CR1 than were the CC group reactors, but the groups were equivalent in urge to drink at CR2.

To determine whether between-group differences in urge ratings may be attributed to between-group differences in attention paid to the alcohol stimuli during cue exposure assessment, we conducted two t tests comparing groups on self-reported attention to the alcohol, one at CR1 and one at CR2. Both were nonsignificant.

Salivation.

We conducted ANCOVAs to examine the effects of time and treatment on salivation in response to alcohol exposure, first including all patients and then repeated for only salivary reactors. The amount that patients salivated during the first 3 min of alcohol exposure at CR1 to CR2 was entered as the repeated measure, using the amount of salivation during the corresponding water trial at each timepoint respectively as a covariate. With all patients in the analysis, a main effect for time was found, with patients in both conditions salivating less during alcohol exposure in CR2 than in CR1, F (1, 24) = 11.78, $p < .003$. The Group × Time interaction effect was not significant. A second analysis performed including only salivary reactors (those who salivated more to alcohol than to water at CR1) at pretreatment (10 in CET, 11 in CC) found essentially the same results, with a significant main effect for time, F (1, 18) = 16.32, $p < .002$, and no Group × Time interaction effect. Mean salivation in grams during alcohol exposure in CR1 was 3.10 ± 1.71 (3.34 ± 1.83 for reactors) and during CR2 was 2.16 ± 1.31 (2.43 ± 1.18 for reactors).

Drinking triggers.

Two separate repeated measures ANCOVAs were used to study changes in mean confidence and urge ratings from pre-to posttreatment. Significant main effects for time were found, with patients reporting more confidence, F (1, 29) = 53.38, $p < .003$, and less urge to drink, F (1, 29) = 22.57, $p < .001$, in response to the trigger situations at posttreatment than at pretreatment. The Group × Time interaction effect was not significant.

Daily urge ratings.

Because daily exposure to alcohol might result in uncomfortably strong or frequent urges to drink between sessions for the CET patients, between-group differences in the three daily urge ratings were compared. To include complete data, we entered the ratings for the first 4 days as the repeated measure in 4 × 2 (Time × Treatment) repeated measures analyses of variance for each of the three variables. No significant main effect for time or group by time interaction effect was found.

Effects of Treatment on Drinking and Coping Strategies Used After Treatment Drinking status.

For both the 3- and 6-month intervals, subjects were coded as having drunk or not and as having drunk

heavily or not (i.e., consumed more than six standard alcoholic drinks on any one day) during that 3-month interval (see Table 1 for number and percentage of subjects). For the first 3 months, both chi-square analyses (Group × Drank and Group × Drank Heavily) were nonsignificant. During the second follow-up period (3 to 6 months posttreatment), the chi-square analysis (with Yates correction, using Kendall's tau B because of cell size) was significant for drinking at all (Kendall's tau B = .35, $p < .03$) but not for drinking heavily. If the subjects lost to follow-up are counted as drinking and drinking heavily, the results are similar, with significantly fewer drinkers in CET during the second follow-up period (50% versus 81%, Kendall's tau B = .33, $p < .03$).

Timeline follow-back variables.

Percent abstinent days and mean number of drinks per day were calculated for possible drinking days only (i.e., not in the hospital or jail). (Only one patient had a jail day, and six had hospital days during follow-up.) Repeated measures ANCOVAs were conducted separately on the two drinking variables to examine between-group differences, entering both the 0- to 3- and 3- to 6-month follow-up values as the repeated measure, with the corresponding variable at baseline serving as a covariate. A significant Group × Time interaction effect was found for percent abstinent days, F (1, 28) = 4.47, $p < .05$. Examination of Figure 2 shows that rate of abstinence is similar for both groups pretreatment and in the first 3 months and that it diverges between groups in the second 3 months. A simple effects test within groups across time showed that although the CET group did not change significantly from the first to the second 3 months, the CC group's abstinent days decreased significantly, F (1, 28) = 4.63, $p < .05$.

In the repeated measures analysis of number of drinks per day, a similar Group × Time effect approached significance, F (1, 28) = 3.56, $p < .07$. CET patients consumed fewer drinks per day during the second than during the first 3 months, whereas CC patients increased the number of drinks they consumed during the follow-up (see Figure 3). Main effects for group and time were not significant.

Coping strategies used after treatment.

Chi-square analyses were performed on the five categories of responses to the openended questions from the Urge Specific Strategies Questionnaire at 3 and 6 months follow-up. Table 2 presents the percentage of subjects in each treatment condition who described using each of these strategies at each follow-up period. At 3 months, CET patients were significantly more likely than CC patients to say they coped by thinking about the negative consequences of drinking (Kendall's tau B = – .38, $p < .03$). At 6 months, CET patients were more likely than CC patients to say they coped by thinking about the positive consequences of sobriety (Kendall's tau B = – .47, $p < .01$). Groups did not differ significantly in reported use of the other strategies.

At 6 months, patients were asked how often they used each of the strategies when they had an urge to drink. We calculated partial correlations (*pr* s) to examine whether the frequency with which patients used these strategies was related to drinking variables over the total 6-month period while partialing baseline drinking. Frequency of use of negative consequences was significantly related to number of drinks per day ($pr = – .40$, $p < .02$) and percent abstinent days ($pr = .37$, $p < .03$). Frequency of using positive consequences was significantly related to percent abstinent days ($pr = – .46$, $p < .006$). More frequent use of these strategies predicted better outcome. Frequency of using delay tactics and substitution were not related to drinking. As only four patients used imagery, those data were omitted.

Predictors of Drinking Outcome DTI variables.

We conducted a hierarchical multiple regression to predict the outcome drinking measures, using the

mean DTI confidence and urge ratings at pre- and posttreatment as the predictor variables and the baseline drinking measures as covariates. Separate regression equations were used for the two drinking measures and the two types of trigger rating at each follow-up. Table 3 presents the *F* statistics for the semipartial squared correlations of the trigger ratings with the drinking variable. Confidence ratings at both pre- and posttreatment accounted for a significant portion of the variance in both of the 3-month follow-up drinking variables with more confidence associated with less drinking. At the 6-month up, posttreatment confidence ratings continued to significantly predict percent of days abstinent and mean number of drinks per day. Mean urge to drink ratings at pretreatment significantly predicted percent abstinent days at 6-month follow-up, with greater urge to drink predicting more abstinence. Urge ratings at posttreatment were unrelated to the drinking measures at both follow-up periods.

CR variables.

We also used hierarchical multiple regression to predict the outcome drinking measures using the two CR variables as the predictor variables. Separate analyses were conducted for the two CR variables and the two outcome drinking variables at each follow-up. For each analysis, the corresponding baseline drinking variable and the CR variable from the water trial were entered as covariates. Urge to drink alcohol at CR1 significantly predicted percent abstinent days at the 3- to 6-month follow-up period ($sr^2 = .12$, $p = .05$), with more urge reactivity predicting more abstinence ($\beta = .48$). Salivary reactivity at CR1 and urge and salivary reactivity at CR2 did not predict outcome.

Discussion

Alcoholics who received cue exposure treatment combined with urge reduction coping skills training in addition to their inpatient alcohol rehabilitation program did not differ during the first 3 months but drank significantly less during the second 3 months after treatment than did patients who received standard treatment alone. More patients who received CET were comletely abstinent, a higher percentage of abstinent days were reported by the CET group, and the CET group tended to report fewer drinks per day during the second 3 months after treatment. This difference appears to be due to the fact that the CET group maintained its improvement in drinking but the control group's drinking worsened.

The fact that the groups diverged in outcome only during the second 3 months is of interest. One implication is that it is less likely that the differences are due solely to extinction (Drummond et al., 1990). Results reported in this study are consistent with the notion that patients in CET learned coping skills that they continued to apply over time while the beneficial effects of standard treatment alone were decreasing. The fact that some of the CET subjects who drank during the first 3 months were completely abstinent during the next 3 months is consistent with the idea that these patients applied coping skills after lapsing to return to abstinence but is inconsistent with an extinction-based explanation of the treatment effects. This interpretation is consistent with the fact of between-groups differences on several of the process measures and with the lack of support for passive extinction-based cue exposure treatment protocols that has been reported for heroin addicts (Childress et al., 1992). Thus, a treatment may sometimes be effective for reasons other than the ones originally expected.

To investigate possible mechanisms by which the treatment package may have effected change in drinking, we administered a series of process measures. These were used to measure change in relevant process variables, to assess the relationship between these measures at posttreatment to actual drinking outcome, and to assess the relationship between processess occurring during follow-up and drinking.

First, CR assessment was conducted before and after treatment to determine whether CET differentially reduced CR. Urge to drink was found to correlate positively with attention paid to the stimulus and to be

relatively independent of changes in salivation in response to alcohol exposure, consistent with prior studies (Rohsenow et al., 1992). Both groups significantly decreased their cue-elicited urge and salivation over the course of treatment. Among patients who reacted to alcohol cues at all at pretreatment, those in CET decreased more in urge than did patients in CC. However, it was not possible to determine whether the decrease was a result of the CET: People who were more reactive at pretreatment happened to be assigned to CET during stratified random assignment, although groups had been balanced for number of reactors and nonreactors. Thus, although both groups improved and the CET group improved more in cue-elicited urge, initial differences in CR make the meaning of this result unclear. No between-group differences were seen for change in cue-elicited salivation, daily ratings of urge to drink, or urge and confidence ratings of individualized high-risk situations.

Second, treatment groups were compared on their use of the strategies that were taught for coping. During the first 3 months, more CET than CC patients reported coping with urges by thinking about negative consequences, and during the second 3 months, more CET patients than CC patients coped by reviewing the positive consequences of sobriety. Thus, the CET group demonstrated continued ability to think of and apply these strategies. It may be that the positive consequences of sobriety became more salient later because patients had more direct experience with them after more time posttreatment had passed. The negative consequences of drinking may have been more salient earlier, closer to their experiencing these.

Use of the aforementioned strategies was significantly related to improvement in quantity and frequency of drinking. The more often the positive consequence strategy was used, the more abstinent days were reported. The more often the negative consequence strategy was used, the greater the number of abstinent days and the fewer the number of drinks per day. This suggests that these two strategies were successfully taught, were remembered during follow-up, and worked well. Other strategies were not significantly effective.

Thus, teaching coping skills designed to cope specifically with urge to drink and providing guided practice with the skills in the presence of actual cues has some demonstrated effectiveness. Because these skills were taught in the presence of actual beverage cues as well as with imaginal high-risk situations, thus allowing in vivo practice, we cannot conclude that training in the absence of cues would be similarly effective. As alcoholics with greater CR also are more likely to show poorer coping skills when engaging in drink refusal in the presence of alcohol (Binkoff et al., 1988), providing urge-specific coping skills training in the presence of alcohol may have had a particularly beneficial effect. Further research with this approach is thus warranted on larger samples and with other populations.

Third, urge to drink during CR assessment and during the DTI was investigated as a predictor of drinking. Greater pretreatment urge was predictive of more abstinent days during follow-up. Although this seems counterintuitive, this is consistent with recent reformulations of Tiffany's (1990) model (Rohsenow et al., 1992 ; Rohsenow et al., in press). Tiffany stated that much drug seeking behavior is under the control of largely automatic processes and that urges may be fairly irrelevant to drug seeking behavior. Consistent with this, a previous study found no relationship between urge to drink during CR assessment and drinking during a 3-month follow-up, but greater attention to the stimulus during CR assessment predicted more abstinent days and fewer drinks per day (Rohsenow et al., in press). As urge correlates highly with attention to stimulus, the relationship of urge to drink to drinking during follow-up may be mediated by increased attention. Rohsenow et al. (in press) proposed that alcoholics who attend more to a high-risk stimulus may be at reduced risk because they are better able to mobilize coping strategies. Alcoholics with less awareness of a high-risk situation or of their reactions to it may be at greater risk because they are more susceptible to automatic drug-seeking processes and less likely to decide to use coping strategies. Although urge to drink in more complex high-risk situations may be related to increased drinking (Monti et al., 1990), coping responses are easier to mobilize and execute

in a simple alcohol exposure situation, so the increased awareness associated with an urge to drink may be beneficial among alcoholics motivated to stay sober.

Self-efficacy predicted drinking outcome, as would be expected (Abrams & Niaura, 1987). Posttreatment ratings of confidence in their ability to handle their own highest risk situations were significantly predictive of lower drinking quantity and a greater number of abstinent days during the first 3 months of follow-up, and they continued to predict increased abstinece at 6 months. These are consistent with other studies that generally found self-efficacy as assessed by confidence or reduced difficulty in a standardized set of high-risk situations to be predictive of less severe drinking (Miller, Ross, Emmerson, & Todt, 1989 ; Monti et al., 1990). Using an individualized DTI to assess self-efficacy warrants further study.

This study was also designed to demonstrate the importance of a comprehensive assessment battery of process and outcome measures to identify changes as a result of treatment and possible mediating mechanisms of between-group differences in outcome. Methodological advances were demonstrated in particular by the use of the individualized assessment of alcoholics' highest risk situations for assessing self-efficacy and urge to drink, using CR assessment as a process measure and predictor of outcome, and assessing the use of urge-specific coping strategies during follow-up. Although the sample was small, the importance of process measures and their usefulness in predicting drinking was demonstrated.

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Table 1.

Table 1
Number and Percentage of Subjects in Each Treatment Condition Who Drank at All or Drank More Than Six Drinks in a Day During Each Follow-up Interval

Outcome status / treatment group	Follow-up interval: 0–3 months n	0–3 months %	3–6 months n	3–6 months %
Drank				
CET	10	56	7*	44
CC	7	50	11	79
Drank heavily				
CET	9	50	5	31
CC	5	36	7	50

Note. CET = Cue exposure treatment; CC = contrast condition.
* CET differs from CC, $p < .05$.

Table 2.

Table 3.

Figure 1. Urge to drink alcohol during cue exposure pre- (Pre) and posttreatment (Post) for all subjects (top panel) and urge reactors only (bottom panel). (CET = cue exposure treatment; CC = contrast condition.)

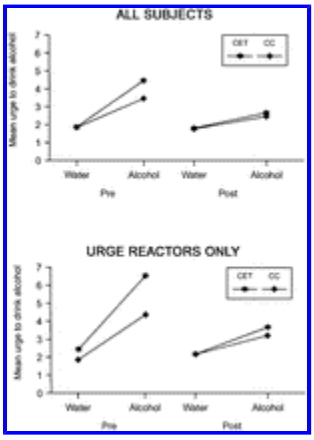

Figure 2. Percent abstinent days at baseline and each follow-up period for each treatment condition. (CET = cue exposure treatment; CC = contrast condition.)

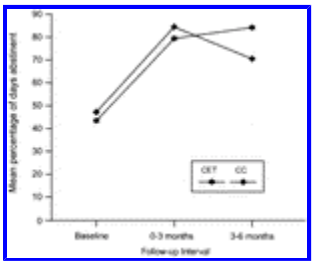

Figure 3. Mean number of drinks per day at baseline and each follow-up period for each treatment condition. (CET = cue exposure treatment; CC = contrast condition.)