We aimed to examine the core elements of cognitive behavioral therapy and acceptance and commitment therapy that target distressing negative cognitions, cognitive restructuring (CR) and cognitive defusion (CD), respectively. Participants (N = 142) recalled a saddening autobiographical event, identified a distressing thought it triggered, and completed a task that induced rumination on these cognitions. They then completed one of four brief interventions that targeted these emotionally charged cognitions: analogue versions of CR and CD, and two control interventions. The personal negative cognitions were then reactivated to examine the protective effects of these interventions. CR and CD were similarly efficacious in alleviating distress, compared to a control intervention that focused on participants’ negative thoughts. Mood improvement was associated with state levels of reappraisal and not with acceptance in CR, whereas the reverse was observed in CD. Improvement was associated with perceived efficacy of the intervention in CR but not in CD. The present findings suggest that although CR and CD effectively promote different types of cognitive strategies, they may share important features that set them both apart from maladaptive forms of coping.

Keywords: negative thinking; cognitive restructuring; cognitive defusion; cognitive behavioral therapy; acceptance and commitment therapy

DISTRESSING THOUGHTS ARE FOUND ACROSS A WIDE RANGE OF PSYCHIATRIC SYNDROMES THAT ARE CHARACTERIZED BY NEGATIVE AFFECT, INCLUDING DEPRESSION, ANXIETY DISORDERS, EATING DISORDERS, PSYCHOSIS, AND INSOMNIA (EHRING & WATKINS, 2008; WATKINS, 2008). These cognitions are often persistent and remain active even following successful treatment, posing a risk for relapse (RISO ET AL., 2003). However, negative thinking is not restricted to clinical populations, but rather, it is part of everyday life (MOR ET AL., 2010). Given the pervasiveness of negative thoughts in psychopathology, it is not surprising that many therapy approaches target them. Two well-established forms of therapy, cognitive behavioral therapy (CBT; A. T. BECK, 1976) and acceptance and commitment therapy (ACT; HAYES, STROSahl, & WILSON, 1999), include core treatment components that specifically focus on negative thinking. CBT and ACT overlap to a great extent, mainly in the behavioral techniques they employ (HAYES, LUOMA, BOND, MASUDA, & LILLIS, 2006; HOFMANN, SAWYER, & FANG, 2010). However, the philosophies guiding the treatment of negative thinking and the cognitive procedures suggested by the two approaches differ significantly (ARCH & CRASKE, 2008; FORMAN ET AL., 2012). The aim of the current research is to examine in a controlled laboratory setting the core components of CBT and ACT that target negative cognitions.
The Core Cognitive Components of CBT and ACT

In A. T. Beck’s (1976) CBT it is assumed that negative thoughts often represent a distorted perception of reality. Therefore, treatment aims to reduce the emotional impact of unpleasant cognitions by replacing them with more accurate and adaptive ones. Clients are first taught to identify negative thoughts that affect their mood. To facilitate the elicitation of “hot” or emotionally laden cognitions, they are often asked to recall the relevant context and their emotional reaction to the situation. These thoughts are then subjected to cognitive restructuring (CR), a relatively structured reappraisal process that is a core element in Beckian CBT. Clients rate the degree to which they believe each thought is correct and the emotional intensity associated with the thought. They then challenge the validity of the thought by examining evidence for and against the assumptions on which it is based, with the aim of replacing it with a more accurate and adaptive thought. Finally, clients reevaluate the degree to which they now believe the original thought and rate again the intensity of their emotions. It is assumed in CBT that repeating this process in different situations leads to a more rational and adaptive and less negative perception of reality (Hofmann & Asmundson, 2008).

ACT (Hayes et al., 1999) emphasizes active acceptance of distressing thoughts, with the aim of lessening their regulatory power over behavior. As in CBT, ACT encourages the recognition of such negative internal events. However, in contrast to CBT, it then advocates for “cognitive defusion” (CD), a separation of thoughts from the self and from what they refer to, without a direct attempt to modify their content. There are many cognitive defusion techniques, and they are all geared toward creating contexts that enable clients to distance themselves from their thoughts and to experience them in ways that weaken their meaning. For example, clients may be asked to repeat their distressing thoughts many times or to write them in unusual ways (e.g., with their nondominant hand), label the process of thinking (e.g., “I am having the thought that...”), or use mindfulness exercises in which they imagine seeing their negative thoughts written on various objects (e.g., on leaves floating on a water stream). It is assumed in ACT that experiencing unwanted thoughts in such contexts de-emphasizes their content and therefore helps to perceive them as internal events that can simply be observed (Hayes et al., 2006). According to this approach, treating negative thoughts as mental occurrences that do not need to be controlled, changed, or acted upon is beneficial because it is incompatible with maladaptive cognitive strategies (e.g., rumination, suppression) and behavioral tendencies (e.g., situational avoidance). Thus, decreasing the frequency of negative thoughts or changing their content is not emphasized in ACT, and instead treatment aims to change the ways in which people relate to the distressing cognitions they experience.

A number of innovative therapy outcome studies used a therapy dismantling approach, whereby the relative efficacy of core treatment components (as opposed to studying a full treatment protocol) is examined by testing them as stand-alone treatments or by comparing treatment packages that did or did not include specific components (Jacobson et al., 1996). Such studies may greatly improve existing therapies because they can suggest whether or not a given component (e.g., CR) has additional value over and above other ingredients of the treatment (e.g., exposure; Marks, Lovell, Noshirvani, Livanou, & Thrasher, 1998). However, the experimental control in these studies is limited, and they do not afford a systematic examination of fine-grained issues associated with specific interventions.

Compared with large-scale investigations of treatment protocols, laboratory-based studies are characterized by higher levels of experimental clarity and precision because they enable the establishment of relatively straightforward causal relationships among variables (Levin, Hildebrandt, Lillis, & Hayes, 2012). In the past two decades, much research has focused on coping with negative thinking (Watkins, 2008). Many studies have examined the cognitive strategies that CR and CD are said to foster, namely reappraisal and acceptance (respectively). In these experiments, participants are typically asked to use one of several strategies during or shortly after a negative mood induction. This work shows that cognitive reappraisal is an effective strategy for coping with negative thoughts, compared to maladaptive strategies such as thought suppression or rumination (e.g., Grisham, Flower, Williams, & Moulds, 2011; Gross, 1998; Szasz, Szentagotai, & Hofmann, 2011). Findings regarding acceptance have been less consistent. Acceptance instructions showed efficacy in alleviating distress associated with negative thinking in some studies (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Huffziger & Kuehner, 2009; Low, Stanton, & Bower, 2008; Singer & Dobson, 2007; Wade, George, & Atkinson, 2009), but not in others (Dunn, Billotti, Murphy, & Dalgleish, 2009; Kuehner, Huffziger, & Liebsch, 2009; Rood, Roelofs, Bögels, & Arntz, 2012; Szasz et al., 2011). The effectiveness of acceptance was demonstrated indirectly in studies that examined techniques that promote acceptance, such as word repetition (Masuda, Hayes, Sackett,
Wehig, 2004; Masuda et al., 2010), mindfulness exercises (Marcks & Woods, 2005), and expressive writing (Ramirez & Beilock, 2011).

In sum, laboratory-based investigations, which enable establishing clearer causal relationships among variables compared to studies of broad treatment packages, provided much information on strategies for coping with negative thinking. However, it is difficult to create in such experiments ecological procedures that would address meaningful treatment-related questions adequately (Holmes, Moulds, & Kavanagh, 2007).

The Present Study
We report here a study in which we examined the efficacy of analogue versions of CR and CD. As ACT is increasingly researched and disseminated, it is important to understand the ways in which it is similar or different from traditional CBT (Arch & Craske, 2008; Hofmann & Asmundson, 2008). Both CR and CD are transdiagnostic interventions that are applied across a broad range of problems and disorders. Numerous investigations tested treatment protocols that included these basic cognitive elements (Butler, Chapman, Forman, & Beck, 2006; Pull, 2009), and many laboratory-based studies (e.g., Singer & Dobson, 2007) tested the mechanisms that were fostered by CR and CD (i.e., reappraisal and acceptance, respectively). However, despite being at the center of a major debate in current research and clinical discourse (Heimberg & Ritter, 2008; Hofmann & Asmundson, 2008), to the best of our knowledge, the effects of these core cognitive interventions have not been examined directly in controlled experimental settings (but see Deacon, Fawzy, Lickel, & Wolitzky-Taylor, 2011, for a naturalistic investigation of these interventions).

As Arch and Craske (2008) noted, experimental methods that isolate the effects of CR and CD are a first step in examining them and the mechanisms of change with which they are associated. Importantly, our goal was to test adaptations of actual treatment elements rather than coping strategies per se. To do that, we developed a procedure that combined standard experimental manipulations and assessments with other procedures that were constructed specifically for this purpose. The current study is comprised of three phases administered in a single session. The tasks in the first phase were designed to elicit distressing and emotionally charged personal cognitions, and the analogue interventions that targeted these cognitions were administered in the second phase. In the third phase, the same personal negative cognitions were reactivated in order to examine the protective effects of the interventions.

We expected that reduction in negative mood following the analogue intervention in the second phase of the study would be greater in both treatment-based conditions, compared to a control condition in which participants were not distracted from their distressing cognitions. We further expected that this reduction would be associated with a concurrent tendency to use cognitive reappraisal (i.e., referring to the specific presently relevant cognition) in the CR group and acceptance in the CD group. As for the protective effects of the interventions, we expected a smaller increase in negative mood following the reactivation of the distressing personal cognitions in the third phase of the experiment in the two treatment-based conditions, compared to a distraction condition.

Methods
Participants
One hundred and forty-two consented college students (93 females) whose age ranged from 18 to 34 years (M = 23.40, SD = 2.81) participated in the study. They received course credit or $12 for their participation. Six participants were not included in the final analyses due to the following reasons. One participant was excluded due to an inconsistent pattern of response on the mood measurements (i.e., an extreme standardized total difference score between reversed and nonreversed items, Z > 3; see below). In addition, because the interventions were not appropriate for individuals who reported a sizable improvement from baseline to the end of Phase 1 (see below), five participants (3.6%) whose average negative mood scores decreased (rather than increased) between Time 1 and Time 2 by more than 0.5 SD of the mean mood change across the sample (9.1 mm), were excluded.

Measures
Current Emotional State
Eight PANAS items (Watson, Clark, & Tellegen, 1988) were used to assess state levels of negative mood at several time-points throughout the experiment. The original English items were translated into Hebrew and then back-translated into English to establish equivalence with the original version. Because mood was assessed four times, it was important to use a brief measure. In order to prevent mindless or repetitive response patterns, not all items were coded in the same direction; six items (sad, upset, nervous, distressed, blameworthy, down-hearted) assessed negative mood directly, and two items (happy, proud) were inversely scored. Similarly, to avoid repetition of responses at the various assessment points and to increase the measure’s sensitivity, each item was measured by a 100 mm visual...
analogue scale (VAS), ranging from “completely disagree” to “completely agree.” Higher scores reflect higher levels of negative mood. A principal component analysis was performed on the baseline measurement of this scale in the present study, and the scree plot suggested a single-factor structure (first five eigenvalues were 4.54, 0.89, 0.81, 0.57, 0.42). A series of similar analyses were then performed for each of the remaining three assessment times. Across the four solutions, the loadings of all eight items on the extracted single factors where consistently high (ranged between 0.58-0.91). Taken together, these findings suggest that a single total score appropriately reflected the latent structure of this measure. Levels of internal consistency were high in all four assessment times (alphas ranged between 0.87-0.91).

State Measure of Cognitive Beliefs
This short scale was created for the purpose of the present study. It included items that measured ad-hoc meta-cognitive beliefs referring to a specific presently relevant cognition (cf. Singer & Dobson, 2007). Three items assessed state-like metacognitive beliefs associated with cognitive reappraisal, which is linked to CR (Hofmann & Asmundson, 2008) (“I believe it is important to examine the verity of my thought”; “I think I need to correct my thought”; “I believe that my thought results from irrational thinking”). Three additional items measured beliefs related to acceptance, which is the metacognitive belief fostered by CD (Hayes et al., 2006) (“I think that the thought I had defines me and the person I am” [reversed]; “I believe that my thought is only a thought that crossed my mind, and nothing more”; “I believe that the very existence of this thought prevents me from living my life the way I’d want to” [reversed]). Each item was measured by a 100 mm VAS, ranging from “completely disagree” to “completely agree.” A total score for reappraisal and acceptance was determined based on responses for each set of items. For each subscale, higher scores reflected higher levels of the measured cognitive belief. Cronbach’s coefficient alphas for the current sample were 0.55 for reappraisal and 0.43 for acceptance. Across all conditions, these two subscales correlated negatively with each other, $r(134) = -0.26, p = 0.002$.

Post-Experiment Manipulation-Check Questions
To assess the subjective importance of the elicited personal material (see below), participants responded to four items that were created for the purpose of the present study (cf. Rood et al., 2012). These items assessed on 4-point scales the centrality of the elicited thoughts to their self-perceptions, the frequency with which participants experience the thoughts, the extent to which other events triggered similar thoughts, and the meaningfulness of the elicited events. Higher scores on this 4-item measure reflected greater subjective importance. Cronbach’s alpha across all conditions was 0.77. In order to assess the perceived efficacy of the interventions, participants used another 4-point scale ranging from “not at all” to “extremely” to rate the degree to which they felt that the intervention was helpful.

PROCEDURE
A written informed consent was obtained from all participants, who were tested individually in a quiet laboratory room. The procedure lasted about 45–50 min, and excluding the intervention it was identical for all groups (see Figure 1 for a schematic description of the experimental sequence).

Phase 1: Eliciting a “Hot” Negative Cognition
The tasks administered in Phase 1 were designed to ensure that the intervention that followed would target a “hot” emotionally charged distressing cognition (Metcalfe & Mischel, 1999). These tasks (translated from Hebrew) can be found online in the supplementary materials. Participants first completed a baseline VAS mood assessment (Time 1). They were then instructed to describe in writing an unpleasant event they had experienced that made them feel sad and think unpleasant thoughts about themselves, and which at times still saddened them. Several general examples were provided (e.g., “Have you ever failed at something that was important to you, and at times it still troubles you?”). Subsequently, they wrote a significant saddening thought about themselves that was triggered by the event and that was brought to mind by its recollection. To facilitate selection of a thought suitable for the experimental conditions of the study, they were asked to describe an unpleasant but not traumatic event. Similarly, in an attempt to prevent the generation of deep-rooted core-beliefs that were not expected to be meaningfully targeted by a brief intervention (see J. Beck, 1995), participants were directed to select a thought related to the specific event. Examples of such event-specific thoughts were provided (e.g., “When Adam failed a test, he thought: ‘I don’t understand any of the material, there’s no way I’ll ever finish my degree.”’). To encourage openness and honesty, participants were informed that they would shred the form on which they wrote the event and the thought upon completion of the experiment.

Because merely writing one’s distressing thoughts can be helpful in and of itself (e.g., Lyubomirsky, Sousa, & Dickerhoof, 2006; Ramirez & Beilock, 2011), participants also performed a focused rumination task, which was a modification of Nolen-
Hoeksema and Morrow’s (1993) rumination induction procedure. The goal of this task was to enable participants to conceptually and emotionally reexperience the saddening event and the negative thought it triggered in a self-immersed manner (cf. Kross & Ayduk, 2008). It included 12 items (each presented for 25 seconds) directing them to ruminate about the event and about the thought they listed (e.g., “Think what ramifications this event may have on your future”). These items (translated from Hebrew) can be found online in the supplementary materials. To examine the effect of Phase 1 tasks on mood and to establish a pre-intervention mood baseline, participants completed a second VAS mood assessment immediately following the focused rumination task (Time 2).

Phase 2: Brief Interventions
Participants were randomly allocated to one of the four conditions: CR (N = 33) and CD (N = 35) that were based on central components of CBT and ACT, respectively, and two conditions designed specifically to control for immediate (N = 35) and protective effects (N = 33) of the treatment-based interventions. In order to prevent participants from employing spontaneous coping strategies similar to the ones fostered in other conditions, we did not include an ambiguous “no training” condition (cf. Rood et al., 2012).

Each intervention commenced with a concise clinical rationale that was tailored to the tasks that followed. The rationale provided was identical in length across conditions. All interventions were structured as a series of concrete paper-and-pencil tasks for several reasons. First, we reasoned that this would maximize participants’ engagement and reduce experimenter bias. Second, we believed that this would prevent participants from employing coping techniques other than the intended ones and reduce overlap among the conditions. Most important, although actual clinical work associated with CR and CD involves an interaction with a therapist, it often follows a similar structure (i.e., concrete written tasks). Pilot work indicated that all interventions took the same time to complete (between 7–9 min.). As in Phase 1, to encourage full engagement in the interventions, participants were told at the outset that written materials would not be retained. The four interventions are described below, and they can also be found (translated from Hebrew) online in the supplementary materials.

Cognitive Restructuring (CR): CBT-based analogue intervention. This intervention was designed to resemble closely CR procedures in which clients are asked to critically examine the veracity of their negative cognitions. It was based on techniques typically used in cognitive therapy (adopted from J. Beck, 1995) that were modified for a self-report format. After reading the rationale, participants wrote their distressing thought and specified the degree to which they believed it was correct on a 0 (I don’t believe it is true at all) to 100 (I believe it is 100% true) VAS. Using six multiple-choice questions, with four response options ranging from “not at all” to “extremely,” participants indicated the degree to which their thoughts were influenced by common cognitive distortions (e.g., “To what degree do you think that your thought is affected by your exaggerated focus on the negative aspects of the

FIGURE 1 Design of the study.
situation, and not seeing the whole picture?”). Then, after reading a short example, participants provided evidence supporting and disputing the thought by completing several times the sentences “I think that my thought is correct because ...” and “On the other hand, my thought may not be accurate because....” They then read again their distressing thought, reviewed their responses and wrote an alternative and more balanced thought. The instructions emphasized that this alternative thought does not need to be more positive, but rather to reflect reality better, to the best of their judgment. They then specified on a 0–100% VAS the degree to which they believed this new thought was accurate. Finally, they were asked to use a second VAS to report the degree to which they currently believed their original thought was correct.

**Cognitive Defusion (CD): ACT-based analogue intervention.** The overall aim of this intervention was to facilitate cognitive distancing from the verbal aspect of emotion-laden cognition (Hayes et al., 1999). After reading the rationale, participants completed several tasks that were based on CD techniques that were adapted from Hayes et al. (1999) and from Hayes and Smith (2005). Specifically, they wrote their thought in various ways (e.g., using their nondominant hand, in upper-case letters and in reverse), visualized it from different vantage points (e.g., written on a bus moving further away from them and on a billboard), labeled the process of thinking (“the thought ... crossed my mind”), and watched a cartoon character portrayed as thinking the thought. They were also asked to visualize the thought as an external and observable object and describe its imagined physical qualities (size, weight, color, shape, texture) by answering short questions (e.g., “Is it smooth or rough?”).

**Distraction Intervention (DI).** The tasks included in this control intervention were a combination of the tasks used in the two treatment analogue interventions. However, rather than participants’ own distressing cognitions, the target material, identical across participants in this group, was nonpersonal and nondistressing. After reading the rationale, participants read a short description of “Daniel,” a 9-year-old child, which ended with the sentence “Daniel likes reading and playing on the computer a lot.” Then, similar to the CR analogue intervention, participants closely examined the content of this sentence. For example, they indicated on a 0–100 VAS the degree to which they believed that this sentence was characteristic of children, answered several multiple choice questions (e.g., To what degree do you believe that it is desirable to develop a love of reading in children?), and provided evidence supporting related statements (e.g., I think that reading is preferable to playing on a computer because...). In addition, similar to the CD intervention, participants wrote the given sentence several times and “viewed” it from different vantage points (e.g., written on a bus moving further away from them).

**No-Distraction Intervention (NDI).** We created a second control intervention that, similar to the treatment-based interventions, included tasks that required participants to focus on their distressing thoughts (cf. Grisham et al., 2011). However, this intervention fostered a different coping strategy, as it encouraged participants to explore different aspects (e.g., antecedents, consequences) related to these cognitions. Participants first read the rationale, and then, as was the case with the two experimental conditions (but not in the DI control condition), they were asked to write down the thought they had generated in Phase 1. They then responded in writing to seven open-ended questions pertaining to this thought and to the events that triggered it (e.g., “If you think it may have been possible for you to cope better, what led you to react the way you did?”). To encourage genuine responses, the instructions emphasized that wording was not important and that there were no correct or incorrect answers. Thus, this intervention differed from the treatment-based interventions not in terms of what participants focused on, but rather with regard to how they did it (see Ray, Wilhelm, & Gross, 2008), whereas the reverse was true for the distraction intervention (DI), that controlled for protective effects.

The procedures that followed the intervention were identical for all conditions. After completing the intervention, participants completed VAS measures of mood (Time 3) and of meta-cognitive beliefs concerning the target negative thought.

**Phase 3: Emotional Reactivation of the Negative Thoughts**

The main goal of this phase was to compare the short-term buffering or protective effects of the two analogue interventions to the DI control condition. To do that, we emotionally reactivated the original distressing thought, using a second 5-min focused-rumination task. Thus, computerized instructions again directed participants to contemplate the original distressing event they had selected and the thought it had triggered. To avoid repetition of the task administered in Phase 1, different instructions were used, which can also be found online.
in supplementary materials. Immediately following the completion of this task, participants completed the fourth and final VAS mood assessment (Time 4). They then responded to the post-experiment manipulation check questions. Finally, participants underwent a positive mood induction, using a short video clip. They were then debriefed and assessed to ensure that any negative effects of the tasks had been alleviated.

OVERVIEW OF ANALYTIC PLAN

In all three phases of the experiment the primary dependent variable was negative mood, assessed by the four Current Emotional State VAS measures. An average score for each of the four assessment times was computed for each participant. Mood change at Phase 1 and the post-experiment manipulation check items were examined to verify that Phase 1 tasks created the suitable conditions for the administration of the brief interventions. In Phase 2 and in Phase 3 we examined whether mood changes across measurement times differed across the four conditions, and then examined our main hypotheses by comparing the two treatment-based interventions (CR and CD) with each other and with the two control groups. In Phase 2 we also examined whether improvement in each of these conditions was associated with the metacognitive belief to which the intervention was theoretically linked and with the perceived efficacy of the intervention.

Results

PHASE 1: MANIPULATION CHECK

As Table 1 shows, participants in the four conditions reported similar levels of negative mood at baseline (Time 1), \( F(3, 132) = 0.07, \ p = 0.98, \ \eta_{p}^2 = 0.001 \). To examine the effect of the initial mood induction across groups, a \( 4 \times 2 \) mixed design ANOVA with intervention condition (CR, CD, NDI, DI) as the between group factor, time (Time 1: baseline, Time 2: end of Phase 1) as the repeated measures factor and mood as a dependent variable, was conducted. As expected, a main effect of Time revealed a substantial increase in negative mood between Time 1 and Time 2 across all groups, \( F(1, 132) = 168.84, p < .001, \ \eta_{p}^2 = 0.56 (95\% \ CI [0.36, 0.80]) \). The main effect of Group, \( F(3, 132) = 0.03, \ p = .99, \ \eta_{p}^2 = 0.001 \), and the interaction effect Group \( \times \) Time, \( F(3, 132) = 0.03, \ p = .85, \ \eta_{p}^2 = 0.006 \), were nonsignificant. Thus, as intended, Phase 1 procedures resulted in an increase in negative mood that was similarly large in all groups. To control for natural within-group variability in baseline mood, we used this measure as a covariate in later analyses.

In order to verify that participants complied with the instructions and selected cognitions they perceived as moderately significant and distressing, we examined the subjective importance of the personal material elicited in Phase 1, based on participants’ responses to the relevant four post-experiment questions. On a possible range of 1-4, the average score for these items was \( M = 2.56 \ (SD = 0.59) \), suggesting that overall participants complied with the instructions. This score did not differ as a function of condition, \( F(3, 132) = 0.53, \ p = 0.66, \ \eta_{p}^2 = 0.012 \). Therefore, in order to remove variance in the dependent measures that was driven by natural within-group differences in subjective significance of the personal material, we used this four-item scale as a covariate in later analyses.

We then focused on Phase 2 and Phase 3 of the experiment, and conducted a \( 4 \times 3 \) mixed design ANCOVA with intervention condition (CR, CD, NDI, DI) as the between group factor, time (Time 2, Time 3, Time 4) as the repeated measures factor, and mood as the dependent variable, with baseline mood (Time 1) and subjective significance of the selected personal material (measured by the four-item scale) as covariates. The main effect of Group was not significant, \( F(3,130) = .10, \ p = 0.96, \ \eta_{p}^2 = 0.002 \), but the main effect of Time was, \( F(2, 260) = 6.23, \ p = .002, \ \eta_{p}^2 = 0.05 \). More importantly, the Group \( \times \) Time interaction was significant, \( F(6, 260) = 5.01, \ p < .001, \ \eta_{p}^2 = 0.10 \), indicating that the pattern of mood changes in the different conditions varied across Phase 2 and Phase 3. We probed this interaction by examining each of these phases separately.

<table>
<thead>
<tr>
<th>Measurement Time</th>
<th>CR (N = 33)</th>
<th>CD (N = 35)</th>
<th>NDI (N = 35)</th>
<th>DI (N = 33)</th>
<th>Total (N = 136)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Time 1</td>
<td>29.67</td>
<td>18.96</td>
<td>29.66</td>
<td>17.47</td>
<td>31.24</td>
</tr>
<tr>
<td>Time 2</td>
<td>49.19</td>
<td>19.32</td>
<td>49.36</td>
<td>18.14</td>
<td>48.07</td>
</tr>
<tr>
<td>Time 3</td>
<td>37.73</td>
<td>17.49</td>
<td>38.16</td>
<td>17.35</td>
<td>44.11</td>
</tr>
<tr>
<td>Time 4</td>
<td>42.94</td>
<td>22.48</td>
<td>40.50</td>
<td>18.90</td>
<td>41.73</td>
</tr>
</tbody>
</table>

Note. CR = cognitive restructuring; CD = cognitive defusion; NDI = no-distraction intervention; DI = distraction intervention.
**Phase 2: Immediate Effects of the Interventions**

**Between-group effects.** To examine the effects of Phase 2 brief interventions on mood, we first performed a 4 × 2 mixed design ANCOVA with intervention condition as the between group factor, time (Time 2, Time 3: pre- and post-intervention) as the repeated measures factor, and mood as the dependent variable, with Time 1 mood and subjective significance of the personal material as covariates. The main effect of Group was not significant, $F(3, 130) = 0.46, p = 0.71, \eta^2_p = 0.01$, but the main effect of Time was, indicated by a decrease in negative mood across all groups from Time 2 ($\text{Mean} = 49.25, \text{SD} = 19.38$) to Time 3 ($\text{Mean} = 38.27, \text{SD} = 18.67$), $F(1, 130) = 11.26, p < .001, \eta^2_p = 0.08$. More importantly, as predicted, the Group × Time interaction was significant, $F(3, 130) = 6.57, p < .001, \eta^2_p = 0.13$, indicating that the effects of the interventions varied across conditions. To tease apart this interaction effect, we examined the differences in mood change between the two treatment-based conditions (CR and CD) and between each of these groups and the two control conditions (NDI and DI). To simplify the interpretation of these comparisons, we performed univariate ANCOVAs with condition as the grouping factor and Time 2–3 change score as the dependent variable, using the same two covariates (baseline mood and subjective importance of the personal material). Simple group effects of these univariate ANCOVAs are statistically identical to the Group × Time interaction effects in the parallel multivariate mixed models. These analyses indicated that the difference between CR ($\text{Mean} = 11.47, \text{SD} = 14.83$) and CD ($\text{Mean} = 11.20, \text{SD} = 10.99$) was small and nonsignificant, $F(1, 64) = 0.13, p = .91, \eta^2_p = 0.001$ (95% CI [0.00, 0.39]). Both the CR and the CD groups experienced a larger decrease in negative mood following the intervention, compared to the NDI group ($\text{Mean} = 3.96, \text{SD} = 13.16$), $F(1, 64) = 5.04, p = .03, \eta^2_p = 0.07$ (95% CI [0.01, 0.23]) for CR, and $F(1, 66) = 7.04, p = .01, \eta^2_p = 0.10$ (95% CI [0.03, 0.31]) for CD. Thus, compared to the NDI control condition, CR and CD were similarly efficacious in reducing negative mood. Distraction was particularly efficacious in the short term, as mood decrease in the DI group was significantly larger than in the CD group, $F(1, 64) = 4.09, p = .05, \eta^2_p = 0.06$ (95% CI [0.01, 0.24]), and almost significantly larger than in the CR group, $F(1, 62) = 3.36, p = .07, \eta^2_p = 0.05$ (95% CI [0.00, 0.22]). For completion, decrease in negative mood in the DI group ($\text{Mean} = 17.71, \text{SD} = 12.84$) was significantly larger than in the NDI group, $F(1, 64) = 20.47, p < .001, \eta^2_p = 0.24$ (95% CI [0.07, 0.52]).

**Metacognitive beliefs.** Next, we examined the relationships between improvement and metacognitive beliefs about the distressing target cognition, measured following the post-intervention mood assessment (Time 3). To do that, we computed the correlations between each type of cognitive belief (reappraisal and acceptance) and mood improvement following the intervention (i.e., Time 2 – Time 3), separately for each of the two treatment-based groups. As predicted, in the CR group, improvement correlated significantly with reappraisal, $r(31) = 0.44, p = 0.01$, but not with acceptance, $r(31) = -0.06, p = 0.75$, and the difference between these correlations was significant ($z = 2.93, p < 0.01$). The opposite pattern emerged in the CD group, where improvement correlated significantly with acceptance, $r(33) = 0.33, p = 0.05$, but not with reappraisal, $r(33) = 0.02, p = 0.89$, and the difference between the correlations was marginally significant ($z = 1.83, p = 0.07$). The correlations between these two scales and improvement in the control groups (NDI and DI) were not significant ($p$’s > 0.1). Taken together, these findings suggest that improvement in each treatment-based condition was specifically and uniquely associated with state levels of the type of metacognitive belief the intervention was expected to foster.

**Perceived efficacy of the interventions.** The mean response to the item that assessed the perceived efficacy of the intervention ranged from $M = 2.40$ for CD to $M = 2.79$ for CR. A univariate ANOVA (comparing the four conditions) did not detect differences among the conditions ($p = 0.10$), thus supporting the credibility of the two control interventions, DI ($M = 2.46$) and NDI ($M = 2.77$). We then focused on the two treatment-based conditions. We examined whether mood improvement following the intervention (i.e., Time 2 – Time 3) in each of these conditions was associated with perceived efficacy. In the CR group the obtained correlation between these two variables was significant and the effect size was large, $r(31) = 0.45, p = 0.009$. In contrast, mood improvement in the CD group was unrelated to the perceived efficacy of the intervention, $r(33) = 0.09, p = 0.58$. Thus, in the CR condition, participants who benefited more from the intervention perceived it as more helpful, but this was not the case in the CD condition.

**Phase 3: Protective Effects of the Interventions**

We next examined the protective effects of the interventions following the reactivation of the distressing thoughts in Phase 3. To do that, we first focused on overall mood change between Time 2
A major strength of the current analogue investigation is the procedures it employed, which are more closely related to actual clinical settings compared to earlier laboratory-based experiments. CR is a systematic reappraisal process \cite{Hofmann & Asmundson, 2008}, whereas in CD the acceptance of negative thoughts is encouraged \cite{Hayes et al., 2006}, and therefore the present results echo findings of earlier studies that focused on these emotion-regulation techniques \cite[e.g.,][]{Gross, 1998, Singer & Dobson, 2007}. However, the use of cognitive strategies has typically been manipulated in these studies by instructing participants to cope with their negative thoughts in certain ways, whereas the manipulations here were based on concrete tasks adopted from commonly used clinical procedures.

Compared to reappraisal, experimental support for the immediate efficacy of acceptance in reducing negative mood has been less consistent, particularly in nonclinical populations \cite[e.g.,][]{Dunn et al., 2009}. For example, in a recent experiment that tested the immediate efficacy of several cognitive strategies following a negative mood induction, positive reappraisal was more helpful than acceptance, which did not differ from rumination \cite{Rood et al., 2012}. The authors suggested that acceptance instructions may be particularly difficult to follow \cite[see also][]{Singer & Dobson, 2009}, and pointed out that in mindfulness-based treatments acceptance is heavily practiced for weeks. In the present study, CD was efficacious, and the magnitude of the beneficial effect it had on mood correlated with state-levels of acceptance. These findings suggest that defusion exercises, which provide an easy-to-follow method for patients to practice acceptance, may be useful therapeutic tools that can promote this coping strategy quickly and effectively.

**CD AND CR: DIFFERENT STRATEGIES, SIMILAR ACTIVE INGREDIENTS?**

CR and CD seem to be distinct from each other. In CR negative cognitions are targeted in a logical disconfirmation process and are subsequently changed. In contrast, in CD the content of thoughts is not directly challenged, and instead clients are encouraged to accept the occurrence of the thoughts without attempting to modify them. The present results support the efficacy of both interventions, but neither was found to be more efficacious than the other \cite[cf.][]{Deacon et al., 2011}. Moreover, the similar pattern of differences of CR and CD compared to the two control conditions combined with the small effect sizes for the differences between these conditions show that CR and CD had a remarkably similar effect on mood throughout the experiment. Null findings are difficult to interpret, and perhaps
methodological limitations (e.g., insufficient power) prevented us from detecting differences between the two analogue interventions. It is possible, however, that this noteworthy similarity is informative in and of itself, as it perhaps suggests that CR and CD are closer than they appear.

Recent theoretical accounts acknowledge the differences that exist between these cognitive elements of CBT and ACT, but they also highlight the features they have in common (Arch & Craske, 2008; Hofmann et al., 2010). According to these perspectives, both CR and CD are essentially approach-oriented procedures that decrease avoidance from unwanted internal experiences, because they encourage clients to monitor and state their distressing cognitions rather than to suppress or distract themselves from them.

In addition, the present results show that CR and CD differed from the NDI condition, although participants in all these three groups focused on their negative thoughts. Accumulating findings suggest that emotional responses depend not only on what people think, but also on how they think about things (e.g., Grisham et al., 2011; Kross & Ayduk, 2008; Ray et al., 2008; Watkins, 2008). In the NDI condition, thoughts were essentially treated as facts, whereas both CD and CR promoted a more objective and distanced approach to negative cognitions. This is clearly the case with ACT, which encourages clients to observe their negative thoughts and distance themselves from them. The defusion exercises ACT employs enable the experience of distancing thoughts in ways that are different from the problematic contexts in which they are routinely experienced, such as the context of literality, which “treats symbols (e.g., the thought, ‘life is hopeless’) as one would referents (i.e., a truly hopeless life)” (Hayes et al., 2006, p. 7). In other words, CD fosters the idea that thoughts, which may or may not reflect reality accurately, are mental occurrences that need to be treated as such. Similarly, the importance of gaining distance from one’s thoughts has long been acknowledged in cognitive therapy (A. T. Beck, 1970), because “The thought often has the same kind of salience as the perception of an external stimulus” (p. 189). Even though CR focuses on the content of thoughts, in sharp contrast with rumination it treats thoughts as hypotheses rather than as facts. Indeed, Teasdale and colleagues (2002) showed that both traditional cognitive therapy and mindfulness-based cognitive therapy reduce relapse to depression by increasing metacognitive awareness, a cognitive set in which mental events are experienced as such. Thus, both CR and CD are aimed at changing the relationships people have with their thoughts by increasing their awareness to the process of thinking itself and see thoughts as independent entities, separate from external events.

To summarize, the present findings indicate that CR and CD promote different coping strategies. However, it is also possible that these differences may be outweighed by features these interventions have in common, as both encourage clients to monitor their distressing cognitions and approach them in an objective and distanced manner. Thus, it may well be the case that the “active ingredients” of CR and CD, which set them both apart from maladaptive forms of coping, overlap to a substantial degree.

**Face Validity of the Interventions**

The findings suggest that CR and CD were similarly efficacious. However, results also show that the individuals who benefitted from these analogue interventions tended to think otherwise, as improvement was related to perceived efficacy of the intervention in CR but not in CD. This pattern parallels findings of a recent study that compared CBT with ACT, in which the former was rated as more credible early in treatment, despite comparable and even superior outcomes of the latter treatment (Arch et al., 2012). Perhaps the present results should not come as a surprise. Beckian CR is a well-structured process that is based on clear logical tools that seem to reflect lay theories on how to address one’s problems, and it explicitly asks clients to assess any changes they experience. In contrast, in ACT focusing on such changes is discouraged, and it has been suggested that the logic of acceptance and defusion is particularly difficult to understand (Rood et al., 2012; Singer & Dobson, 2009). In fact, defusion exercises are designed to create contexts that deviate from standard rules of verbal reasoning and language use (Hayes, Barnes-Holmes, & Roche, 2001). It could therefore be argued that the lack of relationship between improvement and subjective efficacy is in line with the principles of ACT, in which immediate emotional or cognitive changes are not emphasized (Hayes et al., 1999).

**Limitations of the Study**

In this study we did not have access to participants’ responses to the paper-and-pencil tasks. In order to maximize openness and engagement, participants were informed at the outset of the experiment that written materials would not be retained. A careful inspection of these materials in future studies will provide a closer check of the manipulations and allow examination of additional and more specific aspects of the interventions. Also, in the present single-session design, Phase 3 procedures were administered...
almost immediately following the completion of the interventions. Therefore, we were able to examine the protective effects of CR and CD against induced ruminative thinking only in the short term. Future studies will be able to clarify these issues and broaden the scope of the present findings by employing a longitudinal design. For example, it will be possible to examine the longer-term protective effects of CR and CD by administering Phase 2 and Phase 3 procedures in separate experimental sessions (cf. Kross & Ayduk, 2008).

Ecological considerations that affected the interpretability of the findings should also be taken into account. For example, interventions are typically delivered using cognitive behavioral treatments along with relevant psychoeducation. Therefore, each of the analogue interventions administered here commenced with a brief clinical rationale, which may have created demand effects. Because we could not detect any between-group differences in treatment credibility, it is unlikely that these effects were responsible for the overall pattern of findings. However, these rationales were tailored in each intervention to the tasks followed (e.g., explaining why it is important to accept one’s thoughts in CD). It is thus possible that group-specific demand effects accounted at least partly for the relationships between improvement and the relevant metacognitive belief (e.g., acceptance) in the two experimental groups. In addition, state levels of metacognitive beliefs were measured here only once, and therefore it was not possible to examine whether improvement was associated with changes in metacognitions.

Some of the limitations of the current investigation are inherent to the analogue nature of the research. In actual therapy, CR and CD are delivered at least partly in the context of a client-therapist interaction, and in conjunction with other components of treatment. It is likely, for example, that in the CR condition some participants defended their thoughts without being analytical or skeptical about them. Although this is also common in real-life treatments, perhaps in such cases a careful clinical interview would have resulted in a different outcome. Furthermore, the analogue interventions were adopted from actual clinical procedures, but they did not encompass all the cognitive tools of either CBT or ACT, and in actual therapy the effects of cognitive interventions are expected to interact with other treatment elements. In general, the extent to which the brief interventions used in the current study were analogous to the parallel cognitive procedures in actual CBT and ACT treatments is unknown. A thorny issue for studies on ACT treatments (e.g., Twohig et al., 2010) and procedures (e.g., Masuda et al., 2004) is that outcome measurement that is based on aversive internal experiences (e.g., negative mood) is less relevant to this therapy approach, in which functionality and improved valued living are emphasized.

The experience of negative thinking is a universal phenomenon which is not limited to clinical populations, and accordingly CR and CD are frequently used as part of a large number of therapeutic interventions, ranging from self-help books (e.g., Hayes & Smith, 2005; Leahy, 2010) to standard clinic-based treatment. Therefore, we examined here the effects of CR and CD using a nonclinical sample. It is possible, however, that the elicitation of the emotionally charged thought did not provide an analogous context to the experiences of individuals who actually struggle with emotional distress. It is also not clear at this point whether the analogue interventions used here will work well in clinical populations.

The current findings suggest that CR and CD are both efficacious, but results also indicate that these interventions were not helpful for all participants (cf. Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012). Rather than focusing merely on overall efficacy of interventions, future studies on cognitive treatment components will need to address more refined questions. Such research will hopefully help to improve currently available treatments, for example, by examining moderators of change to identify individuals who are more likely to benefit from either intervention (Carver & Connor-Smith, 2010; Huffziger & Kuehner, 2009; Shoham & Insel, 2011). Moreover, perhaps certain thought types (e.g., worries, which are often resistant to logical disconfirmation; Wells & Carter, 1999) are likely to respond better to one type of intervention (e.g., CD) than to another. The methods presented here provide a suitable experimental framework for such studies, and they may also be used to expand our base of empirically supported therapies. This can be done by testing analogue versions of cognitive interventions other than CR or CD (e.g., Watkins et al., 2007) or, alternatively, by examining the effectiveness of adopting currently existing interventions within nontraditional treatment modalities (e.g., internet-based treatments; see Kazdin & Blase, 2011). A fuller understanding of the ways cognitive interventions work is needed in order to improve our understanding of how to cope with emotional distress flexibly and effectively.

Conflict of Interest Statement
The authors declare that there are no conflicts of interest.

Appendix A. Supplementary Data
Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.beth.2014.02.007.
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