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Deficits in Emotion-Regulation Skills Predict Alcohol Use During and After Cognitive Behavioral Therapy for Alcohol Dependence

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Abstract

Objective—As emotion regulation is widely considered to be a primary motive in the misuse of alcohol, the aim of the study was to investigate whether deficits in adaptive emotion-regulation skills maintain alcohol dependence (AD).

Method—A prospective study investigated whether emotion-regulation skills were associated with AD and whether these skills predicted alcohol use during and after treatment for AD. Participants were 116 individuals treated for AD with cognitive behavioral therapy. Emotion regulation and severity of AD symptoms were assessed by self-report. Alcohol use during treatment was assessed by breathalyzer and urine analysis for ethyl glucuronid; alcohol use during the 3-month follow-up interval was assessed by self-report.

Results—Pretreatment emotion-regulation skills predicted alcohol use during treatment, and posttreatment emotion-regulation skills predicted alcohol use at follow-up, even when controlling for other predictors potentially related to emotion regulation. Among a broad range of specific emotion-regulation skills, the ability to tolerate negative emotions was the only skill that negatively predicted subsequent alcohol consumption when controlling for the other skills. Individuals in the AD sample reported significantly more deficits in emotion-regulation skills than did those in a non-clinical control sample, but significantly less than did those in a sample of individuals exclusively meeting criteria for major depressive disorder.

Conclusions—Enhancement of general emotion-regulation skills, especially the ability to tolerate negative emotions, appears to be an important target in the treatment of AD.

Keywords

alcohol; treatment; relapse; emotion regulation; skills; dysregulation

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Alcohol dependence (AD) is the most serious form of alcohol-use disorder. AD is associated with intense mental, physical, and functional impairment; high societal costs; and long-term suffering by both the dependent individual and the individual's family members (e.g., Caetano, Nelson, & Cunradi, 2001). However, AD is also fairly widespread, with a 12-month prevalence rate of nearly 4% in the general population (Hasin, Stinson, Ogburn, & Grant, 2007). Despite the development and implementation of several empirically supported treatments, only about 25% of clients have been found to remain abstinent during the first year following treatment termination (Miller, Walters, & Bennett, 2001). Thus, there is a strong and pressing need to improve the efficacy of treatment for AD.

According to the relapse prevention model proposed by Marlatt and colleagues (Marlatt & Witkiewitz, 2005), relapse is likely to occur when at-risk individuals are confronted with high-risk situations and lack the coping skills necessary to deal with such situations effectively. Consistent with this model, a number of studies have focused on identifying specific high-risk situations. Extensive evidence from these studies has shown that negative affect is one of the most prominent factors associated with relapse to maladaptive drinking. First, AD is highly associated with affect-related disorders, such as anxiety, depression, and borderline personality disorder (Gregory et al., 2008; Hasin et al., 2007), and individuals with co-occurring symptoms of these disorders display significantly higher rates of relapse after treatment (Bradizza, Stasiewicz, & Paas, 2006). Second, the majority of clients retrospectively attribute relapse to negative affective states (Lowman, Allen, & Stout, 1996; Zywiak, Connors, Maisto, & Westerberg, 1996). Third, negative affect -- such as stress/nervousness, anxiety, anger, dysphoric/depressed mood, feelings of loneliness/uselessness/boredom -- predicts subsequent desire to drink/drinking-level in epidemiological studies and relapse in treatment-outcome studies (Falk, Yi & Hilton, 2008; Gamble et al., 2010; Hodgins, el-Guebaly, & Armstrong, 1995; Swendsen et al., 2000; Willinger et al., 2002). Fourth, in laboratory paradigms, the induction of negative affect was shown to predict increased urges to drink and increased expectancies of relief after drinking (Cooney, Litt, Morse, Bauer & Gaupp, 1997; Birch et al., 2004; Sinha et al., 2009). Fifth, interventions focusing on the reduction of depressed mood or anxiety symptoms have been shown to decrease relapse and severity of alcohol use disorders (Brown, Evans, Miller, Burgess, & Mueller, 1997; Watt, Stewart, Birch, & Bernier, 2006), and interventions with a strong focus on emotion-regulation skills, such as dialectical behavioral therapy (Linehan, 1993a) have been shown to reduce substance use (including alcohol) in clients suffering from borderline personality disorder (Harned et al., 2008; Linehan et al., 2002). Finally, evidence suggests that although alcohol may initially reduce negative affect to some extent (Armeli et al., 2003; Kushner et al., 1996; Swendsen et al., 2000), maladaptive use eventually leads to the continuation and potential increase of such affect, thereby generating a vicious cycle contributing to the chronic and escalating nature of AD (Heinz et al., 1998; Koob & Le Moal, 2001; Witkiewitz & Villarroel, 2009).

In line with these findings, a number of theories contend that affect regulation is a primary motive for alcohol use; such models include the affective processing model (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), the motivational model of alcohol use (Cox & Klinger, 1988; Cooper, Frone, Russel, & Mudar, 1995), the stress and negative affect model (Colder & Chassin, 1993), the self-medication model (Khantzian, 1997), the stress response dampening theory (Levenson, Sher, Grossman, Newman, & Newlin, 1980), and the tension reduction hypothesis (Conger, 1956). The implication of these models is that emotion-regulation skills (i.e., skills relevant for "monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals"; Thompson, 1994, pp. 27-28), should be important -- if not essential -- for preventing relapse in AD. This hypothesis received preliminary support from studies demonstrating that trait

emotional intelligence (defined as the ability to be aware of emotions, identify emotions correctly and modify emotions effectively) was negatively associated with alcohol-related problems (Riley & Schutte, 2003) and that emotional intelligence moderated the association between negative emotions and craving for alcohol in AD patients (Cordovil de Sousa Uva et al., 2010). Additional research has shown that abstinent alcoholics report more difficulty effectively regulating their emotions than do social drinkers (Fox, Hong, & Sinha, 2008). However, research has yet to investigate the predictive effects of emotion-regulation skills on alcohol use during and after treatment.

To facilitate the utilization of the emotion-regulation framework for clinical purposes, Berking (2010) has synthesized and expanded upon previous theories (e.g., Gross, 1998; Larsen, 2000; Saarni, 1999; Greenberg, 2002) and proposed a skill-based model of emotion regulation. According to the *Adaptive Coping with Emotions (ACE) Model* (Berking, 2010), effective emotion regulation can be conceptualized as the situation-adapted interplay of the abilities to (a) be aware of emotions, (b) identify and label emotions, (c) correctly interpret emotion-related body sensations, (d) understand the prompts of emotions, (e) actively modify negative emotions to feel better, (f) accept negative emotions when necessary, (g) tolerate negative emotions when they cannot be changed, (h) confront (vs. avoid) distressing situations in order to attain important goals, and (i) compassionately support (encourage, self-soothe) oneself in emotionally distressing situations (in order to counterbalance potential short-term negative effects that engagement in the other skills may have on one's emotions). Empirical studies have shown that all skills included in the ACE model are significantly associated with various indicators of mental health in clinical and at-risk populations (Berking et al., 2010; Berking, Meier, & Wupperman, 2010; Berking, Orth, Wupperman, Meier, & Caspar, 2008; Berking, Wupperman, et al. 2008; Berking & Znoj, 2008). However, research has not yet investigated whether these skills are associated with AD and whether they facilitate abstinence during or after treatment for AD. In addition, as deficient emotion-regulation skills are likely to be associated with other potential predictors of relapse, such as symptom severity (Langenbucher, Sulesund, Chung, & Morgenstern, 1996), degree of comorbidity (Tate, Brown, Unrod, & Ramo, 2004), cognitive abilities (Blume, Schmaling, & Marlatt, 2005), and negative mood (Hodgins et al., 1995), it is important to investigate whether emotion-regulation skills predict alcohol use beyond these additional factors.

Moreover, there is a lack of research comparing the emotion-regulation skills of populations with alcohol-use disorders with those of other clinical populations. Although some evidence exists for the transdiagnostic nature of emotion-regulation skills (Aldao, Nolen-Hoeksema, & Schweizer, 2010), deficits in these skills may be more integral to some disorders than to others. For example, in the emotional disorders (i.e. depression and anxiety) the inability to effectively regulate dysfunctional emotions can be conceptualized as the core of these disorders (Moses & Barlow, 2006); whereas in disorders such as AD, deficits in these skills might be seen as one relevant factor among many that contribute to the onset and maintenance of the disorder (Marlatt & Donovan, 2005). Finally, few studies have assessed a broad range of emotion-regulation skills in order to identify the skills most strongly associated with (changes in) psychopathological symptoms (e.g. Berking, Wupperman, et al., 2008) -- and thus the skills that should be considered important targets in treatment. At this point, no such study is available for AD.

Therefore, the major aim of the present study was to test the primary hypotheses that (1) more effective pretreatment emotion-regulation skills would negatively predict alcohol use during treatment and (2) more effective posttreatment emotion-regulation skills would negatively predict alcohol use during the three months following termination of treatment; even when controlling for other predictors potentially related to emotion regulation.

Additionally, we investigated whether, (a) more effective pretreatment emotion-regulation skills would be associated with lower pretreatment AD symptom severity, (b) AD patients would report less successful emotion-regulation than did non-clinical controls, but more successful emotion-regulation than did patients meeting criteria for major depressive disorder (MDD), and (c) specific emotion-regulation skills could be identified as particularly important in negatively predicting alcohol use during and after treatment for AD.

Method

Participants and Procedures

Participants were 116 inpatients referred to a hospital that specialized in treating alcohol use disorders (AHG Clinic; Luebeck, Germany). Inclusion criteria for the study were (a) ICD-10 diagnoses of alcohol dependency, (b) successful completion of detoxification, (c) an intended treatment length of at least six weeks, and (d) sufficient German spelling skills. The only exclusion criterion was a significant risk for suicide, which was assessed during the intake interview by trained clinicians. As part of this assessment, the clinician gathered information on the history of suicide attempts, current intention and commitment to commit suicide, availability of specific suicide means and plans, and reasons for living. Enrollment occurred between November 2006 and September 2007. Diagnoses were based on ICD-10 criteria for alcohol dependence (Dilling, Mombour, & Schmidt, 2004). Assessments of diagnoses and other study criteria were conducted during an intake interview by experienced psychotherapists who were either psychologists or physicians with master degrees or above, and who had all been trained extensively in the Structured Clinical Interviews for DSM-IV (SCID; German Version: Wittchen, Zaudig, & Fydrich, 1997). In addition to self-report and interview data, alcohol use was further measured with urine and breath-analyzer tests (see *Measures*). All participants met criteria for alcohol dependence according to ICD-10 (F10.2). In addition to AD, 70.7% of participants met ICD-10 criteria for at least one comorbid mental disorder, and 34.5% met criteria for at least two comorbid disorders. The most common comorbid disorders were nicotine dependence (52.6%), anxiety disorders (19.9% total; 12.9% social anxiety disorder, 6.9% specific phobia, 3.5% posttraumatic stress disorder), substance related disorders other than alcohol or nicotine dependence (15.5% total; 9.5% politoxicomania, 2.6% cannabis, 1.8% tranquilizer, 0.9% opiates), affective disorders (13.8% total; 12.9% MDD, 0.9 dysthymia) and personality disorders (8.6% total; 2.6 borderline personality disorder, 1.7% avoidant personality disorder).

The majority of participants were male (84%), and all were Caucasian. The average age of participants was 43.10 years (*range* = 23 to 68; *SD* = 9.75). The highest level of education achieved was: nine years of school with no degree for 9.2%, nine years of school with the corresponding degree for 65%, ten years of school with the corresponding degree for 20%, high school degree for 3.3%, and college/university degree for 2.5%. Among all participants: 21.6% reported living in a steady relationship, and 27.7% reported being currently employed/having a steady job. According to self-reports, average consumption of alcohol prior to detoxification was 1728.09 grams of alcohol per week (*range* = 100 - 6860; *SD* = 1127.90), and average length of problematic use 154.11 months (*range* = 6 - 420; *SD* = 95.25).

To compare pretreatment emotion-regulation skills (assessed with the Emotion-Regulation Skills Questionnaire; ERSQ; Berking & Znoj, 2008) of individuals with AD (*N* = 116) with the skills of a non-clinical control group and a clinical MDD group, we used data from several previous community and clinical studies in which the ERSQ was administered. For the non-clinical control group, we used a sample of 385 participants (assessed between December 2008 and November 2009) who had reported that they had never engaged in psychotherapeutic treatment. For the clinical control group, we began with a combined

sample of 4,096 non-suicidal patients from a German mental health clinic and identified 680 patients who met criteria exclusively for MDD according to ICD-10 criteria, as assessed by experienced clinicians at intake between January 2008 and December 2009. When assessing suicidality, the same criteria and procedures were used in the MDD and the AD sample. For each participant of the AD sample, we first narrowed the control sample to the matching gender. In a second step, we selected those controls who matched the AD patient with regard to age. In the absence of a perfect match, we chose the control with the smallest difference in age; if several controls showed the same age difference, we chose by the toss of a coin. Since the AD sample was predominantly male and the basis for both other samples predominantly female, we did not achieve a perfect fit. Average age of the non-clinical control sample was 43.2 (*range* = 22 - 65; *SD* = 9.9), and 88% were male. Average age of the MDD sample was 44.5 (*range* = 22 - 63; *SD* = 9.8), and 78.8% were male. All participants in the non-clinical control and the MDD sample were Caucasian. There were no significant differences regarding age, gender and ethnic background among the three samples. For all participants, study participation was voluntary, informed consent was obtained, and internationally accepted human-research guidelines (e.g. Helsinki Protocol) were followed.

Treatment

Average length of treatment was 98 days (*range* = 42 - 126; *SD* = 21.26). Treatment consisted primarily of cognitive-behavioral relapse prevention (based on Marlatt & Donovan, 2005) explicitly aimed at complete and sustained abstinence. All patients completed medical detoxification prior to treatment. Each patient received one 50-minute session of individual therapy and four 90-minute sessions of group-based therapy per week. Additionally, each patient participated in specific target groups, such as psychoeducation and motivation enhancement (6 sessions), advanced relapse prevention training (9 sessions) and social skills training (8 sessions). Patients meeting criteria for co-occurring anxiety disorder(s) also participated in a treatment group focusing on anxiety disorders (10 sessions). Following established principles and strategies of cognitive-behavioral therapy (CBT), all treatment components focused on changing cognitions and behavior. No specific emotion-regulation training (e.g. Berking, 2010) or emotion-focussed techniques (Greenberg, 2002) were applied. Emotion-related skills were only targeted to the extent that therapists considered these skills relevant for CBT relapse prevention skills and/or to the extent that they referred to specific emotions relevant for co-occurring problems (e.g., social anxiety management skills in the social skills training group). Therapists were either licensed psychotherapists (*n* = 5) or postgraduate fellows in advanced stages of clinical training (*n* = 3). All had been trained in CBT-based relapse prevention for AD and had at least two years of clinical practice (*range* = 2 - 22; *M* = 11.38; *SD* = 8.12). Additionally, adherence to the treatment protocol was ensured by weekly supervision delivered by experienced licensed therapists. In addition to the CBT-based psychotherapeutic interventions, all patients received four sessions per week of occupational therapy, two sessions per week of sports therapy, and one session per week of art therapy. None of these adjunctive measures focussed systematically on emotion-regulation skills.

Measures

Emotion-regulation skills—Emotion-regulation skills were assessed with the Emotion-Regulation Skills Questionnaire (ERSQ; German version: Berking & Znoj, 2008). The ERSQ is a 27-item self-report instrument that utilizes a five-point Likert-type scale (0 = *not at all* to 4 = *almost always*) to assess the adaptive emotion-regulation skills described in the introduction. Each skill is assessed with a subscale of three items. Items are preceded by the stem, “Last week…” Items include: “I paid attention to my feelings” (*awareness*); “my physical sensations were a good indication of how I was feeling” (*sensations*); “I was clear

about what emotions I was experiencing" (*clarity*); "I was aware of why I felt the way I felt" (*understanding*); "I accepted my emotions" (*acceptance*); "I felt I could cope with even intense negative feelings" (*tolerance*); "I did what I had planned, even if it made me feel uncomfortable or anxious" (*readiness to confront distressing situations*); and "I was able to influence my negative feelings" (*modification*). In addition to the subscales, the ERSQ consists of a total score which is computed as the average of all items.

In previous studies, the $ERSQ_{total}$ score displayed adequate-to-good internal consistencies (Cronbach's $\alpha = .90$) and adequate retest-stability ($r_{tt} = .75$; 2-week interval); results from exploratory and confirmatory factor analyses provide support for the assumed dimensionality of the measure, and sensitivity to change has been demonstrated in multiple samples of clients undergoing psychotherapeutic treatment. Consistent with theoretical expectations, all scales have demonstrated positive associations with measures of well-being and mental health, and negative associations with measures of ill-being, psychopathology and emotion-regulation deficits (Berking, Wupperman, et al., 2008; Berking & Znoj, 2008). In the current study, the ERSQ showed good internal consistencies for most scales, with alphas ranging from .7 to .9. The scales *sensations*, *acceptance*, *self-support*, and *readiness-to-confront* showed alphas between .6 and .7 (Table 1).

Alcohol Dependence Symptom Severity—Severity of AD was assessed with the total score of the Severity Scales of Alcohol Dependence (SESA; German version: John, Hapke, & Rumpf, 2003). SESA is a self-report questionnaire consisting of 33 items addressing the severity of AD symptoms as included in the Diagnostic and Statistical Manual of Mental Disorders (such as tolerance, withdrawal, craving/persistent desire to drink, loss of control over drinking, preoccupation with alcohol use; American Psychiatric Association, 2000). A total score is computed with a potential range of 0 to 100. The reliability and validity of the SESA has been demonstrated in several studies (John et al., 2003). Additionally, self-reports of average amount of alcohol consumed per day (ACD) was assessed at intake based on the most-recent drinking phase prior to detoxification. Assessment of ACD included the type and quality of all beverages containing alcohol and was based on procedures developed by Sobell, Sobell, Kaljner, Pavan, and Basian (1986). Information provided by participants was subsequently converted to grams of alcohol per day.

Alcohol Use—According to facility rules, patients were prohibited from consuming any alcohol during treatment, and were informed that disclosure of repeated use might lead to termination from the program. Given these rules, self-reports were unlikely to be reliable indicators of alcohol use during treatment. Therefore, consumption of alcohol during treatment was assessed with a breath-analyzer machine (breathalyzer; Alcotest® 7410 from Draeger Inc.) and urine toxology screens. Breathalyzer tests occurred throughout the treatment at three preset times per day, as well as any time clinical staff suspected alcohol use. Any level of alcohol measured after patients rinsed their mouths was recorded as evidence for alcohol use. To detect alcohol after patients were away from the facility for more than a few hours, urine samples were collected and analyzed for ethyl glucuronide (EtG). Urinary EtG was analysed at the Institute of Clinical Chemistry of the University clinic of Luebeck. EtG was determined by a direct negative electrospray ionization (ESI) LC-MS method using a 500-MS ion trap, a binary ProStar solvent delivery system, and a 410 autosampler (all from Varian, Darmstadt, Germany). EtG tests have been shown to reliably detect the use of alcohol several days after consumption (Beck et al., 2007). In order to reduce the risk of false positives, a conservative limit of quantification (0.4 mg/L) was used.

Alcohol use during the three months following inpatient treatment was assessed as follows: Upon completion of treatment, each participant was provided with a 3-month diary and

instructed to monitor alcohol consumption during the subsequent 3 months. For each day during this period, participants were instructed to rate whether they had consumed: (a) no alcohol, (b) less than 26 grams, (c) more than 26 but less than 60 grams, (d) more than 60 but less than 150 grams, or e) more than 150 grams. Participants were provided with a table of information on alcohol contents of typical alcoholic drinks (e.g. 0.3/0.5 liter beer). They were given a stamped envelope and asked to mail the completed diary to the clinic at the end of the 3-month period. If no such mail was received, a new stamped envelope was sent to the participant with a reminder to return the diary. This reminder also included a short questionnaire asking whether or not they had consumed alcohol in the past three months. If participants could not be reached by mail, an effort was made to obtain the new addresses by contacting local registry offices. If no diary was returned, up to five attempts were made to reach the participants by phone. If the participant could be reached by phone, he/she was asked whether he/she has been "abstinent throughout the entire past three months?" Those who answered anything other than "yes" were classified as having consumed alcohol. Participants were also classified as having consumed alcohol if this was reported by other treatment facilities or if the participant could not be contacted by mail or phone.

Potential confounds—Symptom severity and number of comorbid disorders were assessed as described above. Cognitive capacities were assessed with the Raven's Standard Progressive Matrices (SPM; German version: Kratzmeier & Horn, 1988), the short-term memory subtest of the Verbaler Lern- and Merkfähigkeitstest (VLMT; German for Verbal Learning and Memory Test; Helmstaedter, Lendt, & Lux, 2001), and the Mehrfach-Wortschatz-Intelligenztest (MWT; German for Vocabulary-based Test of Intelligence [only assessed at pretreatment]; Lehrl, 1999). Negative affect was assessed with the negative affect scales of the Positive and Negative Affect Schedule (PANAS-NA; German version; Krohne, Egloff, Kohlmann, & Tausch, 1996). The SPM is a commonly used test for logical reasoning. In the VLMT-subtest, a list of 15 words is presented, and participants are asked to recall as many words as possible. In the MWT, participants are instructed to define a series of words of increasing abstractness. The PANAS-NA assesses the intensity of negative affect with 10 items. In this study, these items referred to the previous seven days in order to cover the same time period as the ERSQ. All instruments are widely used in psychological research and have demonstrated at least satisfying psychometric properties.

Statistical Analyses

To assess the bivariate associations between pre- and posttreatment ERSQ scores and subsequent alcohol use, we computed point-biserial correlations. In order to test our primary hypothesis we used multivariate binary logistic regression analyses with indicators of symptom severity as first step, cognitive capacities as second step, negative mood as third step, and emotion-regulation skills as fourth step. Within these hierarchical blocks, we used standard inclusion procedure. For the secondary analyses, we used Pearson's correlations in order to test whether pretreatment ERSQ scores were significantly associated with indicators of symptom severity. For the comparisons among the AD, the non-clinical control and the MDD samples, we used independent t-tests. We additionally used dependent t-tests to test whether $ERSQ_{total}$ scores increased during treatment. In order to identify ERSQ subscales that best discriminate between subsequently abstinent and non-abstinent AD individuals when the influence of the other subscales was controlled, we utilized stepwise multivariate logistic regression analyses. To keep the number of predictors within a range appropriate for the sample size, we included all nine ERSQ subscales as predictors, but none of the potential confounds used when testing the primary hypotheses. We utilized stepwise procedure in these analyses because we conducted this research with a focus on the identification of potential targets for treatment. Setting realistic and effective targets is a crucial element in any psychosocial intervention and involves decisions on how to distribute limited

therapeutic resources (Berking, Grosse Holtforth, Jacobi, & Kröner-Herwig, 2005). In order to facilitate an effective deployment of resources when working to enhance emotion-regulation skills, data is needed on: (1) What is/are the most important skill(s) to target during treatment for AD? and (2) Can the outcome be further enhanced by providing secondary focus on any of the additional skills? Thus, identifying the strongest predictors of alcohol consumption and, subsequently, predictors that are important beyond the effects of already included predictors is arguable more appropriate than including all potential predictors simultaneously.

We used one-tailed tests when testing directional hypotheses, and report Cohen's *d* (Cohen, 1988), point-biserial correlation coefficients, odds ratios and Nagelkerkes R^2 as effect sizes. Preliminary analyses indicated that all assumptions required for the analytical approaches were met. All analyses were performed using SPSS 18.0.

Results

Consistent with our first primary hypothesis, participants who consumed alcohol during treatment ($n = 39$) had significantly lower $ERSQ_{total}$ scores at pretreatment than did participants who remained abstinent ($n = 77$, Table 2). A small-to-moderate point-biserial correlation coefficient indicated that pretreatment $ERSQ_{total}$ scores were significantly associated with alcohol use during treatment. As shown in Table 3, $ERSQ_{total}$ scores at pretreatment predicted alcohol use during treatment even if the effects of other potential predictors were controlled. The logistic regression analysis indicated that a one-unit increase on the ERSQ at pretreatment corresponded to a reduction of the likelihood of alcohol use during treatment by 48%.

Classification of alcohol use for the follow-up assessment was based on the consumption diary ($n = 50$), response to the reminder letter ($n = 19$), the telephone interview ($n = 29$), and information provided by other treatment facilities ($n = 4$). Patients who could not be contacted in any way ($n = 14$) were classified as consumers. In line with our second primary hypothesis, participants who were classified as consumers ($n = 58$) displayed significantly lower $ERSQ_{total}$ scores at posttreatment than did participants who were classified as abstinent ($n = 58$; Table 2). A small-to-moderate point-biserial correlation coefficient indicated that posttreatment $ERSQ_{total}$ scores were significantly associated with alcohol use during the 3-month follow-up period. Moreover, $ERSQ_{total}$ scores predicted alcohol use during and after treatment even if the effects of other potential predictors were controlled (Table 3). In the final regression model, a one-unit increase on the ERSQ at posttreatment corresponded to a reduction of the likelihood of alcohol use during follow-up by 64%.

An additional bivariate logistic regression analysis indicated that posttreatment $ERSQ_{total}$ scores continued to predict alcohol use at follow-up even when only including patients who had completed the report-based assessment or who were unambiguously identified as users with the help of other treatment facilities ($n = 98$; n = 102, resp; $B = -0.63$, $SE = 0.38$, $p < 0.05$, $e^B = 0.53$; $B = -0.83$, $SE = 0.41$, $p < 0.05$, $e^B = 0.44$, resp.) Additional analyses within the subgroup of patients providing quantitative information on alcohol consumption during follow-up ($n = 58$) showed a trend for the association of the total amount of alcohol (computed by transforming diary categories b/c/d/e into: 13/44/105/151 grams) consumed during this period ($M = 300.22$, $SD = 818.13$, *range* = 0 - 5000) and posttreatment $ERSQ_{total}$ scores ($r = 0.19$, $p = 0.08$).

Regarding secondary hypotheses, we found that pretreatment $ERSQ_{total}$ scores were not significantly associated with pretreatment $SESA_{total}$ scores ($r = 0.04$; $p = 0.33$) nor with the amount of alcohol consumed per day prior to treatment ($r = 0.006$; $p = 0.47$). Additional

analyses indicated that gender was not associated with either $ERSQ_{total}$ scores pre- or posttreatment, nor with changes in these scores during treatment, nor with alcohol use during and after treatment. In contrast, the number of comorbid psychiatric disorders was significantly associated with pre- and posttreatment $ERSQ_{total}$ scores ($r = -0.20$, $p > 0.05$; $r = -0.18$, $p > 0.05$), although not with changes in $ERSQ_{total}$ score during the treatment ($r = -0.03$, $p = 0.37$). Although psychiatric comorbidity was significantly associated with alcohol use during follow-up ($r = 0.17$, $p < 0.05$), only a trend emerged for the association between comorbidity and alcohol use during treatment ($r = 0.13$, $p = 0.09$).

Regarding group differences, findings presented in Table 4 show that $ERSQ_{total}$ scores in the AD sample were significantly lower than those in the non-clinical sample and significantly higher (better) than those in the MDD sample. The AD-vs.-non-clinical-controls difference shows a small-to-moderate effect and the AD-MDD comparison a large effect according to Cohen (1988). Additional analyses also presented in Table 4 indicated that $ERSQ_{total}$ scores increased significantly over the course of treatment, with pre-post changes indicating a small-to-moderate effect. After treatment, $ERSQ_{total}$ scores no longer differed significantly from those of the non-clinical control group. A small trend ($r = -0.14$) - which narrowly missed the level of statistical significance ($p = 0.069$) - was found for the association between an increase in ER skills and alcohol use during follow-up.

With regard to specific emotion-regulation skills, the effect sizes presented in Table 4 suggest that the largest differences between the pretreatment AD sample and the non-clinical controls can be found in the subscales *understanding*, *tolerance*, *modification*, and *clarity*. The greatest gains during CBT for AD occurred for *modification* and *awareness*. As shown in Table 2, a*cceptance*, *tolerance*, *readiness-to-confront*, and *modification* were the only subscales (assessed at pretreatment) significantly associated with alcohol use during treatment. The multivariate logistic binary analysis indicated that only *tolerance of negative emotions* ($B = -0.42$, $SE_B = 0.21$, *Wald* = 4.07, $df = 1$, $p < 0.05$, $e^B = 0.66$) had a unique contribution to the prediction of alcohol use ($\chi^2 = 4.23$, $df = 1$, $p < 0.05$, $R^2 = 0.05$). For the prediction of relapse after treatment termination, all subscales (assessed at posttreatment) except *sensations* were significantly associated with alcohol use during follow-up (Table 2). In these analyses, the subscales *tolerance*, *understanding*, *modification*, and *clarity* were most strongly associated with subsequent alcohol use. The multivariate analysis demonstrated that only *tolerance* ($B = -0.69$, $SE_B = 0.27$, *Wald* = 6.45, $df = 1$, $p < 0.01$, $e^B = 0.50$) made a unique contribution to the prediction of alcohol use after treatment ($\chi^2 = 7.09$, $df = 1$, $p < 0.01$; $R^2 = 0.08$).

Discussion

Building upon substantial evidence that negative affect is associated with alcohol use, the current study added to the literature by examining whether deficits in effective emotion-regulation skills contribute to the use of alcohol in individuals treated for alcohol dependence (AD). Consistent with the primary hypotheses, deficits in pretreatment emotion-regulation skills predicted alcohol use during CBT for AD, and deficits in posttreatment emotion-regulation skills predicted alcohol use during a 3-month follow-up period, even when controlling for the effects of other potential predictors (symptom severity, number of comorbid disorders, cognitive capacities, and negative affect).

Secondary analyses demonstrated that (a) pretreatment emotion-regulation skills were not significantly associated with indicators of pretreatment AD symptom severity; (b) individuals seeking treatment for AD displayed greater difficulties with adaptive regulation of negative emotions at pretreatment than did non-clinical controls, but less than did individuals seeking treatment for MDD; and (c) among a broad range of emotion-regulation

skills, the ability to tolerate negative emotions was the only skill of the ACE model that negatively predicted subsequent alcohol use when controlling for the other skills; this pattern was consistent for the prediction of alcohol use both during and after treatment.

These findings have important implications. The confirmation of the primary hypotheses is in line with research demonstrating the importance of negative affect in the maintenance of AD (e.g., Lowman, Allen, & Stout, 1996), but significantly extends such research by showing that emotion-regulation skills (i.e., specific abilities relevant for effectively *coping* with negative affective states) help maintain abstinence both during treatment and during the high-risk period within the first months following treatment. In addition, as deficits in emotion-regulation skills predict alcohol use even when negative affect is controlled, these skills appear to reduce alcohol use not just by reducing the negative affect that may precede use, but by helping maintain abstinence even in the *presence* of negative affect, likely by providing ways of dealing with negative emotions other than the use of alcohol. As such, the enhancement of general emotion-regulation skills may be an effective target in psychosocial treatments for AD. Although the need for specific treatments for co-occurring AD and borderline personality disorder (BPD) has been acknowledged in the literature (Gregory et al., 2008; Gregory, DeLucia-Deranja, & Mogle, 2010), findings from this study (which included only a small percentage of participants with co-occuring BPD) suggest that individuals with AD might benefit from enhanced emotion-regulation skills even if they do not display emotional dysregulation to the extent found in BPD. However, the association between the increase in emotion-regulation skills during treatment and alcohol use at follow-up was small and did not reach the level of statistical significance. It is possible that CBT did not explicitly target ER skills and, therefore, did not affect these skills as strongly as would have been necessary to predict subsequent use from skill enhancement. However, this post-hoc explanation is speculative and we recommend for future research to examine the mechanism of CBT, including the role of emotion regulation strategies.

Interestingly, participants' self-report of their emotion-regulation skills were not associated with pretreatment AD symptoms. This might be explained by the incomplete overlap of assessment periods addressed in the three measures (ERSQ: last week; SESA: last month; average daily consumption: last period of notable alcohol use). Alternatively, given evidence that ERSQ scores tend to be highly correlated across several weeks (Berking & Znoj, 2008; Berking, Orth, et al., 2008), this finding might indicate that once an individual has begun to engage in heavy alcohol use, the availability of adaptive emotion-regulation skills does not further affect symptom level. Instead, at this stage of the relapse process, factors such as conditioned responses to alcohol-related cues may be more closely related to symptom variation than are unregulated negative affective states (Jansma, Breteler, Schippers, De Jong, & Van Der Staak, 2000). Consequently, at this stage, severity may depend on factors other than effective emotion regulation (e.g., specific disengagement skills, social support and/or access to treatment facilities; Broome, Simpson, & Joe, 2002; Marlatt & Donovan, 2005). However, after a successfully completed detoxification and/or treatment for AD, the availability of effective emotion-regulation skills appears to be significantly relevant for the maintenance of abstinence.

The secondary finding of significant differences in emotion-regulation skills among the AD, non-clinical control, and MDD samples should be interpreted with care because of the differences in assessment periods. However, as we have found no effects for season or economy within or across the numerous studies we have conducted over the past decade, we propose that the finding that the AD sample reported less-successful pretreatment emotion regulation than did non-clinical controls can be seen as further support for the affect-based theories of AD. As such, this result adds to the findings of numerous other studies showing that deficits in emotion-regulation skills are associated with a variety of mental disorders

(Aldao et al., 2010; Berking, Wuppermann, et al., 2008; Cisler, Olatunji, Feldner, & Forsyth, 2010). However, the finding that the AD sample reported less deficits in emotion-regulation skills than did the MDD sample also suggests that the availability of specific emotion regulation-skills differs across disorders, and that such deficits might be more important for the development and maintenance of MDD (as an "emotional disorder") than for AD. Alternatively, at least to a certain extent, the MDD-AD differences might also be explained by assuming a disorder-specific bias in the perception, evaluation, and report of skills: Depressed individuals are more likely to underestimate their skills when compared with non-depressed individuals (e.g., Johnson, Petzel, Hartney, & Morgan, 1983), whereas AD has been associated with the phenomenon of overconfidence, such as the systematic over-evaluation of the ability to remain abstinent (e.g., Ferrari, Groh, Rulka, Jason, & Davis, 2008).

Because of the lack of an untreated control condition, the observed changes in ERSQ scores during treatment should also be interpreted with great caution. However, the data are consistent with research demonstrating that emotion-regulation skills increase during CBT and that the largest gains result in the abilities to be aware of emotions and to modify emotions (Berking, Ebert, Filipek, Cal, & Dippel, 2010; Berking, Wupperman, et al., 2008). Moreover, these findings are in line with conceptualizations of CBT as aiming to actively solve problems (such as unwanted emotions) by first raising awareness of the problem(s) and then teaching patients effective coping skills (e.g., cognitive restructuring or opposite action). Although CBT also has a tradition of fostering acceptance (e.g., Ellis, 1962), it has also been criticized for focusing too strongly on change (Ciarrochi & Bailey, 2008; Hayes, Strosahl & Wilson, 1999), which might be particularly problematic in the context of issues that may be difficult to change (such as negative emotions, Linehan, 1993a). In this study, CBT arguably demonstrated its largest effects on the subscales *modification* and *awareness*, although *tolerance* was identified as the most important predictor of relapse. These findings suggest that CBT-based treatments for AD could be improved by incorporating interventions that systematically target emotion-regulation skills with a particular emphasis on the ability to tolerate negative emotions. Such treatments include the Affect Regulation Training (ART; Berking, 2010), Emotion Focused Therapy (EFT; Greenberg, 2002), and/or the emotion regulation, mindfulness, and distress tolerance modules of Dialectical Behavioral Therapy (DBT; Linehan, 1993b). In line with this conclusion, CBT-based treatments that incorporate mindfulness interventions have shown promise for treating both alcohol-use and drug-use disorders (Bowen et al., 2009; Witkiewitz, Marlatt, & Walker, 2005; Hofmann, Sawyer, Witt, & Oh, 2010). These treatments are theorized to enhance the ability to tolerate negative affective states by facilitating a non-judgmental attitude toward aversive experiences, while also increasing habituation through formal and informal practices (Brown, Ryan, & Creswell, 2007; Witkiewitz et al., 2005).

Limitations of the current study include (1) lack of reliability checks for diagnoses, (2) exclusive use of self-reports, assessed at two-time points, for emotion-regulation skills, (3) exclusive use of self-reports for the majority of cases in the assessment of posttreatment alcohol use, which may in part be biased by last-minute completions of diaries, (4) use of control groups which were assessed at time points other than those of the AD sample and which could not be matched for education level, (5) the demographics of the AD (and consequently, the matched control) sample(s), which were predominantly male and 100% Caucasian, and (6) the dichotomous assessment of the main outcome criteria, which is likely to be associated with a loss of quantitative information. Moreover, due to the lack of an untreated AD control sample, empirical indicators of treatment adherence, and process data detailing ways emotion-regulation skills were targeted in treatment, we cannot specify whether changes during treatment were caused by the CBT-based treatment or what mechanisms might be responsible for these effects.

With regard to the lack of reliability checks for diagnoses, it is of note that diagnostics were conducted by experienced clinicians who had the opportunity to observe the patients for several months and correct potential errors if necessary (although no such corrections were deemed necessary in the present study). Additionally, all patients had been given the diagnoses of alcohol dependence prior to treatment by health professionals who were responsible for the referral to the clinic. The dichotomous outcome criteria was primarily necessitated by our utilization of objective biological markers of alcohol use, such as the breathalyzer and the EtG-test. The use of objective measures was particularly important during the inpatient treatment, when reporting alcohol consumption had the potential of leading to undesirable contingencies (such as disapproval from treatment staff), thus increasing the likelihood that patients might deny consumption that occurred. Although these objective tests provide reliable information on whether or not a participant has consumed (any amount of) alcohol, they cannot provide reliable information on the amount consumed (Wurst, Kempter, Seidl, & Alt, 1999). For the follow-up assessment, we relied on self-reports (and information provided by other treatment providers) because including biological measures likely would have led to a significant increase in the attrition rate and thus endangered validity. Self-reports of alcohol use have been shown to be strongly associated with objective markers and collateral reports (Whitford, Widner, Mellick, & Elkins, 2009). However, according to our clinical experience with self-reports, the *amount* of alcohol consumed is particularly affected by tendencies of underreporting. Thus, we focused on the question of whether or not the participant had consumed (as opposed to *how much* the participant has consumed) in order to reduce the impact of these tendencies. This approach also increased the validity of the assessment by allowing (a) the inclusion of dichotomous information on posttreatment alcohol use provided by other treatment facilities, and (b) the direct comparison of findings from during- and posttreatment analyses.

Given the strengths of the study (e.g., fairly large clinical sample, prospective design, predicting alcohol use both during and after treatment, use of objective indicators of alcohol use during treatment, addressing incremental predictive validity), the results provide considerable support for the importance of emotion-regulation skills in the prevention of relapse in individuals treated for alcohol-use disorders -- thus suggesting the need to target these skills in treatment. Future research should investigate the association of emotion-regulation skills and (subsequent) alcohol consumption utilizing reliability checks of diagnoses, adherence checks, process data on interventions (potentially) targeting emotion-regulation skills, more-thoroughly matched control samples, and an untreated AD control sample. Moreover, we recommend that future studies include several measurement points assessing multiple and independent indicators of emotion-regulation skills and alcohol use, thus allowing more-stringent tests of causal relationships (e.g. latent difference score models; e.g., Berking, Neacsiu, Comtois, & Linehan, 2009). Finally, future research should investigate the effects of experimental manipulations of ER skills on subsequent alcohol use in randomized controlled trials.

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References

Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: A meta-analytic review. Clinical Psychology Review. 2010; 30:217–237. [PubMed: 20015584]

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed., text revision. American Psychiatric Association; Washington, DC: 2000.

Armeli S, Tennen H, Todd M, Carney MA, Mohr C, Affleck G, Hromi A. A daily process examination of the stress-response dampening effects of alcohol consumption. Psychology of Addictive Behaviors. 2003; 17:266–276. [PubMed: 14640822]

Baker TB, Piper ME, McCarthy DE, Majeskie MR, Fiore MC. Addiction motivation reformulated: An affective processing model of negative reinforcement. Psychological Review. 2004; 111:33–51. [PubMed: 14756584]

Beck O, Stephanson N, Böttcher M, Dahmen N, Fehr C, Helander A. Biomarkers to disclose recent intake of alcohol: Potential of 5-hydroxytryptophol glucuronide testing using new direct UPLC-tandem MS and elisa methods. Alcohol and Alcoholism. 2007; 42:321–325. [PubMed: 17533162]

Berking, M. Training Emotionaler Kompetenzen. 2. Aufl. Springer; Heidelberg: 2010. [ART- The Affect Regulation Training; ART, 2nd ed.]

Berking M, Ebert D, Filipek M, Cal Y, Dippel A. Evaluation eines Emotionsregulationstrainings als zusätzliche Behandlungskomponente in KVT-basierter Depressionstherapie. Zeitschrift für Klinische Psychologie und Psychotherapie. 2010; 39:5. [Evaluating the efficacy of the affect regulation training as an adjunctive intervention in the CBT for major depressive disorder].

Berking M, Grosse Holtforth M, Jacobi C, Kröner-Herwig B. Empirically based guidelines for goal-finding procedures in psychotherapy. Psychotherapy Research. 2005; 15:316–325.

Berking M, Meier C, Wupperman P. Enhancing emotion-regulation skills in police officers - Results of a controlled study. Behavior Therapy. 2010; 41:329–339. [PubMed: 20569782]

Berking M, Neacsiu A, Comtois KA, Linehan MM. The impact of experiential avoidance on the reduction of depression in treatment for borderline personality disorder. Behaviour Research and Therapy. 2009; 47:663–670. [PubMed: 19477434]

Berking M, Orth U, Wupperman P, Meier L, Caspar F. Prospective effects of emotion regulation on emotional adjustment. Journal of Counseling Psychology. 2008; 55:485–494.

Berking M, Poppe C, Luhmann M, Wupperman P, Jaggi V, Seifritz E. Emotion-regulation skills and psychopathology: Is the ability to modify emotions the pathway by which all other skills affect mental health? Journal of Social and Clinical Psychology. 2010 Manuscript currently under review at.

Berking M, Wupperman P, Reichardt A, Pejic T, Dippel A, Znoj H. General emotion-regulation skills as a treatment target in psychotherapy. Behaviour Research and Therapy. 2008; 46:1230–1237. [PubMed: 18835479]

Berking M, Znoj H. Entwicklung und Validierung eines Fragebogens zur standardisierten Selbsteinschätzung emotionaler Kompetenzen (SEK-27). Zeitschrift für Psychiatrie, Psychologie und Psychotherapie. 2008; 56:141–152. [Development and validation of the Emotion-Regulation Skills Questionnaire (ERSQ-27)].

Birch CD, Stewart SH, Wall A, McKee SA, Eisnor SJ, Theakston JA. Mood-induced increases in alcohol expectancy strength in internally motivated drinkers. Psychology of Addictive Behaviors. 2004; 18:231–238. [PubMed: 15482078]

Blume AW, Schmaling KB, Marlatt GA. Memory, executive cognitive function, and readiness to change drinking behaviour. Addictive Behaviors. 2005; 30:301–314. [PubMed: 15621401]

Bowen S, Chawla N, Collins S, Witkiewitz K, Hsu S, Grow J, et al. Mindfulness-based relapse prevention for substance use disorders: A pilot efficacy trial. Substance Abuse. 2009; 30:295–305. [PubMed: 19904665]

Bradizza CM, Stasiewicz PR, Paas ND. Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: A review. Clinical Psychology Review. 2006; 26:162–178. [PubMed: 16406196]

Broome K, Simpson D, Joe G. The role of social support following short-term inpatient treatment. The American Journal on Addictions. 2002; 11:57–65. [PubMed: 11876584]

Brown RA, Evans DM, Miller IW, Burgess ES, Mueller TI. Cognitive-behavioral treatment for depression in alcoholism. Journal of Consulting and Clinical Psychology. 1997; 65:715–26. [PubMed: 9337490]

Brown K, Ryan R, Creswell J. Mindfulness: Theoretical foundations and evidence for its salutary effects. Psychological Inquiry. 2007; 18:211–237.

Caetano R, Nelson S, Cunradi C. Intimate partner violence, dependence symptoms and social consequences from drinking among White, Black and Hispanic couples in the United States. The American Journal on Addictions. 2001; 10:60–69. [PubMed: 11268822]

Ciarrochi, JV.; Bailey, A. A CBT-practitioner's guide to ACT: How to bridge the gap between cognitive behavioral therapy and acceptance & commitment therapy. New Harbinger Publications; Oakland, California: 2008.

Cisler J, Olatunji B, Feldner M, Forsyth J. Emotion regulation and the anxiety disorders: An integrative review. Journal of Psychopathology and Behavioral Assessment. 2010; 32:68–82. [PubMed: 20622981]

Cohen, J. Statistical power analysis for the behavioral sciences. 2 ed. Lawrence Erlbaum Associates; Hillsdale, NJ: 1988.

Colder C, Chassin L. The stress and negative affect model of adolescent alcohol use and the moderating effects of behavioral under control. Journal of Studies on Alcohol. 1993; 54:326–333. [PubMed: 8487542]

Conger JJ. Reinforcement theory and the dynamics of alcoholism. Quarterly Journal of Studies on Alcohol. 1956; 18:296–305. [PubMed: 13336262]

Cooney NL, Litt MD, Morse PA, Bauer LO, Gaupp L. Alcohol cue reactivity, negative-mood reactivity, and relapse in treated alcoholic men. Journal of Abnormal Psychology. 1997; 106:243–250. [PubMed: 9131844]

Cooper ML, Frone MR, Russell M, Mudar P. Drinking to regulate positive and negative emotions: A motivational model of alcohol use. Journal of Personality and Social Psychology. 1995; 69:990–1005. [PubMed: 7473043]

Cordovil de Sousa Uva M, de Timary P, Cortesi M, Mikolajczak M, du Roy de Blicquy P, Luminet O. Moderating effect of emotional intelligence on the role of negative affect in the motivation to drink in alcohol-dependent subjects undergoing protracted withdrawal. Personality and Individual Differences. 2010; 48:16–21.

Cox WM, Klinger E. A motivational model of alcohol use. Journal of Abnormal Psychology. 1988; 97:168–180. [PubMed: 3290306]

Dilling, H.; Mombour, W.; Schmidt, MH. Internationale Klassifikation psychischer Störungen: ICD-10 Kapitel V (F). Klinisch-Diagnostische Leitlinien, WHO. 5 ed. Huber; Bern: 2004.

Ellis, A. Reason and Emotion in Psychotherapy. Lyle Stuart; New York: 1962.

Falk D, Yi H, Hilton M. Age of onset and temporal sequencing of lifetime DSM-IV alcohol use disorders relative to comorbid mood and anxiety disorders. Drug and Alcohol Dependence. 2008; 94:234–245. [PubMed: 18215474]

Ferrari J, Groh D, Rulka G, Jason L, Davis M. Coming to terms with reality: Predictors of self-deception within substance abuse recovery. Addictive Disorders & Their Treatment. 2008; 7:210–218.

Fox HC, Hong KA, Sinha R. Difficulties in emotion regulation and impulse control in recently abstinent alcoholics compared with social drinkers. Addictive Behaviors. 2008; 33:388–394. [PubMed: 18023295]

Gamble SA, Conner KR, Talbot NL, Yu Q, Tu XM, Connors GJ. Effects of pretreatment and posttreatment depressive symptoms on alcohol consumption following treatment in project MATCH. Journal of Studies on Alcohol and Drugs. 2010; 71:71–77. [PubMed: 20105416]

Greenberg, LS. Emotion-focused therapy: Coaching clients to work through their feelings. American Psychological Association; Washington, DC, US: 2002.

Gregory RJ, Chlebowski S, Kang D, Remen AL, Soderberg MG, Stepkovitch J, Virk S. A controlled trial of psychodynamic psychotherapy for co-occurring borderline personality disorder and alcohol use disorder. Psychotherapy: Theory, Research, Practice, Training. 2008; 45:28–41.

Gregory RJ, DeLucia-Deranja E, Mogle JA. Dynamic deconstructive psychotherapy versus optimized community care for borderline personality disorder co-occurring with alcohol use disorders - a 30-month follow-up. The Journal of Nervous and Mental Disease. 2010; 198:292–298. [PubMed: 20386259]

Gross JJ. The emerging field of emotion regulation: An integrative review. Review of General Psychology. 1998; 2:271–299.

Harned MS, Chapman AL, Elizabeth DT, Murray A, Comtois KA, Linehan MM. Treating co-occurring Axis I disorders in recurrently suicidal women with borderline personality disorder: A 2-year randomized trial of dialectical behavior therapy versus community treatment by experts. Journal of Consulting and Clinical Psychology. 2008; 76:1068–1075. [PubMed: 19045974]

Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of *DSM-IV* alcohol abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. Archives of General Psychiatry. 2007; 64:830–842. [PubMed: 17606817]

Hayes, SC.; Strosahl, KD.; Wilson, KG. Acceptance and Commitment Therapy. Guilford; New York: 1999.

Heinz A, Ragan P, Jones DW, Hommer D, Williams W, Knable MB, et al. Reduced central serotonin transporters in alcoholism. American Journal of Psychiatry. 1998; 155:1544–1549. [PubMed: 9812115]

Helmstaedter, C.; Lendt, M.; Lux, S. Verbaler Lern- und Merkfähigkeitstest. Beltz; Weinheim: 2001. [VLMT - Verbal learning and memory test]

Hodgins DC, el-Guebaly N, Armstrong S. Prospective and retrospective reports of mood states before relapse to substance use. Journal of Consulting and Clinical Psychology. 1995; 63:400–407. [PubMed: 7608352]

Hofmann SG, Sawyer AT, Witt AA, Oh D. The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. Journal of Consulting and Clinical Psychology. 2010; 78:169–183. [PubMed: 20350028]

Jansma A, Breteler MHM, Schippers GM, De Jong COA, Van Der Staak CPF. No effect of negative mood on the alcohol cue reactivity of in-client alcoholics. Addictive Behaviors. 2000; 25:619–624. [PubMed: 10972455]

John U, Hapke U, Rumpf HJ. A new measure of the alcohol dependence syndrome: The severity scale of alcohol dependence. European Addiction Research. 2003; 9:87–93. [PubMed: 12644735]

Johnson J, Petzel T, Hartney L, Morgan R. Recall of importance ratings of completed and uncompleted tasks as a function of depression. Cognitive Therapy and Research. 1983; 7:51–56.

Khantzian EJ. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. Harvard Review of Psychiatry. 1997; 4:231–244. [PubMed: 9385000]

Koob GF, Le Moal M. Drug Addiction, Dysregulation of Reward, and Allostasis. Neuropsychopharmacology. 2001; 24:97–129. [PubMed: 11120394]

Krohne HW, Egloff B, Kohlmann CW, Tausch A. Untersuchungen mit einer deutschen Version der Positive and Negative Affect Schedule (PANAS). Diagnostica. 1996; 42:139–156. [Studies with a German version of the Positive and Negative Affect Schedule (PANAS)].

Kushner MG, Mackenzie TB, Fiszdon J, Valentiner DP, Foa E, Anderson N, Wangensteen D. The effects of alcohol consumption on laboratory-induced panic and state anxiety. Archives of General Psychiatry. 1996; 53:264–270. [PubMed: 8611064]

Langenbucher J, Sulesund D, Chung T, Morgenstern J. Illness severity and self-efficacy as course predictors of DSM-IV alcoholic dependence in a multisite clinical sample. Addictive Behaviors. 1996; 21(5):543–553. [PubMed: 8876757]

Larsen RJ. Toward a science of mood regulation. Psychological Inquiry. 2000; 11:129–141.

Lehrl, S. Mehrfachwahl-Wortschatz-Intelligenztest (MWT-B). Spitta Verlag; Ballingen: 1999. [Vocabulary-based Test of Intelligence]

Levenson RW, Sher KJ, Grossman LM, Newman J. Joseph, Newlin DB. Alcohol and stress response dampening: Pharmacological Effects, expectancy, and tension reduction. Journal of Abnormal Psychology. 1980; 89:528–538. [PubMed: 7400453]

Linehan, MM. Cognitive-behavioral treatment of borderline personality disorder. Guilford; New York: 1993a.

Linehan, MM. Skill Training Manual for Treating Borderline Personality Disorder. Guilford Press; New York: 1993b.

Linehan MM, Dimeff LA, Reynolds SK, Comtois KA, Welch SS, Heagerty P, et al. Dialectical behavior therapy versus comprehensive validation therapy plus 12-step for the treatment of opioid dependent women meeting criteria for borderline personality disorder. Drug and Alcohol Dependence. 2002; 67:13–26. [PubMed: 12062776]

Lowman C, Allen J, Stout R. Marlatt's taxonomy of high-risk situations for relapse: Replication and extension. Addiction. 1996; 91:51–71.

Marlatt, GA.; Donovan, DM. Relapse prevention: Maintenance strategies in the treatment of addictive behaviors. 2nd ed. Guilford Press; New York: 2005.

Marlatt, G.; Witkiewitz, K. Relapse prevention for alcohol and drug problems. In: Marlatt, G.; Donovan, D., editors. Relapse prevention: Maintenance strategies in the treatment of addictive behaviors. 2nd ed. Guilford Press; New York, NY US: 2005. p. 1-44.

Miller WR, Walters ST, Bennett ME. How effective is alcoholism treatment in the United States? Journal of Studies on Alcohol. 2001; 62:211–220. [PubMed: 11327187]

Moses EB, Barlow DH. A new unified treatment approach for emotional disorders based on emotion science. Current Directions in Psychological Science. 2006; 15:146–150.

Kratzmeier, H.; Horn, R. Raven-Matrizen-Test. Beltz; Weinheim: 1988. [Standard Progressive Matrices]

Riley H, Schutte NS. Low emotional intelligence as predictor of substance-use problems. Journal of Drug Education. 2003; 33:391–398. [PubMed: 15237864]

Saarni, C. The Development of Emotional Competence. Guilford Press; New York: 1999.

Sinha R, Fox HC, Hong KA, Bergquist K, Bhagwagar Z, Siedlarz KM. Enhanced negative emotion and alcohol craving, and altered physiological responses following stress and cue exposure in alcohol dependent individuals. Neuropsychopharmacology. 2009; 34:1198–1208. [PubMed: 18563062]

Sobell MB, Sobell LC, Klajner F, Pavan D, Basian E. The reliability of a timeline method for assessing normal drinker college students' recent drinking history: Utility for alcohol research. Addictive Behaviors. 1986; 11:149–161. [PubMed: 3739800]

Swendsen JD, Tennen H, Carney MA, Affleck G, Willard A, Hromi A. Mood and alcohol consumption: An experience sampling test of the self-medication hypothesis. Journal of Abnormal Psychology. 2000; 109:198–204. [PubMed: 10895557]

Tate SR, Brown SA, Unrod M, Ramo DE. Context of relapse for substance-dependent adults with and without comorbid psychiatric disorders. Addictive Behaviors. 2004; 29:1707–1724. [PubMed: 15530716]

Thompson RA. Emotion regulation: A theme in search of definition. Monographs of the Society for Research in Child Development. 1994; 59:25–52. [PubMed: 7984164]

Watt M, Stewart S, Birch C, Bernier D. Brief CBT for high anxiety sensitivity decreases drinking problems, relief alcohol outcome expectancies, and conformity drinking motives: Evidence from a randomized controlled trial. Journal of Mental Health. 2006; 15:683–695.

Whitford JL, Widner SC, Mellick D, Elkins RL. Self-report of drinking compared to objective markers of alcohol consumption. American Journal of Drug and Alcohol Abuse. 2009; 35:55–58. [PubMed: 19322728]

Willinger U, Lenzinger E, Hornik K, Fischer G, Schonbeck G, Aschauer HN, Meszaros K. Anxiety as a predictor of relapse in detoxified alcohol-dependent clients. Alcohol and Alcoholism. 2002; 37:609–612. [PubMed: 12414556]

Witkiewitz K, Marlatt G, Walker D. Mindfulness-Based Relapse Prevention for Alcohol and Substance Use Disorders. Journal of Cognitive Psychotherapy. 2005; 19:211–228.

Witkiewitz K, Villarroel NA. Dynamic association between negative affect and alcohol lapses following alcohol treatment. Journal of Consulting and Clinical Psychology. 2009; 77:633–644. [PubMed: 19634957]

Wittchen, HU.; Zaudig, M.; Fydrich, T. Strukturiertes klinisches Interview für DSM-IV. Hogrefe; Göttingen: 1997. [Structured Clinical Interview for DSM-IV.]

Wurst FM, Kempter C, Seidl S, Alt A. Ethyl glucuronide - a marker of alcohol consumption and a relapse marker with clinical and forensic implications. Alcohol & Alcoholism. 1999; 34:71–77. [PubMed: 10075405]

Zywiak WH, Connors GJ, Maisto SA, Westerberg VS. Relapse research and the Reasons for Drinking Questionnaire: A factor analysis of Marlatt's relapse taxonomy. Addiction. 1996; 91:121–130. [PubMed: 8822020]

Table 1

Alphas and Intercorrelations of ERSQ Scales for the AD-Sample (Pretreatment).

ERSQ-Scales	α	1	2	3	4	5	6	7	8	9	10
1. Awareness	0.83	--									
2. Sensations	0.61	.56	--								
3. Clarity	0.78	.45	.68	--							
4. Understanding	0.78	.52	.58	.73	--						
5. Acceptance	0.68	.57	.61	.66	.62	--					
6. Tolerance	0.84	.38	.48	.59	.55	.70	--				
7. Self-support	0.67	.33	.49	.56	.45	.48	.51	--			
8. R. to confront	0.66	.34	.51	.51	.42	.43	.55	.62	--		
9. Modification	0.76	.46	.62	.55	.61	.53	.58	.58	.53	--	
10. $ERSQ_{total}$	0.94	.67	.79	.83	.80	.81	.78	.73	.71	.80	--

Note. ERSQ = Emotion Regulation Skills Questionnaire; R. to confront = Readiness to confront distressing situations; all intercorrelations are significant with $p > 0.001$.

Table 2

Mean Values and Standard Deviations for ERSQ Scores in Abstinent and Non-Abstinent Participants in the AD-Sample.

ERSQ-Scale	During treatment					During follow-up interval				
	Abstinent (*N* = 75)		Non-abstinent (*N* = 38)			Abstinent (*N* = 58)		Non-abstinent (*N* = 58)		
	M	SD	M	SD	r_{pb}	M	SD	M	SD	r_{pb}
Awareness	2.52	0.88	2.27	1.00	−.13	2.86	0.63	2.59	0.97	−.17*
Sensations	2.68	0.78	2.47	0.70	−.13	2.78	0.67	2.63	0.73	−.11
Clarity	2.67	0.89	2.40	0.93	−.14	2.91	0.73	2.60	0.79	−.20*
Understanding	2.38	0.98	2.31	0.78	−.04	2.80	0.74	2.43	0.73	−.24**
Acceptance	2.69	0.84	2.42	0.71	−.16*	2.91	0.67	2.64	0.71	−.17*
Tolerance	2.64	0.99	2.24	0.95	−.19*	2.90	0.69	2.54	0.79	−.24**
Self-support	2.56	0.86	2.34	0.88	−.12	2.71	0.68	2.51	0.70	−.16*
R. to confront	2.77	0.81	2.44	0.85	−.19*	2.83	0.71	2.57	0.70	−.19*
Modification	2.19	0.98	1.82	0.80	−.19*	2.57	0.82	2.24	0.80	−.20*
$ERSQ_{total}$	2.57	0.70	2.30	0.61	−.19*	2.81	0.52	2.53	0.58	−.24**

Note. Sample sizes for during treatment analyses reflect two missing ERSQ scores in the abstinent and one missing ERSQ score in the alcohol-use group; ERSQ = Emotion Regulation Skills Questionnaire; r_{pb} = point-biserial correlation coefficient; R. to confront = Readiness to confront distressing situations;

* $p < .05$.

** $p < .01$.

Table 3

Summary of Logistic Regression Analysis for ERSQ Scores Predicting Alcohol Use in AD Patients, Controlling for Potential Confounds; with Alcohol Use During Treatment Predicted by Pretreatment $ERSQ_{total}$ Scores and Alcohol Use During the 3-Month Follow-Up Interval Being Predicted by Posttreatment $ERSQ_{total}$ Scores.

	During treatment				During follow-up interval			
Predictors	**B**	**SE**	**e^B**	**Wald**	**B**	**SE**	**e^B**	**Wald**
1. Symptom severity								
Pretreatment alcohol per day	0.00	0.00	1.00	0.26	0.00	0.00	1.00	1.91
$SESA_{total}$	−0.01	0.01	0.99	0.72	0.01	0.01	1.02	1.40
No. comorbid psych. disorders	0.13	0.22	1.14	0.38	0.19	0.20	1.21	0.94
2. Cognitive capacities								
SPM	−0.01	0.03	0.99	0.17	−0.02	0.02	0.98	0.64
VLMT	0.08	0.03	1.08	5.97**	−0.01	0.02	0.99	0.10
MWT	0.09	0.06	2.16	2.04		n.a.		
3. Negative affect								
PANAS-NA	0.56	0.32	1.74	2.96*	−0.01	0.23	0.99	0.00
4. Emotion-regulation skills								
$ERSQ_{total}$	−0.65	0.37	0.52	2.99*	−1.03	0.39	0.36	7.02**
Constant	−5.89	2.32	0.00	6.45**	2.55	1.68	12.83	2.30
χ^2 / df / R^2 / % correctly classified	19.82 / 8 / .22 / 69.9				14.01 / 7 / .15 / 57.8			
% abstinent	33.63				50			

Note. No. comorbid psych. disorders = number of comorbid psychiatric disorders; SPM = Standard Progressive Matrices; VLMT = Verbal Learn- and Memorytest [“Verbaler Lern- und Merkfähigkeitstest”]; MWT = Vocabulary test [“Mehrfach Wortschatz Test”]; n.a. = not applicable as the MWT was only assessed at pretreatment; PANAS-NA = Positive and Negative Affect Schedule - Negative Affect; ERSQ = Emotion-Regulation Skills Questionnaire; R^2 = Nagelkerkes R^2;

* $p < .05$;

** $p < .01$;

n = 1/1/4 pretreatment SESA/SPM/VLMT scores were replaced by AD pretreatment mean scores; *n* = 3/2/1 posttreatment SPM/VLMT/PANAS-NA scores were imputed from pretreatment scores using multiple regression analyses.

Table 4

Comparisons of Pretreatment ERSQ Scores in the AD Sample with those of Non-Clinical Controls, the MDD-Sample, and AD Posttreatment Scores.

ERSQ-Scales	AD_{pre}		NCC		MDD		AD_{pre}-NCC		AD_{pre}-MDD		AD_{post}		AD_{post}-AD_{pre}		AD_{post}-NCC	
	M	SD	M	SD	M	SD	t	d	t	d	M	SD	t	d	t	d
Awareness	2.44	0.93	2.37	0.93	2.01	0.90	0.60	0.08	3.58^{**}	0.47	2.73	0.83	3.77^{**}	0.33	3.10^{**}	0.41
Sensations	2.61	0.76	2.76	0.73	2.11	0.89	−1.55	−0.20	4.49^{**}	0.60	2.71	0.70	1.24	0.14	−0.56	−0.07
Clarity	2.58	0.91	2.94	0.67	1.96	0.99	-3.37^{**}	−0.45	4.88^{**}	0.65	2.76	0.77	2.04^{*}	0.21	-1.88^{*}	−0.25
Understanding	2.36	0.92	2.85	0.65	1.78	1.01	-4.63^{**}	−0.62	4.51^{**}	0.60	2.62	0.76	3.09^{**}	0.31	-2.45^{**}	−0.33
Acceptance	2.60	0.80	2.80	0.71	1.75	0.91	-1.96^{*}	−0.26	7.48^{**}	0.99	2.77	0.70	2.33^{*}	0.23	−0.25	−0.04
Tolerance	2.50	0.99	2.86	0.78	1.41	0.97	-2.98^{**}	−0.40	8.39^{**}	1.11	2.72	0.76	2.53^{**}	0.25	−1.35	−0.18
Self-support	2.49	0.87	2.52	0.81	1.71	0.95	−0.24	−0.04	6.39^{**}	0.86	2.61	0.69	1.49	0.15	0.94	0.12
R. to confront	2.66	0.83	2.89	0.74	1.77	0.95	-2.17^{*}	−0.29	7.49^{**}	1.00	2.70	0.71	0.45	0.05	-1.95^{*}	−0.26
Modification	2.06	0.94	2.36	0.84	1.31	0.93	-2.52^{**}	−0.34	6.04^{**}	0.80	2.40	0.82	3.73^{**}	0.39	0.38	0.05
$ERSQ_{total}$	2.48	0.68	2.70	0.55	1.76	0.78	-2.74^{**}	−0.36	7.40^{**}	0.98	2.67	0.57	3.26^{**}	0.30	−0.48	−0.05

Note. *AD* = Alcohol dependence sample; pre = pretreatment; NCC = non-clinical control sample; MDD = major depression sample; post = posttreatment; R. to confront = Readiness to confront distressing situations; ERSQ = Emotion Regulation Skills Questionnaire; α = Cronbach's alpha; *d* = Cohen's *d*. All *t*'s with 1 degree of freedom and *N* = 232.

$^{*}p < .05$.

$^{**}p < .01$.