Journal of Abnormal Psychology
2009, Vol. 118, No. 1, 55–64

0021-843X/09/$12.00 DOI: 10.1037/a0013642

Concreteness Training Reduces Dysphoria: Proof-of-Principle for Repeated Cognitive Bias Modification in Depression

Ed R. Watkins, Celine B. Baeyens, and Rebecca Read
University of Exeter

A tendency toward abstract and overgeneral processing is a cognitive bias hypothesized to causally contribute to symptoms of depression. This hypothesis predicts that training dysphoric individuals to become more concrete and specific in their thinking would reduce depressive symptoms. To test this prediction, 60 participants with dysphoria were randomly allocated either to (a) concreteness training; (b) bogus concreteness training, matched with concreteness training for treatment rationale, experimenter contact, and treatment duration but without active engagement in concrete thinking; (c) a waiting-list, no training control. Concreteness training resulted in significantly greater decreases in depressive symptoms and significantly greater increases in concrete thinking than the waiting-list and the bogus training control, and significantly greater decreases in rumination than the waiting-list control. These findings suggest that concreteness training has potential as a guided self-help intervention for mild-to-moderate depressive symptoms.

Keywords: cognitive bias modification, rumination, overgeneralization, depression, guided self-help

Cognitive models of psychopathology propose that biases in cognitive processing, such as in attention, memory, and interpretations, may underpin the onset and maintenance of emotional disorders. Consistent with such models, cognitive biases, such as selective attention to negative information and negative interpretation of ambiguity, have been repeatedly found in anxious and depressed patients, relative to controls (see reviews in Harvey, Watkins, Mansell, & Shafran, 2004; J. M. G. Williams, Watts, MacLeod, & Matthews, 1997). However, the association of these cognitive biases with anxiety and depression is not sufficient to demonstrate that the cognitive biases play a causal role in the development of negative affect: Cognitive biases must be manipulated in experimental studies in order to demonstrate causality and find that such manipulations directly influence negative affect. To this end, the *cognitive bias modification* (CBM) approach has emerged in which participants repeatedly practice on cognitive-experimental tasks that engender a way of processing emotionally relevant information that is either consistent or inconsistent with an identified cognitive bias (e.g., MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Mathews & Mackintosh, 2000; Mathews & MacLeod, 2002).

However, to date, CBM research has focused narrowly on the attention and interpretation biases, which are considered most relevant to anxiety disorders (see Mathews & MacLeod, 2005) and on the effect of these biases in influencing anxiety vulnerability, rather than explicitly addressing cognitive biases in depression. One cognitive bias strongly implicated in the onset and maintenance of depression is the tendency to process self-relevant information in an overgeneralized and abstract manner (Beck, 1976; Clark, Beck, & Alford, 1999). First, depression is characterized by an increased tendency toward overgeneralizations, in which a general rule or conclusion is drawn on the basis of isolated incidents and applied across the board to related and unrelated situations. For example, a single negative event, such as a failure, is interpreted as indicating a global, characterological inadequacy (Beck, 1976; Carver & Ganellen, 1983). Overgeneralization has been found to be specific to depression and not anxiety (Carver & Ganellen, 1983; Carver, Lavoie, Kuhl, & Ganellen, 1988; Ganellen, 1988), and to prospectively predict subsequent levels of depression (Carver, 1998; Dykman, 1996; Edelman, Ahrens, & Haaga, 1994). Second, depression is characterized by increased recall of overgeneral memories, characterized by categoric summaries of repeated events (e.g., "making mistakes" or "playing golf every week") even when asked to recall specific personal memories, relative to healthy controls and other psychiatric patients (except posttraumatic stress disorder; J. M. G. Williams et al., 2007). Furthermore, overgeneral memory retrieval predicts poorer long-term outcome for depression in prospective studies (see J. M. G. Williams et al., 2007, for a review).

Another cognitive process implicated in the onset and maintenance of depression (and other disorders, see Watkins, 2008) is depressive rumination, with longitudinal studies demonstrating that rumination prospectively predicts the likelihood, severity, and duration of syndromal depression (Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). Depressive rumination is characterized by an abstract, evaluative style of processing that involves recurrent thinking about the *causes*, *meanings*, *and implications* of depressive symptoms (Nolen-Hoeksema, 1991). Experimental studies have indicated that such rumination plays a causal role in main-

Ed R. Watkins, C. B. Baeyens, and R. Read, Mood Disorders Centre, School of Psychology, University of Exetfer, Exeter, United Kingdom.

This research was supported by a UK Medical Research Council Experimental Medicine Grant ID 77156 awarded to Ed R. Watkins.

Correspondence concerning this article should be addressed to Ed R. Watkins, Mood Disorders Centre, School of Psychology, University of Exeter, Washington Singer Laboratories, Perry Road, Exeter EX4 4QG, United Kingdom. E-mail: e.r.watkins@exeter.ac.uk

taining pathological overgeneral processing, whether overgeneral autobiographical memory (Watkins & Teasdale, 2001, 2004; Watkins, Teasdale, & Williams, 2000), global negative self-judgments (Rimes & Watkins, 2005), or overgeneral attempts at problem solving (Watkins & Moulds, 2005). Thus, depressive rumination is implicated in the development of overgeneralization. Moreover, there is evidence implicating abstract-overgeneral processing as an important dimension underpinning the negative effects of rumination (Watkins, 2008).

Therefore, there is convergent evidence that depression is characterized by bias toward overgeneralized processing, with this cognitive bias implicated in the onset and maintenance of depressive symptoms. Such processing parallels the conceptualization of abstract construals within the cognitive and social-cognitive literatures (e.g., Trope & Liberman, 2003; Vallacher & Wegner, 1987). In these theories, abstract construals are general, superordinate, and decontextualized mental representations that convey the essential gist and meaning of events and actions, such as inferences of global traits that are invariant across different situations (e.g., "laziness") or representations of "why" an action is performed and of its ends and consequences. In contrast, concrete construals are more low-level mental representations that include subordinate, contextual, and incidental details of events and actions, such as inferences of situation-specific states, such as "tiredness," or representations of the specific "how" details of an action and of the means to an end. Thus, depression involves a cognitive bias characterized by the abstract construal of self-relevant (particularly negative) actions and events. Cognitive theories suggest that this *abstract-overgeneral cognitive bias* should causally influence negative affect, such that increasing abstract overgeneralization should increase negative affect (Beck, 1976; Carver & Ganellen, 1983).

Consistent with this hypothesis, overgeneralization mediates the effect of failure on subsequent negative affect (Brown & Dutton, 1995; Kernis, Brockner, & Frankel, 1989; Wenzlaff & Grozier, 1988). Furthermore, voluntarily recalling an emotional event in specific detail produces less emotional response than recalling it at a more general level (Philippot, Baeyens, & Douilliez, 2006; Philippot, Schaefer, & Herbette, 2003), and practicing recall of specific autobiographical memories reduces the negative response to a later stressful task relative to recall of general autobiographical memories (Raes, Hermans, Williams, & Eelen, 2006).

Moreover, the CBM method has recently been used to investigate whether abstract processing causally influences emotional reactivity. In one study, after a failure experience, higher levels of trait rumination were associated with lower levels of positive affect, but only for participants who previously practiced abstract processing of emotional scenarios ("think about the causes, meanings, and implications of each situation") and not for participants who had practiced more concrete processing ("focus on how the event happened"; Moberly & Watkins, 2006). In three replications, participants who practiced focusing on imagined emotional scenarios in a more concrete way demonstrated smaller increases in negative affect following a subsequent failure compared with participants who practiced more abstract processing when focusing on the same emotional scenarios (Watkins, Moberly, & Moulds, 2008).

These studies provided initial evidence that the extent of abstract processing could be successfully modified (e.g., assessed via blind ratings of the concreteness of problem descriptions) and that this bias causally influences emotional reactivity. However, these studies only involved a mild failure induction and nonclinical participants, raising the questions of the generalizability of these findings to real-world settings, naturally occurring negative affect, and more depressed samples. If as hypothesized this cognitive bias does causally contribute to the maintenance of depression, then sustained changes in this bias would be expected to influence depressive symptoms; for example, an ongoing reduction in emotional reactivity may result in a reduction in depressive symptoms in response to potentially upsetting events in the real world. Recent work has suggested that repeated sessions of CBM training can be beneficial in reducing real-world anxiety (Mathews & MacLeod, 2002; Mathews, Ridgeway, Cook, & Yiend, 2007). A logical parallel is to examine whether repeated sessions of training more concrete processing (henceforward referred to as *concreteness training* [CNT]) can reduce naturally occurring depressive symptoms in individuals with elevated levels of depressive symptoms, relative to a no-training control. Such a finding would suggest that deliberately targeting the abstract-overgeneral bias can influence depressive symptoms and provide preliminary evidence consistent with the hypothesis that modifying this bias influences emotional vulnerability in real-life settings.

In order to extend the previous findings to a more vulnerable population, we used a sample of participants with dysphoria, operationalized as scoring at least 14 on the Beck Depression Inventory–II (BDI-II; i.e., above the cut-off for mild depression; Beck, Steer, & Brown, 1996). To examine repeated sessions of training, the experimental intervention involved daily practice for 7 days.

The CNT consisted of explicit instructions to actively engage in generating concrete construals (e.g., focusing on the specific details of an event, on what makes each event unique, and on the process of how it happened) when imagining emotional events, audio recorded for daily practice. These exercises were based on the experimental manipulation demonstrated to reduce negative affect in response to experimental stress (Watkins et al., 2008). To make the training more applicable to daily life and more personally relevant, CNT included repeated practice on self-selected personal autobiographical memories.

Paralleling the previous studies of repeated CBM (Mathews & MacLeod, 2002; Mathews et al., 2007), we included a no-training control (waiting-list [WL] control). However, as noted by Mathews et al. (2007), the use of only a no-training control leaves open the possibility that any reductions in cognitive bias and symptoms may be due to nonspecific factors, such as demand effects, positive expectations arising from the training rationale, or support and empathy from the researchers administering the training. Moreover, although a pilot study found that for participants with stable dysphoria, 7 days of repeated CNT added to relaxation training reduced depression significantly more than relaxation training alone, these conditions were not matched for treatment rationale or for duration of training (CNT + relaxation > relaxation only) (Watkins & Moberly, 2008). Thus, in the present study, to control for nonspecific factors, we also included a control condition that was matched identically with the CNT condition for treatment rationale (reducing overgeneralization and rumination), duration of training (30-min daily practice), face-to-face researcher contact, and that involved daily exercises that were plausible as a means of increasing concreteness but that did not involve participants actively engaging in concrete thinking (i.e., a bogus concreteness training [BGT] condition). The BGT condition consisted of repeated daily practice on a computerized interpretation training paradigm modified such that the final word fragments provided concrete disambiguations of emotional scenarios. Thus, although involving materials that had face validity for influencing concrete processing and sharing the same explanation as CNT concerning the value of becoming more concrete, BGT was not expected to alter the degree of concrete processing directly. We predicted that CNT would produce significantly greater decreases in abstract-overgeneral processing and depressive symptoms from pretraining to posttraining than WL control and than BGT. To our knowledge, this article represents the first reported attempt to examine whether repeated training in a concrete and specific way reduces depression in dysphoric individuals, relative to no training and bogus training, as a *proof-of-principle* test of the hypothesis that targeting the abstract-overgeneral bias influences depressive symptoms.

Method

Participants

Participants with dysphoria, operationalized in terms of individuals with scores > 14 on the BDI-II, were recruited. Ninety-seven participants were assessed at a face-to-face pretraining assessment after responding to e-mail, poster, and newspaper advertisements soliciting participants who experienced depressive symptoms. The majority (87%) were screened for dysphoria at initial contact prior to the face-to-face assessment. At the pretraining assessment, participants were excluded who (a) reported a recent change in treatment for depression (change in antidepressant medication within last 8 weeks, $n = 7$; starting CBT-based therapy in the last 4 weeks, $n = 2$) in order to reduce the likelihood of external treatments influencing the study's outcomes; (b) were no longer dysphoric ($n = 6$); (c) met diagnostic criteria for bipolar disorder or psychosis ($n = 5$) or presented as actively suicidal ($n = 1$) and who were referred back to their general practitioners for more appropriate care. Six participants did not proceed on to training (3 did not attend the training session; three technical problems with the first digital recordings precluded involvement). Ten participants did not attend the posttraining (Time 2) assessment despite repeated attempts to contact them (WL, $n = 1$; CNT, $n = 6$; BGT, $n = 3$), $\chi^2(2, N = 70) = 3.2$, $p = .20$. In total, 60 participants (21 men, 39 women; 33 community adults, 27 students) met the eligibility criteria and completed the training intervention week and final assessment, of whom 31 (52%) met *Diagnostic and Statistical Manual for Mental Disorders*, 4th edition (*DSM–IV*; American Psychiatric Association, 1994) criteria for a current major depressive episode (MDE), 45 (75%) met criteria for a past MDE, and 8 (13.3%) were currently prescribed antidepressant medication.

A series of analyses of variance (ANOVAs) revealed that the 10 nonattenders did not differ significantly from participants who completed the study in terms of age, BDI-II score, or Response Styles Questionnaire Ruminative Responses Scale (RSQ; Nolen-Hoeksema & Morrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) score (all *F*s < 1) but were significantly more depressed on the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960; J. B. W. Williams, 1998), $F(1, 69) = 7.69$, $p < .01$ (completers: $M = 12.44$, $SD = 6.16$; nonattenders: $M = 18.10$, $SD = 4.60$). Chi-square tests revealed no difference between nonattenders and completers for gender, status (student vs. community), or diagnosis of current or past MDE (all *p*s > .17).

Training Interventions

Both training conditions involved an initial 1.5- to 2-hr session with an experimenter to explain and practice the training method, followed by a 30-min practice daily for the next week. In both variants, participants were initially given an explicit rationale for the concreteness training, which explored how overgeneralization and rumination (e.g., "jumping to conclusions," "losing perspective") was unhelpful and how the training exercises were designed to reduce this unhelpful thinking and, thereby, reduce depression.

CNT. In the initial training session, participants first worked through a 10-min guided relaxation procedure in which they practiced tensing and relaxing various parts of their body while focusing on their breathing and bodily sensations, designed to focus attention down to direct sensory experience and to improve concentration for the later exercises. Next, for the remaining 60–80 min of the training session, participants practiced the key elements of concrete processing via direct instructions, guiding questions, and using mental imagery: (a) focusing on sensory details in the moment (e.g., questions asking participants to focus on and describe what they could see, hear, feel); (b) noticing what is specific and distinctive about the context of the event; (c) noticing the process of how events and behaviors unfold (e.g., "imagine a movie of how events unfolded"); (d) generating detailed step-by-step plans of how to proceed from here. Guided by the experimenter, each participant practiced all these elements of concrete processing for six standardized scenarios (three negative, e.g., not being invited to socialize after work by colleagues; three positive, e.g., making new friends at a party) and for three *personally relevant*, *self-generated*, *specific autobiographic memories* (defined as memories that took place at a particular place and time and lasted less than 1 day; one negative, one positive, and one memory of an occasion when the participant was highly immersed and absorbed in the process of an activity because such "flow" experiences are characterized by concrete processing focused on the specific details of the task; Csikszentmihalyi, 2002).

At the end of the training session, participants were given a digital recording of the exercises to practice at home (e.g., on compact disc), plus a diary to record their practice daily and a booklet explaining the training. The recording included two tracks, each lasting approximately 30 min and replicating the sequence and contents of the training session (in order): 5 min of relaxation, 25 min focusing on four imaginary scenarios (two positive, two negative, with different examples on each track), and recalling autobiographical memories (one positive, one negative, one absorbing), all using the same concreteness instructions. The recording prompted participants to think of different memories each time they practiced the exercise. Participants were asked to practice these exercises by listening to the recording at a convenient time each day for 1 week, alternating between tracks each day.

Thus, CNT included multiple elements all designed to encourage more concrete processing: sensory focus, mental imagery, recall of specific autobiographical memories, and explicit instructions to focus attention on experience, on distinctive details, on how events unfold, and on how to proceed (focus on "how" is a key element in theoretical conceptualizations of concrete processing; Trope & Liberman, 2003; Vallacher & Wegner, 1987). Importantly, unlike previous forms of CBM, this training was not designed to shift the valence of processing. Focus on negative material was balanced with focus on positive material to ensure that the training did not produce a positive cognitive bias or reduce a negative cognitive bias, but only increased concrete processing, unlike the use of mental imagery to enhance training of a positive interpretation bias (Holmes & Mathews, 2005; Holmes, Mathews, Dalgleish, & Mackintosh, 2006).

BGT. Following the provision of an identical rationale to CNT, participants practiced the computerized task with the guidance of the experimenter in the laboratory. The task consisted of the following: (a) Participants read 64 computer-presented short descriptions of social situations that remain ambiguous in overall meaning until the final word, presented as a fragment to be completed, which resolved the overall meaning for each scenario; (b) across all the scenarios, each word fragment was chosen to direct the participant to generate a concrete interpretation; (c) to progress to the next description, participants had to correctly type in the missing letter of the fragment and then respond to a comprehension question about the description, designed to further reinforce the required concrete interpretation. Of the descriptions, 32 were positive in valence, and 32 were negative in valence, to ensure that the training did not alter the valence of any cognitive bias.

For example, one negative description read as follows:

> You have been seeing each other for three weeks, and it seems that you have found a true soul mate. After dinner one evening, your partner explains that you can't be together anymore. At that moment, you stare at the table and contemplate your empty gl_ss (i.e., "glass," forcing a concrete construal of the situation, in contrast to an abstract construal, e.g., "life").

Like CNT, BGT also involved mental imagery of the scenarios: Before reading each computer-presented scenario, participants were instructed to imagine each scenario as vividly as possible. Similar positive and negative scenarios involving both achievement and social themes were used in CNT and BGT used. The same materials were used for each day of training.

Participants were shown how to access the computerized training by logging onto a Web site, which allowed them to practice the training daily for 1 week. As in CNT, participants were provided with a booklet, explaining the training, and a weekly diary. The computerized training took approximately 30 min to complete each day. The Web-based program automatically recorded the number of times each individual logged onto the Web-based training.

Materials

The Structured Clinical Interview for DSM–IV (SCID; Spitzer, Williams, Gibbon, & First, 1996). The SCID for mood disorders was administered at the pretraining assessment by trained research workers to assess current and past diagnoses of unipolar and bipolar depression.

The HRSD (Hamilton, 1960; J.B.W. Williams, 1998). The 17-item HRSD interview was administered at each assessment to provide an interviewer-rated measure of the severity of depression (nine items rated 0–4, eight items rated 0–2, 0 = *symptom absent*, range = 0–54).

The BDI-II (Beck et al., 1996). The BDI-II assesses levels of depressive symptomatology with 21 items (range = 0–63), each rated on a scale from 0 (*no symptoms*) to 3 (*severe symptoms*). The BDI-II was adapted for the present study so that participants were asked to indicate how they were feeling over the *last week*.

The RSQ Scale (Nolen-Hoeksema & Morrow, 1991; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The RSQ measures the extent to which individuals generally respond to feeling sad, down, or depressed by ruminating on self, symptoms, and on the causes and consequences of their mood, with 22 items (e.g.., "Why do I always react this way?"), each rated on a 4-point frequency scale ranging from 1 (*almost never*) to 4 (*almost always*), with higher scores indicating more rumination (range = 22–88).

Attitudes Toward Self Scale (ATS; Carver & Ganellen, 1983; Carver et al., 1988; Ganellen, 1988). The ATS measures three potential cognitive vulnerabilities for depression: High Standards (three items, e.g., "Compared to other people, I expect a lot from myself"; range = 3–15), Self-Criticism in response to failure (three items, e.g., "When I don't do as well as I hoped to, I often get upset with myself"; range = 3–15), and Overgeneralization (four items, e.g., "A single failure can change me from feeling OK to seeing only the bad in myself"; range = 4–20). Each item is scored on a 5-point scale ranging from 1 (*I agree a lot*) to 5 (*I disagree a lot*), with all items reversed scored except one, such that more agreement with items leads to higher vulnerability scores. It was predicted that relative to the other conditions, CNT would reduce overgeneralization. Because a single session of CNT reduced emotional vulnerability to a subsequent failure event (Moberly & Watkins, 2006), it was predicted that CNT would reduce self-reported criticism in response to failure. There was no expectation for any effect of training on the endorsement of high standards.

Concreteness of problem descriptions. This task provided an observer-rated process measure of concreteness, based on the Problem Elaboration Questionnaire (PEQ; Stöber & Borkovec, 2002). Participants were instructed to write down two major problems that they are currently repeatedly dwelling on and frequently thinking about and to then write down a brief description of the first major problem. This problem description was then scored by a rater blind to condition for level of concreteness according to Stöber and Borkovec's (2002) 1–5 Likert scale, where 1 = *abstract*, 2 = *somewhat abstract*, 3 = *neither–nor*, 4 = *somewhat concrete*, 5 = *concrete*. On this scale, concrete thought is defined as "distinct, situationally specific, unequivocal, clear, singular" and abstract thought as "indistinct, cross-situational, equivocal, unclear, aggregated" (Stöber & Borkovec, 2002, p. 92). For example, a problem description such as "I think I am heading nowhere in life and career and relationships" would be rated as 1 (*abstract*), whereas "I demanded the housekeeper do up my bootlace, my mother took exception and struck me" would be rated as 5 (*concrete*). This measure successfully discriminated levels of abstraction-concreteness between depressed patients and nondepressed controls (Watkins & Moulds, 2007) and was sensitive to experimental manipulations of ruminative thinking style (Watkins & Moulds, 2005). The rater demonstrated good interrater reliability with another blind rater ($r = .82$, $\kappa = 0.70$).

To explore whether the interventions influenced problem solving, participants were asked to write down how they would attempt to solve the first major problem, and these solutions were then rated against the Means Ends Problem Solving (MEPS) criteria (e.g., Marx, Williams, & Claridge, 1992; Platt & Spivack, 1972, 1975). A judge unaware of condition scored the written strategies for (a) number of relevant means, where each mean is defined as a discrete step that is effective in moving the person toward successful resolution of the problem or in overcoming a potential obstacle; and (b) their effectiveness, using a 7-point Likert-type scale ranging from 1 (*not at all effective*) to 7 (*extremely effective*) (Marx et al., 1992). There was good interrater reliability with a second rater, who was also unaware of condition (agreement across all responses, $r = .82$ for means, $r = .74$ for effectiveness).

The Credibility and Expectations Questionnaire (CEQ; Devilly & Borkovec, 2000). Participants in the CNT and BGT conditions completed the CEQ (referring to depression symptoms) at the end of the initial training session. Three items assessed the credibility of the treatment rationale (e.g., "At this point, how logical does the training offered to you seem?"), scored from 1 (*not at all*) to 9 (*very*). Three items rated expectancy that the training would be helpful (e.g., "At this point, how much do you really feel that the training will help you to reduce your depression symptoms?"), scored from 0% to 100%.

Procedure

Individuals who expressed an interest in a study of self-help treatment for depression were contacted (by e-mail, letter, or telephone) and asked to complete and return the BDI-II. An appointment was then made as soon as possible with participants scoring in the dysphoric range. At this assessment meeting, the participant provided informed consent and completed the HRSD, BDI-II, RSQ, ATS, PEQ, and SCID for mood disorders (Time 1: pretraining assessment). If participants met study criteria, then they were randomized into WL, CNT, or BGT conditions. For participants randomized to the training conditions, a training session was arranged as soon as possible, after which participants were encouraged to practice the exercises daily for the following week. As soon as possible after the training week, a postintervention assessment (Time 2) involving the HRSD, BDI-II, RSQ, ATS, and PEQ was completed. Participants in the WL condition were given no intervention following the assessment and completed their Time 2 assessment between 10 and 14 days after the assessment session, matching the interval between Time 1 and Time 2 assessments in the training conditions. Participants in the WL condition were offered the option of receiving CNT following this assessment if they so wished. For each participant, the initial assessment and training were provided by one researcher, whereas the posttraining assessment was administered by a second researcher, blind to condition. The study procedure was approved by the university ethics committee.

Results

Background Characteristics

We conducted a multivariate ANOVA, with condition (WL vs. CNT vs. BGT) as the between-group factor to examine whether demographic and baseline pretraining variables differed between conditions (see Table 1).[1] This revealed no significant difference between conditions, $F(7, 50) = 1.42$, $p = .16$. Chi-square tests of contingency revealed no difference between conditions for gender, status (student vs. community participant), or diagnosis of current or past MDE (all $ps > .24$).

Effect of training on depressive symptoms. Table 2 provides descriptive statistics for the BDI-II and HRSD before and after training (Time 1 and 2). To test our prediction that CNT would reduce depressive symptoms significantly more than WL, we conducted separate mixed-design 3 × 2 repeated measures ANOVAs, with condition (WL vs. CNT vs. BGT) as the between-groups factor, time (pretraining vs. posttraining) as the repeated measures factor, and depression as the dependent variable (separately for BDI-II and HRSD, respectively). As predicted, for the BDI-II, there was a significant main effect of Time, $F(1, 55) = 49.51$, $p < .001$, $\eta_p^2 = .47$, qualified by a significant interaction of Condition × Time, $F(2, 55) = 8.27$, $p < .001$, $\eta_p^2 = .24$. This interaction reflected a significant reduction in BDI-II from pretraining to posttraining in the CNT condition, $t(18) = 7.71$, $p < .001$ (95% confidence interval [CI]: 9.61, 16.81), and the BGT condition, $t(18) = 3.55$, $p < .005$ (95% CI: 2.96, 11.56), but no significant reduction in the WL condition, $t(19) = 1.31$, $p = .205$ (95% CI: −1.45, 6.35). Post hoc Scheffé tests on the reduction in BDI-II from pretraining to posttraining revealed that there was a significantly greater reduction in the CNT condition relative to the WL condition ($p = .001$; 95% CI: 4.10, 17.43) but not relative to the BGT condition ($p = .095$; 95% CI: −.80, 12.70), and no difference between the BGT and WL conditions ($p = .20$; 95% CI: −1.85, 11.48).

For the HRSD, there was a significant main effect of Time, $F(1, 57) = 16.42$, $p < .001$, $\eta_p^2 = .22$, qualified by a significant interaction of Condition × Time, $F(2, 57) = 5.90$, $p < .005$, $\eta_p^2 = .17$. This interaction reflected a significant reduction in HRSD from pretraining to posttraining in the CNT condition, $t(19) = 5.36$, $p < .001$ (95% CI: 4.05, 9.25), but no significant reduction in the BGT condition, $t(19) = 1.43$, $p = .17$ (95% CI: −.83, 4.43) or the WL condition, $t(19) = 0.49$, $p = .62$ (95% CI: −2.24, 3.64). Post hoc Scheffé tests on the reduction in HRSD from pretraining to posttraining revealed that there was a significantly greater reduction in the CNT condition relative to the WL condition ($p = .008$; 95% CI: 1.31, 10.58), and relative to the BGT condition ($p = .038$; 95% CI: .21, 9.48), and no difference between the BGT and WL conditions ($p = .84$; 95% CI: −3.53, 5.73).

We also calculated Cohen's d for the change in depressive symptoms between the CNT and WL conditions. This analysis indicated a large effect size (BDI-II, $d = 1.36$; HRSD, $d = 1.00$).

[1] Of the 60 participants, we were missing data for one set of pretraining questionnaires (BDI-II, RSQ, ATS, PEQ) and for one set of posttraining questionnaires (i.e., non return of questionnaires), such that $n = 58$ for analysis of questionnaires, but $n = 60$ for analysis of HRSD.

In a set of additional analyses, we examined whether current diagnosis (current MDE vs. no current MDE), history of depression (past MDE vs. no MDE), and antidepressant medication use (current use vs. no use) influenced the beneficial effects of CNT by adding each variable as a between-groups factor to separate repeated measures ANOVAs. All these analyses replicated the previous findings of a significant interaction of Condition × Time on depressive symptoms (e.g., for current diagnosis, BDI-II, $F[2, 52] = 6.66$, $p < .005$; HRSD, $F[2, 54] = 4.84$, $p < .05$), and we found no critically significant interaction of present or past diagnosis or antidepressant use with the effects of the different training conditions on symptoms over time (all Fs < 1.25, ps $> .27$).[2]

We also conducted an "intention-to-treat" analysis in which the nonattenders at the posttraining assessment were included in the analysis by replicating their pretraining scores as their posttraining scores (i.e., on the conservative assumption that their depressive symptoms did not change at all). Replicating the previous findings, for the BDI-II, there was a significant main effect of time, $F(1, 65) = 36.15$, $p < .001$, qualified by a significant interaction of Condition × Time, $F(2, 65) = 4.70$, $p < .05$, reflecting a significant reduction in depression symptoms from pretraining to posttraining in the CNT condition, $t(24) = 5.79$, $p < .001$ (95% CI: 6.46, 13.61), and the BGT condition, $t(20) = 3.40$, $p = .003$ (95% CI: 2.44, 10.10), but no significant reduction in the WL condition, $t(20) = 1.31$, $p = .204$ (95% CI: −1.38, 6.04). Likewise, for the HRSD, there was a significant main effect of time, $F(1, 67) = 12.98$, $p < .001$, qualified by a significant interaction of Condition × Time, $F(2, 67) = 4.17$, $p < .05$, reflecting a significant reduction in depression symptoms from pretraining to posttraining in the CNT condition, $t(25) = 4.64$, $p < .001$ (95% CI: 2.85, 7.38), but no significant reduction in the BGT condition, $t(22) = 1.43$, $p = .17$ (95% CI: −.71, 3.84), or WL condition, $t(20) = 0.50$, $p = .62$ (95% CI: −2.13, 3.46).

Effect of training on measures of the abstract-overgeneral cognitive bias. In order to test whether training successfully modified the abstract-overgeneral cognitive bias, we conducted a further series of mixed-design 3 (condition: WL vs. CNT vs. BGT) × 2 (time: pretraining vs. posttraining) repeated measures ANOVAs, with each cognitive measure as the dependent variable. We predicted that relative to the other conditions, CNT would increase the concreteness of problem descriptions but reduce rumination, overgeneralization, and self-criticism. Table 2 provides descriptive statistics for these measures before and after training.

As predicted, for the concreteness of problem descriptions, there was a significant main effect of time, $F(1, 56) = 9.89$, $p < .003$,

Table 1
Sample Characteristics and Means (and Standard Deviations) at the Initial Pretraining Assessment by Condition

Variable	Condition		
	WL (n = 20)	CNT (n = 20)[a]	BGT (n = 20)
Gender	13 women	15 women	11 women
Status	6 students	10 students	11 students
Current MDE	8	13	10
Past MDE	13	17	15
Age	39.05 (16.86)	34.65 (14.28)	31.15 (12.52)
BDI-II	26.45 (12.64)	25.50 (6.69)	25.85 (10.03)
HRSD	12.10 (7.23)	13.65 (5.19)	11.95 (5.97)
RSQ	53.75 (7.61)	53.47 (11.69)	58.29 (10.10)
ATS Overgeneralization	17.40 (2.33)	16.00 (3.40)	15.90 (3.32)
ATS High Standards	11.95 (2.95)	12.95 (2.20)	12.15 (2.37)
ATS Self-Criticism	12.80 (1.58)	13.58 (1.95)	12.85 (2.45)

Note. WL = waiting list no-training control; CNT = concreteness training; BGT = bogus concreteness training; MDE = major depressive episode; BDI-II = Beck Depression Inventory–II; HRSD = Hamilton Rating Scale for Depression; RSQ = Response Style Questionnaire Ruminative Responses Scale; ATS = Attitude towards Self Scale.
[a] Pre-training questionnaires are missing for 1 CNT participant.

Table 2
Means (and Standard Deviations) for Depressive Symptomatology and Measures of Cognitive Bias Before and After Training

Measure	Condition		
	WL (n = 20)	CNT (n = 20)[a]	BGT (n = 20)[a]
HRSD			
Pretraining	12.10 (7.23)	13.65 (5.19)	11.95 (5.97)
Posttraining	11.40 (4.81)	7.00 (4.41)	10.15 (6.11)
BDI-II			
Pretraining	26.45 (12.64)	24.89 (6.29)	25.85 (10.03)
Posttraining	24.00 (11.28)	11.68 (6.29)	18.53 (10.89)
RSQ total			
Pretraining	53.75 (7.61)	53.47 (11.69)	58.29 (10.10)
Posttraining	52.60 (9.46)	44.76 (9.57)	52.00 (10.03)
PEQ-concreteness			
Pretraining	2.35 (1.39)	2.11 (0.99)	2.50 (1.00)
Posttraining	2.45 (1.43)	3.21 (0.98)	2.65 (1.18)
Solution means			
Pretraining	1.35 (0.87)	1.89 (1.05)	1.50 (0.83)
Posttraining	1.35 (1.04)	1.68 (0.95)	1.65 (0.93)
Solution effectiveness			
Pretraining	2.15 (0.93)	2.79 (1.13)	2.50 (0.95)
Posttraining	2.50 (0.95)	2.89 (0.87)	2.65 (0.74)
ATS Overgeneralization			
Pretraining	17.40 (2.33)	16.00 (3.40)	15.90 (3.32)
Posttraining	17.20 (2.38)	13.95 (4.13)	14.95 (3.98)
ATS High Standards			
Pretraining	11.95 (2.95)	12.95 (2.20)	12.15 (2.37)
Posttraining	11.75 (3.31)	12.63 (2.17)	12.21 (2.44)
ATS Self-Criticism			
Pretraining	12.80 (1.58)	13.58 (1.95)	12.85 (2.45)
Posttraining	13.35 (1.35)	12.21 (1.78)	12.68 (1.73)

Note. WL = waiting list no training control; CNT = concreteness training; BGT = bogus concreteness training; HRSD = Hamilton Rating Scale for Depression; BDI-II = Beck Depression Inventory–II; RSQ = Response Style Questionnaire Ruminative Responses Scale; PEQ-concreteness = Problem Elaboration Questionnaire nonself-report measure of concreteness of problem descriptions; ATS = Attitude towards Self Scale.
[a] Questionnaire scores missing for 1 participant each in CNT (n = 19) and BGT (n = 19).

[2] To further test the clinical significance of these findings, we repeated analyses for only those participants with at least moderate levels of depression (BDI-II > 19). For the BDI-II, the previous findings were replicated: a significant main effect of time, $F(1, 38) = 63.71$, $p < .001$, $\eta_p^2 = .63$, qualified by a significant interaction of Condition × Time, $F(2, 38) = 3.57$, $p < .05$, $\eta_p^2 = .16$. For the HRSD, there was a main effect of time, $F(1, 40) = 24.78$, $p < .001$, $\eta_p^2 = .63$, and although there was not a significant interaction of Condition × Time, $F(2, 40) = 2.15$, $p = .13$, $\eta_p^2 = .10$, the pattern of findings and effect size were similar to that observed for the full sample.

η_p^2 = .15, qualified by a significant interaction of Condition × Time, $F(2, 56) = 5.10$, $p < .01$, $\eta_p^2 = .15$. This interaction reflected a significant increase in the concreteness of the problem description from pretraining to posttraining in the CNT condition, $t(18) = 4.85$, $p < .001$ (95% CI: .63, 1.58), but no significant increase in either the BGT condition, $t(19) = 0.57$, $p = .58$ (95% CI: −.70, .40), or the WL condition, $t(19) = 0.40$, $p = .69$ (95% CI: −.62, .42). Post hoc Scheffé tests on the change in concreteness from pretraining to posttraining revealed that there was a significantly greater increase in concreteness in the CNT condition relative to the WL condition ($p = .023$; 95% CI: .12, 1.89) and relative to the BGT condition ($p = .032$; 95% CI: .07, 1.84), but no difference between the WL and BGT conditions ($p = .99$; 95% CI: −.93, .83).

For self-report of rumination, there was a significant main effect of time, $F(1, 55) = 24.51$, $p < .001$, $\eta_p^2 = .31$, qualified by a significant interaction of Condition × Time, $F(2, 55) = 4.34$, $p < .05$, $\eta_p^2 = .14$. This interaction reflected a significant reduction in rumination from pretraining to posttraining in the CNT condition, $t(18) = 4.94$, $p < .001$ (95% CI: 5.02, 12.46) and in the BGT condition, $t(18) = 2.85$, $p = .011$ (95% CI: 1.59, 10.51), but not in the WL condition, $t(19) = 0.69$, $p = .50$ (95% CI: −2.34, 4.64). Post hoc Scheffé tests on the change in rumination from pretraining to posttraining reveal that there was a significantly greater reduction in rumination in the CNT condition relative to the WL condition ($p = .02$; 95% CI: 1.00, 14.17) but not relative to the BGT condition ($p = .60$; 95% CI: −3.98, 9.35), with no difference between the BGT and WL conditions ($p = .18$; 95% CI: −1.68, 11.49).[3]

For ATS Overgeneralization, there was a significant main effect of time, $F(1, 55) = 7.91$, $p < .01$, $\eta_p^2 = .13$, but no significant interaction of Condition × Time, $F(2, 55) = 2.20$, $p = .12$, $\eta_p^2 = .07$. Nonetheless, as predicted, post hoc t tests revealed a significant reduction in ATS Overgeneralization from pretraining to posttraining in the CNT condition, $t(18) = 2.76$, $p = .013$ (95% CI: .49, 3.61), but not in the BGT condition, $t(18) = 1.29$, $p = .21$ (95% CI: −.52, 2.21) or the WL condition, $t(19) = 0.40$, $p = .69$ (95% CI: −.85, 1.25).

For ATS Self-Criticism, there was not a significant main effect of time, $F(1, 55) = 2.82$, $p = .099$, $\eta_p^2 = .049$, but there was a significant interaction of Condition × Time, $F(2, 55) = 8.38$, $p < .001$, $\eta_p^2 = .23$. This interaction reflected a significant reduction in self-criticism from pretraining to posttraining in the CNT condition, $t(18) = 4.44$, $p < .001$ (95% CI: .72, 2.01), no significant change in the BGT condition, $t(18) = 0.37$, $p = .72$ (95% CI: −.74, 1.06), but a significant increase in self-criticism in the WL condition, $t(19) = -2.15$, $p < .05$ (95% CI: −1.08, −0.14). For ATS High Standards, there was no main effect of time, $F(1, 55) = 0.20$, $p = .65$, $\eta_p^2 = .004$, and no significant interaction of Condition × Time, $F(2, 55) = 0.49$, $p = .61$, $\eta_p^2 = .018$.[4,5]

Extent of Practice, Credibility, Expectancy

We calculated a series of ANOVAs, with condition (CNT vs. BGT) as the independent variable and with credibility, expectations, and number of days of practice as separate dependent variables to explore whether CNT and BGT were seen as equally likely to be helpful and utilized to the same degree by participants. There was no difference between the number of days of practice (reported in the daily diary for CNT; automatically recorded when participant logged on to the Web site for BGT), $F(1, 38) = 2.45$, $p = .13$, $\eta_p^2 = .06$ (CNT: $M = 6.25$, $SD = 1.45$; BGT: $M = 5.20$, $SD = 2.63$). There was a trend toward CNT being rated as more credible, $F(1, 38) = 3.78$, $p = .059$, $\eta_p^2 = .09$ (CNT: $M = 6.87$, $SD = 1.15$; BGT: $M = 5.93$, $SD = 1.81$), and having more positive expectations than BGT, $F(1, 38) = 3.91$, $p = .055$, $\eta_p^2 = .09$ (CNT: $M = 63.56$, $SD = 21.30$; BGT: $M = 49.11$, $SD = 24.79$). This is not surprising given the greater face validity of CNT because it involves practice on personally relevant scenarios in daily life compared with practice on a circumscribed computer task.

Nonetheless, to examine whether the differential effects of the training conditions might be due to different rationale credibility and expectancy in the training, we compared participants in each condition after matching for levels of credibility and expectancy. Examination of the data revealed two outliers within the BGT condition who endorsed much lower credibility to the training than other participants (credibility < 2.5). When we excluded these outliers, the training conditions were not statistically different for credibility, $F(1, 36) = 1.65$, $p = .21$, $\eta_p^2 = .04$ (CNT: $M = 6.87$, $SD = 1.15$; BGT: $M = 6.33$, $SD = 1.41$), or expectancy, $F(1, 36) = 2.17$, $p = .15$, $\eta_p^2 = .06$ (CNT: $M = 63.56$, $SD = 21.30$; BGT: $M = 52.98$, $SD = 22.95$). Critically, when our principal analyses were repeated for this matched sample, our findings were identical: Repeated measures ANOVAs replicated the previous findings of significant Condition × Time interactions for BDI-II, $F(2, 54) = 8.15$, $p < .001$, $\eta_p^2 = .23$; for HRSD, $F(2, 55) = 5.94$, $p < .001$, $\eta_p^2 = .18$; for rumination, $F(2, 54) = 4.25$, $p < .05$, $\eta_p^2 = .16$; for concreteness of problem descriptions, $F(2, 54) = 5.13$, $p < .01$, $\eta_p^2 = .16$; and for ATS Self-Criticism, $F(2, 54) = 8.21$, $p < .001$, $\eta_p^2 = .23$. These results suggest that the differential effects of the conditions were not due to credibility or expectancy.

Discussion

In the present study, we aimed to test whether the beneficial effects of a single session of CNT in reducing emotional reactivity (Moberly & Watkins, 2006; Watkins et al., 2008) could be ex-

[3] The same pattern of results was found for the depression-related rumination and brooding subtypes of rumination as for the total rumination score. There was a significant Condition × Time interaction for both depression-related rumination and brooding, reflecting decreases in both subtypes of rumination in CNT and BGT but not in the WL condition. However, there was not a significant Condition × Time interaction for reflection, $F(2, 55) = 1.21$, $p = .30$.

[4] There was no main effect of time or interaction of Condition × Time for either number of means or ratings of effectiveness of solutions (all Fs < 1, $p > .63$), except effect of time for effectiveness rating, $F(1, 56) = 2.45$, $p = .12$, indicating no differential effect of the conditions on problem solving.

[5] Increase in concreteness of problem descriptions from pretraining to posttraining showed a trend toward being significantly correlated with reduction in depression from pretraining to posttraining ($n = 59$; BDI-II, $r = -.25$, $p = .058$; HRSD, $r = -.23$, $p = .08$). Decrease in self-criticism was correlated with reduction in depression ($n = 58$; BDI-II, $r = 40$, $p = .002$; HRSD, $r = 31$, $p = .016$). Decrease in rumination was correlated with reduction in depression ($n = 58$; BDI-II, $r = 43$, $p = .001$; HRSD, $r = .47$, $p = .001$).

tended to real-world improvements in depressive symptoms if repeated over multiple occasions in dysphoric participants. The rationale for the study was that abstract and overgeneral processing was hypothesized to be a cognitive bias involved in maintaining depression, therefore targeting this bias was predicted to reduce depressive symptoms. Moreover, recent work has suggested the benefit of repeated sessions of CBM in reducing anxiety (Mathews & MacLeod, 2002; Mathews et al., 2007). We examined whether repeated sessions of CBM could similarly reduce symptoms of depression, as an initial *proof-of-principle* that CNT can be beneficial. To this end, participants with dysphoria were randomly allocated to WL, CNT, or BGT conditions.

As predicted, CNT reduced depressive symptoms significantly more than WL control on both self-reported (BDI-II) and interviewer-rated (HRSD) measures of depressive symptoms. Importantly, there was no significant change in depressive symptoms in the WL control, reducing the likelihood that any improvement in symptoms across the training phase was due to spontaneous remission or regression to the mean. Also as predicted, relative to WL, CNT significantly increased concreteness of problem descriptions and significantly reduced rumination and self-criticism. These findings provide initial evidence that repeated CNT can have beneficial effects on naturally occurring symptoms in a subclinical sample.

BGT was included to provide a control for nonspecific treatment factors shared with CNT and, thereby, to determine whether CNT had active ingredients above and beyond nonspecific treatment factors such as therapeutic rationale, credibility, positive expectancy, face-to-face contact, and duration of practice. CNT reduced depressive symptoms significantly more than BGT on the interviewer-rated HRSD but only showed a trend toward a significantly greater reduction in symptoms on the self-reported BDI-II. Both CNT and BGT significantly reduced depressive symptoms on the BDI-II, but only CNT significantly reduced depressive symptoms on the HRSD. Similarly, CNT increased the observer ratings of the concreteness of problem descriptions significantly more than BGT but did not produce significantly greater change than BGT on self-reported rumination and ATS Overgeneralization (although CNT reduced self-reported ATS Self-Criticism significantly more than BGT). Nonetheless for the change in depressive symptoms from pretraining to posttraining, CNT significantly differed from WL control, whereas BGT did not, indicating that CNT had a stronger treatment effect than BGT. Thus, the results partially confirmed our hypothesis that CNT would reduce depression more than BGT. This study therefore provides initial evidence that CBM focused on targeting the abstract-overgeneral bias was successful at reducing depression relative to both control conditions.

Moreover, although CNT and BGT were deliberately matched for nonspecific treatment factors, CNT involved repeated exercises to enhance concreteness by the active generation of concrete memories, images, and descriptions, which were not present in BGT. Consistent with CNT actively engaging participants in exercises to shift concreteness, CNT increased the observer ratings of the concreteness of problem descriptions significantly more than BGT. Moreover, the significantly greater treatment effect of CNT compared with BGT on the observer-rated HRSD suggests that CNT had active therapeutic mechanisms in addition to any nonspecific factors shared with BGT. It is therefore a plausible hypothesis that increased concreteness is this additional active therapeutic mechanism. Moreover, given the shared nonspecific elements between BGT and CNT, we speculate that the beneficial effects of BGT are due to nonspecific treatment effects such as positive expectancy and support from the researchers administering the training. Consistent with this possibility, BGT resulted in significant improvements on self-report measures only (BDI, RSQ), which are more likely to be influenced by an expectation of improvement, by a convincing therapeutic rationale, and by associated demand effects, than observer measures (HRSD, concreteness of descriptions) that are less susceptible to such effects.

Nonetheless, before we can definitively confirm that CNT worked by reducing the abstract-overgeneral bias, we need to establish that training did in fact reduce the abstract-overgeneral bias and that this change mediated the treatment effect.[6] Although the observed changes from pretraining to posttraining are suggestive of this mechanism, they are not conclusive. Consistent with the hypothesis that CNT reduced the abstract-overgeneral bias, CNT significantly increased the concreteness-of-problem descriptions relative to both WL and BGT. This increase in concreteness pre- to posttraining showed a trend toward being significantly correlated with reduction in depression pre- to posttraining, indicating that it may be a potential mediator (see Footnote 5). Similarly, there was a significant reduction in ATS Overgeneralization from pretraining to posttraining in the CNT condition only, although there was no overall Condition $\times$ Time interaction for overgeneralization.

However, the results also suggest that change in self-criticism may be a potential mechanism underlying clinical improvement: CNT reduced self-criticism significantly more than WL and BGT, and reduction in self-criticism was correlated with reduction in depression (see Footnote 5). Although consistent with previous studies in which CNT was shown to reduce emotional reactivity (Moberly & Watkins, 2006), it is not clear to what extent change in self-criticism reflects change in the abstract-overgeneral bias. Moreover, we only assessed measures of cognitive bias before and after training in the present study, whereas a more definitive test of the hypothesized mechanism would examine measures on a day-to-day basis as the training progressed, for example, by seeing whether participants actually interpreted the intervention scenarios more concretely each day. Likewise, replication of these findings on other measures, such as the number of overgeneral memories retrieved on the autobiographical memory test, is necessary to provide conclusive evidence for the hypothesis that CNT works by reducing the abstract-overgeneral bias.

Finally, we included multiple elements in CNT, each targeting concrete processing in complementary ways in order to increase our likelihood of shifting the cognitive bias. However, one limitation of this multidimensional nature of the training is that we do not know for sure which element(s) was critical to its beneficial effects. For example, either relaxation or improved problem solving (resulting from imagining detailed step-by-step plans) are elements that could potentially account for symptom reduction. However, arguing against relaxation as a key active component, this component was brief (only 5 min on the audio recording), and CNT plus relaxation was found in a pilot study to reduce depres-

[6] This study is underpowered in terms of conducting a meaningful mediational analysis, and, therefore, this was not calculated.

sion significantly more than relaxation alone (Watkins & Moberly, 2008). Similarly, the failure to find any effect of condition on the solutions generated to personal problems is inconsistent with problem solving being an active element of CNT (see Footnote 4). Nonetheless, further research could usefully disentangle which elements are critical to symptom reduction, via a dismantling study comparing separate components of CNT.

CNT passes the first tests necessary to establish that an experimental paradigm may be translatable into a useful clinical intervention because it influenced naturally occurring depressive symptoms in an at-risk population (mild-to-moderate levels of depression) and had greater efficacy than WL control or BGT. Furthermore, pretraining symptoms were characteristic of those found in depressed patients in primary care, with 50% experiencing a current MDE and 75% having previously had major depression. Moreover, analyses indicated that the effects of CNT on symptom reduction was not a function of current major depression, past history of depression, or antidepressant use and were still found on a conservative intention-to-treat analysis, suggesting the clinical relevance of these findings. The effect size for CNT versus WL was of an order of magnitude comparable to that found in a meta-analysis of randomized controlled trials of self-help treatments for depression versus WL controls ($d = 0.82$; Gellatly et al., 2007) and a meta-analysis of randomized controlled trials of CBT for depression versus WL/placebo controls ($d = 0.82$; Gloaguen, Cottraux, Cucherat, & Blackburn, 1998). These findings suggest that CNT has potential as a treatment.

However, we note several reasons to be cautious about CNT as a treatment. First, we only examined the effects of the training over 1 week, so there is no data on whether the benefits of training are maintained in the medium- or long term. Second, we did not assess whether the intervention changed diagnostic status. Third, the sample consisted of a dysphoric sample rather than a sample exclusively of patients with a diagnosis of major depression. Fourth, it is important to examine the rates of dropout from the treatment in clinical samples to determine acceptability to patients. In order to determine the potential for CNT as a treatment intervention, future research will need to further examine (a) the durability and stability of its antidepressant effect over weeks and months and (b) its generalizability to patients with diagnoses of major depression. Nonetheless, this study was designed as an experimental test of "proof-of-principle" to see whether repeated CNT could influence depression rather than as a fully workable treatment. We speculate that treatment benefits may be enhanced by including more support and encouragement, perhaps via follow-up telephone contact, plus a longer treatment period. If these benefits are replicated, then CNT could be delivered as a guided self-help intervention within a stepped care approach, with the patient undertaking the training exercises with minimal guidance from a health professional. This treatment format has the advantages of being accessible, easy to disseminate, relatively inexpensive, and deliverable to high volumes of patients, and, as such, may provide an innovative means to reach the many patients with depression who do not have access to psychological help (Hollon et al., 2002).

Despite the several limitations noted above, the study has a number of strengths, including the use of a subclinical group with moderate levels of depressive symptoms, the use of both no-training waiting-list and bogus-training control conditions, blind assessment of outcome, and the use of both self-report and interviewer-rated measures of depression and of cognitive bias. Moreover, there was a matched rationale and duration of treatment between the training condition and the bogus training condition and measures of the credibility and expectancy of the training. Furthermore, to our knowledge, these findings are the first demonstration that repeated sessions of CBM designed to target the abstract-overgeneral bias characteristic of depression can reduce symptoms of depression. In conclusion, we have demonstrated that it is possible to reduce depressive symptoms in dysphoric individuals by repeated practice in adopting a more concrete way of processing self-related information, relative to no-training control and BGT conditions. Future research will need to more definitively establish the mechanism of change underpinning this treatment effect.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Beck, A. T. (1976). *Cognitive therapy and emotional disorders.* New York: Meridian.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *The Beck Depression Inventory- Second Edition.* San Antonio, TX: The Psychological Corporation.

Brown, J. D., & Dutton, K. A. (1995). The thrill of victory, the complexity of defeat: Self-esteem and people's emotional reactions to success and failure. *Journal of Personality and Social Psychology, 68,* 712–722.

Carver, C. S. (1998). Generalization, adverse events, and development of depressive symptoms. *Journal of Personality, 66,* 607–619.

Carver, C. S., & Ganellen, R. J. (1983). Depression and components of self-punitiveness: High standards, self-criticism, and overgeneralization. *Journal of Abnormal Psychology, 92,* 330–337.

Carver, C. S., Lavoie, L., Kuhl, J., & Ganellen, R. J. (1988). Cognitive concomitants of depression: A further examination of the roles of generalization, high standards, and self-criticism. *Journal of Social and Clinical Psychology, 7,* 350–365.

Clark, D. A., Beck, A. T., & Alford, B. A. (1999). *Scientific foundations of cognitive theory and therapy of depression.* New York: Wiley.

Csikszentmihalyi, M. (2002). *Flow.* London: Rider.

Devilly, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/expectancy questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry, 31,* 73–86.

Dykman, B. M. (1996). Negative self-evaluations among dysphoric college students: A difference in degree or kind? *Cognitive Therapy and Research, 20,* 445–464.

Edelman, R. E., Ahrens, A. H., & Haaga, D. A. F. (1994). Inferences about the self, attributions, and overgeneralization as predictors of recovery from dysphoria. *Cognitive Therapy and Research, 18,* 551–566.

Ganellen, R. J. (1988). Specificity of attributions and overgeneralization in depression and anxiety. *Journal of Abnormal Psychology, 97,* 83–86.

Gellatly, J., Bower, P., Hennessy, S., Richards, D., Gilbody, S., & Lovell, K. (2007). What makes self-help interventions effective in the management of depressive symptoms? Meta-analysis and meta-regresssion. *Psychological Medicine, 37,* 1217–1228.

Gloaguen, V., Cottrauz, J., Cucherat, M., & Blackburn, I.-M. (1998). A meta-analysis of the effects of cognitive therapy in depressed patients. *Journal of Affective Disorders, 49,* 59–72.

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology Neurosurgery and Psychiatry, 12,* 52–62.

Harvey, A. G., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioural processes across psychological disorders.* Oxford, England: Oxford University Press.

Hollon, S. D., Muñoz, R. F., Barlow, D. H., Beardslee, W. R., Bell, C. C., Bernal, G., et al. (2002). Psychosocial intervention development for the prevention and treatment of depression: Promoting innovation and increasing access. *Biological Psychiatry, 52,* 610–630.

Holmes, E. A., & Mathews, A. (2005). Mental imagery and emotion: A special relationship? *Emotion, 5,* 489–497.

Holmes, E. A., Mathews, A., Dalgleish, T., & Mackintosh, B. (2006). Positive interpretation training: Effects of mental imagery versus verbal training on positive mood. *Behavior Therapy, 37,* 237–247.

Kernis, M. H., Brockner, J., & Frankel, B. S. (1989). Self-esteem and reactions to failure: The mediating role of overgeneralization. *Journal of Personality and Social Psychology, 57,* 707–714.

MacLeod, C., Rutherford, E., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology, 111,* 107–123.

Marx, E. M., Williams, J. B. W., & Claridge, G. C. (1992). Depression and social problem solving. *Journal of Abnormal Psychology, 101,* 78–86.

Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109,* 602–615.

Mathews, A., & MacLeod, C. (2002). Induced processing biases have causal effects on anxiety. *Cognition & Emotion, 16,* 331–354.

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology, 1,* 167–195.

Mathews, A., Ridgeway, V. A., Cook, E., & Yiend, J. (2007). Inducing a benign interpretational bias reduces trait anxiety. *Journal of Behavior Therapy and Experimental Psychiatry, 38,* 225–236.

Moberly, N. J., & Watkins, E. (2006). Processing mode influences the relationship between trait rumination and emotional vulnerability. *Behavior Therapy, 37,* 281–291.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100,* 569–582.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109,* 504–511.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology, 61,* 115–121.

Philippot, P., Baeyens, C., & Douilliez, C. (2006). Specifying emotional information: Regulation of emotional intensity via executive processes. *Emotion, 6,* 560–571.

Philippot, P., Schaefer, A., & Herbette, G. (2003). Consequences of specific processing of emotional information: Impact of general versus specific autobiographical memory priming on emotion elicitation. *Emotion, 3,* 270–283.

Platt, J. J., & Spivack, G. (1972). Problem-solving thinking of psychiatric patients. *Journal of Consulting and Clinical Psychology, 39,* 151.

Platt, J. J., & Spivack, G. (1975). *Manual for the Means-Ends Problem-Solving Test (MEPS): A measure of interpersonal problem solving skill.* Philadelphia: Hahnemann Medical College and Hospital.

Raes, F., Hermans, D., Williams, J. M. G., & Eelen, P. (2006). Reduced autobiographical memory specificity and affect regulation. *Cognition & Emotion, 20,* 402–429.

Rimes, K. A., & Watkins, E. (2005). The effects of self-focused rumination on global negative self-judgements in depression. *Behaviour Research and Therapy, 43,* 1673–1681.

Spasojevic, J., & Alloy, L. B. (2001). Rumination as a common mechanism relating depressive risk factors to depression. *Emotion, 1,* 25–37.

Spitzer, R. L., Williams, J. B. W., Gibbon, M., & First, M. B. (1996). *Structured Clinical Interview for DSM-IV (SCID).* Washington, DC: American Psychiatric Association.

Stöber, J., & Borkovec, T. D. (2002). Reduced concreteness of worry in generalized anxiety disorder: Findings from a therapy study. *Cognitive Therapy and Research, 26,* 89–96.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27,* 247–259.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110,* 403–421.

Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review, 94,* 3–15.

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin, 134,* 163–206.

Watkins, E. R., & Moberly, N. J. (2008). *Training to be concrete reduces dysphoria: A proof-of-principle study*. Manuscript submitted for publication.

Watkins, E., Moberly, N. J., & Moulds, M. L. (2008). Processing mode causally influences emotional reactivity: Distinct effects of abstract versus concrete construal on emotional response. *Emotion, 8,* 364–378.

Watkins, E., & Moulds, M. (2005). Distinct modes of ruminative self-focus: Impact of abstract versus concrete rumination on problem solving in depression. *Emotion, 5,* 319–328.

Watkins, E. R., & Moulds, M. (2007). Reduced concreteness in depression. *Personality and Individual Differences, 43,* 1386–1395.

Watkins, E., & Teasdale, J. D. (2001). Rumination and overgeneral memory in depression: Effects of self-focus and analytic thinking. *Journal of Abnormal Psychology, 110,* 353–357.

Watkins, E., & Teasdale, J. D. (2004). Adaptive and maladaptive self-focus in depression. *Journal of Affective Disorders, 82,* 1–8.

Watkins, E., Teasdale, J. D., & Williams, R. M. (2000). Decentring and distraction reduce overgeneral autobiographical memory in depression. *Psychological Medicine, 30,* 911–920.

Wenzlaff, R. M., & Grozier, S. A. (1988). Depression and the magnification of failure. *Journal of Abnormal Psychology, 97,* 90–93.

Williams, J. B. W. (1998). A structured clinical interview guide for the Hamilton Depression Rating Scale. *Archives of General Psychiatry, 45,* 742–747.

Williams, J. M. G., Barnhofer, T., Crane, C., Hermans, D., Raes, F., Watkins, E., et al. (2007). Autobiographical memory specificity and emotional disorder. *Psychological Bulletin, 133,* 122–148.

Williams, J. M. G., Watts, F. N., MacLeod, C., & Matthews, A. (1997). *Cognitive psychology and the emotional disorders.* (2nd ed.). Chichester, England: Wiley.

Received October 8, 2007
Revision received May 7, 2008
Accepted June 18, 2008 ■