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Thought suppression and cognitive vulnerability to depression

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Objectives. Cognitive reactivity (CR) has been defined as the relative ease with which maladaptive cognitions or cognitive styles are triggered by mild (non-pathological) mood fluctuations. CR has been found to predict relapse of depression (Segal, Gemar & Williams, 1999). This study compared different measures of CR, and also investigated the role of thought suppression as a possible mechanism underlying CR.

Design and methods. Participants included 24 previously depressed, and 24 never depressed individuals who underwent a mood induction. They also completed a questionnaire designed to measure CR (LEIDS; Van der Does, 2002a), and participated in the scrambled sentences task (SST). The SST was designed to uncover thought suppression tendencies, and has been shown to discriminate between never depressed and previously depressed samples.

Results. LEIDS scores were higher for previously depressed than for never depressed individuals. However, CR as measured with the mood induction did not distinguish between these groups. The LEIDS was correlated with the results of the SST and with self-report measures of thought suppression.

Conclusion. Active suppression of unwanted thoughts may be involved in the apparent inactive state of depressive cognitions during remission.

According to cognitive theory, individuals at high risk of depression are characterized by dysfunctional cognitions or schemas. Individuals who endorse statements like, 'I can only be happy if everyone likes me' are thought to be more prone to develop depression than people who do not. Although recovered depressed patients are at high risk of future episodes (Mueller *et al.*, 1999), dysfunctional cognitions have proven difficult to measure in this group. For instance, scores on dysfunctional cognition questionnaires, for example, the Dysfunctional Attitudes Scale (DAS; Weissman, 1979), do not distinguish between never depressed and previously depressed individuals, only for currently euthymic individuals (Lewinsohn, Steinmetz, Larson, & Franklin, 1981; Simons, Garfield, & Murphy, 1984). Recently, however, a number of measures and

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procedures have been developed that have made cognitive vulnerability to depression measurable.

Cognitive reactivity as a measure of vulnerability to depression

Firstly, the combination of a particular cognitive style – the tendency to attribute negative events to internal, global, and stable causes – with negative life events increases the likelihood of developing a constellation of depressive symptoms called hopelessness depression (Abramson, Metalsky, & Alloy, 1989; Alloy *et al.*, 1999; Joiner, 2001). In another line of investigation, a set of procedures is used that involves the experimental manipulation of mood. After a so-called sad mood induction, never depressed individuals and recovered depressed patients typically experience similar changes in mood, but only the latter group show increases in dysfunctional cognition scores (e.g. Miranda, Gross, Persons, & Hahn, 1998; Miranda & Persons, 1988; Van der Does, 2002a). Similar findings have been obtained from studies where cognitions were assessed during naturally occurring mood fluctuations (Miranda, Persons, & Byers, 1990). Also, individuals at risk of depression have shown negative information processing biases following a priming manipulation (Hedlund & Rude, 1995; Taylor & Ingram, 1999).

These studies have demonstrated the existence of a residual deficit that has been labelled cognitive reactivity (CR), but there have also been unsuccessful attempts to replicate these findings (e.g. Brosse, Craighead, & Craighead, 1999). The importance of the concept of CR was demonstrated by Segal, Gemar, and Williams (1999), who found that CR scores for 29 patients treated with antidepressants were greater than those for 25 patients treated with cognitive therapy. Furthermore, high CR predicted depressive relapse, regardless of prior treatment modality.

Measurement of cognitive reactivity

If replicated, these findings may provide clinicians with a tool to assess the need for (continued) cognitive therapy in patients whose overt symptoms are in remission. However, mood inductions are rather impractical, and also have a number of fundamental problems (e.g. a significant minority of participants do not experience a mood change). Therefore, alternative procedures have been developed. Teasdale and Cox (2001) found differences between previously depressed and never depressed individuals on a new self-report measure, the Depressed States Checklist. Furthermore, preliminary data suggest that another brief self-report measure, the Leiden Index of Depression Sensitivity (LEIDS) also distinguishes between previously depressed and never depressed groups, and also correlates highly with CR, as measured with a mood induction procedure (Van der Does, 2002a). A limitation of this latter study, however, is that only 8 of the 48 participants were vulnerable to depression (i.e. had experienced a depressive episode in the past). Since CR is higher in formerly depressed individuals, the performance of the LEIDS may not have been optimally tested. The aims of the present study were (a) to further investigate the LEIDS as a measure of CR in a more diverse sample, and (b) to compare CR scores to other measures of cognitive vulnerability to depression.

Thought suppression and depression

The concept of CR is based on Bower's (1987) associative network theory. During remission, depressive cognitions may not disappear, but become inactive ('dormant' or 'latent') (Beck, Rush, Shaw, & Emery, 1979; Miranda & Persons, 1988; Teasdale, 1988).

Cognitive theory has clear ideas about how dysfunctional schemas develop (Segal, Williams, Teasdale, & Gemar, 1996), but it is less clear about how an existing dysfunctional schema becomes latent. It has been argued that depression-related cognitions may not become inactive, but are actively suppressed (Wenzlaff & Bates, 1998). In this view, remission of depression equals regaining mental control over negative cognitions. Indeed, in the early stages of cognitive therapy, patients are taught to distract themselves from negative thinking patterns. According to ironic process theory (Wegner, 1994), mental control is more likely to fail when mental capacity is taxed. In other words, under conditions of mental load, the effortful process of suppressing depressive cognitions is hindered, and negative cognitions are more likely to become active and conscious. To test this hypothesis, depressed, not depressed, and previously depressed individuals completed a task that required unscrambling sentences that could form either positive or negative statements (Wenzlaff & Bates, 1998). The task was taken under time pressure, and half of the participants were also given a six-digit number to remember during the test ('cognitive load condition'). When participants are explicitly instructed to form positive sentences, the production of a negative sentence is thought to reflect a failure of mental control. As predicted by ironic process theory, previously depressed individuals in the cognitive load condition formed a higher percentage of negative statements (17%) than those in the no-load condition (5%). For the currently depressed and the never depressed groups, cognitive load did not affect the percentage of negative statements. Furthermore, the percentage of negative statements unscrambled was correlated with self-reported thought suppression frequency in the at-risk group.

The second aim of the present study was to replicate Wenzlaff and Bates' (1998) findings, and to investigate the relationship of thought suppression with CR. Hypothesizing that thought suppression is indeed involved in the 'inactive' state of depressive cognitions, it was predicted that both measures would be correlated.

In summary, the following hypotheses were tested:

- (1) LEIDS scores correlate significantly with DAS change scores before and after the induction of a sad mood.
- (2) Thought suppression (measured by self-report and by the scrambled sentences task) is higher in previously depressed than in never depressed individuals.
- (3) Cognitive reactivity (measured by the LEIDS and by DAS change scores) and thought suppression are correlated, even when residual symptoms of depression are partialled out.

Methods

Participants

Previously depressed and never depressed participants were recruited through advertisements at the faculty of Social Sciences of Leiden University, the university library, and at a number of sites in the town of Leiden, for example, the town library. Inclusion criteria were being between the ages of 18 and 70 years, and fluency in Dutch. Participants were allocated to one of the study groups on the basis of presence or absence of an episode of major depression in the past. Recruitment continued until both groups had 24 participants. For both groups, an exclusion criterion was a current episode of depression or dysthymia according to DSM-IV (American Psychiatric

Association, 1994). Past dysthymia was an exclusion criterion for the never depressed group. The experiment took approximately 70 minutes and participants were paid € 6.

Mood induction

Participants were asked to try to focus on a time or event in their lives when they felt sad (or to envision a future sad event) while sad music was played on audiotape (cf. Segal *et al.*, 1999). The music was presented as an auxiliary, not as something that would by itself always produce a sad mood.

Scrambled sentences task (SST)

A Dutch translation of the test constructed by Wenzlaff and Bates (1998) was used: three sets of 20 scrambled sentences were presented in counterbalanced order. Each of the scrambled sentences contained six words. A uniform set of instructions preceded the first set. Participants had to unscramble precisely five words in each sentence by placing a number over each of the five words indicating the proper order. For example:

3 2 4 1 5
looks dismal future very my bright

Participants were instructed to choose only one of the possible solutions, to work quickly, and not to correct mistakes. Each set of 20 scrambled sentences was preceded by one of three valence instructions, presented in counterbalanced order: (a) no valence instructions ('Unscramble each sentence to form whatever statement comes to mind first'), (b) negative valence instructions ('Unscramble each sentence to form a negative statement - one that conveys a negative thought or idea'), and (c) positive valence instructions.

Immediately prior to the presentation of each set of scrambled sentences, half of the participants (randomly determined) were asked to retain a six-digit number in memory (the cognitive load condition). Following each set of 20 sentences, participants attempted to recall the six-digit number and were given a new six-digit number prior to the next set. The maximum time to complete each set was 4 minutes.

Following Wenzlaff and Bates (1998), on completion of the three sets of 20 sentences, participants rated how often they had tried to suppress unwanted negative thoughts during the past month, and how successful they had been at suppressing these thoughts. Both ratings were made on a 7-point Likert scale.

Instruments

Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1995).

The current and past depression modules of the SCID were administered to check the inclusion and exclusion criteria.

Beck Depression Inventory - II (BDI-II; Beck, Steer, & Brown, 1996; Van der Does & Beck, 2005).

This 21-item measure assesses current (past 2 weeks) levels of depressive symptoms. The mean scores of the BDI-II are 1 point (lower score range) to 6 points (higher score range) higher than those of the BDI-I (Beck *et al.*, 1996). The Dutch translation was used (Van der Does, 2002c).

Dysfunctional Attitudes Scale (DAS) - versions A and B (Weissman, 1979)

The DAS measures dysfunctional beliefs that, according to cognitive theories, are core concepts of vulnerability to depression. As noted in the introduction, CR is the change in DAS scores before and after a mood induction procedure (Segal *et al.*, 1999). Forms A and B of the DAS were used. Both forms have 40 items.

Mood ratings

Participants gave three ratings of their current mood (sadness, irritation, tension) repeatedly throughout the experiment, using Likert-type rating scales, ranging from *not at all* (0) to *extremely* (10).

Leiden Index of Depression Sensitivity (LEIDS; Van der Does, 2002a)

The LEIDS is a self-report measure of CR to sad mood. Participants are asked to imagine feeling somewhat sad (but not depressed), and then to fill out 26 items that comprise four subscales. Sample items for each of these subscales are: 'When I am in a sad mood, I have less confidence in my future' (negative self-evaluation; NSE); 'I work harder when I feel down' (acceptance/coping; A/C); 'When I am sad, I care less about what others think of me' (indifference; IND); 'When I feel down, I take fewer risks' (harm avoidance; HAV). The scale was developed in a sample of 198 participants; it was found to have good psychometric properties, and to correlate highly with CR, as measured with a mood induction procedure (Van der Does, 2002b).

White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994)

The WBSI is a 15-item scale to measure stable individual differences in the tendency to suppress thoughts across a variety of situations and thought topics. Like the original, the Dutch version is unifactorial and is reliable in terms of internal consistency and test-retest reliability (Muris, Merckelbach, & Horselenberg, 1996).

Procedure

Participants received written information about the study by mail or e-mail. All participants were tested in a single session that lasted between 60 and 70 minutes. After an opportunity for questions was given and informed consent was obtained, participants were interviewed by a trained experimenter using the SCID modules. Next, they filled out the BDI-II, WBSI, and LEIDS. Participants underwent the mood induction and then completed the SST, in fixed order. These procedures were separated by a 5-minute break and by a 10-minute neutral task (memory test for abstract figures), to counter crossover of residual mood effects. The mood induction was preceded and followed by the DAS and the three mood ratings. To counter any systematic differences between the two DAS versions, half of the participants received form A before, and form B after, the mood induction. The order was reversed in the other half of participants. The two DAS form orders, the two conditions of the SST (load/no load), and the six orders of presentation of the three SST sets (valence order) were stratified to form cells with equal numbers of participants. Participants were randomly allocated to one of the cells. After the SST, participants were paid and debriefed. A brief humorous movie fragment was available to lift any residual mood effects, but it was not necessary to use it.

An experimenter was present in the test room, except during the mood induction procedure, when participants were left alone. As known to the participants, the experimenter went to an adjacent room and followed the procedure via one-way screen and intercom. Participants were signalled through the intercom after 7 minutes to begin filling out the mood ratings and DAS. The music continued while the

participants filled out the questionnaires, and the experimenter returned when the questionnaires were completed.

Results

Participants

Fifty participants were recruited. Two participants were excluded after the SCID-interview because they fulfilled criteria for a current depressive episode. Forty-eight participants completed the experiment, but the SST results of two participants had to be excluded: one had clearly misread the valence instructions to one set of sentences, and another participant had completed very few sentences because she had been copying the words in a new order instead of putting numbers above the words. These individuals' mood induction results were retained. In another seven cases, the experimenter failed to notice that the participant had overlooked the final page of the booklet that contained the questionnaires. For these participants, the frequency and success of thought suppression ratings were missing, but their other results were retained. There were no adverse events.

Demographic and baseline clinical characteristics are shown in Table 1. About half of the participants in each group were college students. The ages ranged from 19 to 56 years, and 50% were older than 21. The current level of depressive symptoms (BDI-II score) was low and equivalent for both groups. In the previously depressed group, participants had fulfilled a mean number of 6.9 (*SD* = 1.4) of the nine DSM-IV criteria for a major depression during their worst episode. Two participants in the never depressed group had experienced a subclinical episode of depression in the past (three and four symptoms, respectively), but not dysthymia. As expected, both groups had similar DAS scores. LEIDS scores as well as WBSI scores, however, distinguished between never depressed and previously depressed groups. For both scales, the between-group difference was approximately one standard deviation (except for the acceptance/coping subscale of the LEIDS).

Table 1. Demographic and clinical baseline scores for never depressed (*N* = 24) and previously depressed (*N* = 24) participants

	Never depressed	Previously depressed	Contrast
Age	25.3 (8.5)	27.5 (11.1)	ns
Sex (% females)	66.7%	75.0%	ns
Depressive symptoms (BDI-II)	3.8 (3.7)	4.7 (5.2)	ns
Dysfunctional cognitions (DAS)	110.1 (18.7)	108.9 (24.9)	ns
Thought suppression (WBSI)	37.3 (9.9)	46.3 (11.4)	<i>p</i> = .006
LEIDS: negative self-evaluation	9.7 (6.3)	14.9 (6.8)	<i>p</i> = .008
LEIDS: acceptance/coping	1.3 (1.6)	2.1 (3.1)	ns
LEIDS: indifference	7.7 (3.8)	11.0 (5.4)	<i>p</i> = .020
LEIDS: harm avoidance	5.8 (4.1)	8.4 (4.6)	<i>p</i> = .039
LEIDS: total score	24.4 (12.4)	36.4 (15.0)	<i>p</i> = .018

Notes. Mean scores, standard deviations in parentheses. Contrast: *t*-test (or χ^2), two-tailed significance. BDI-II = Beck Depression Inventory – II, WBSI = White Bear Suppression Inventory, DAS = Dysfunctional Attitudes Scale, LEIDS = Leiden Index of Depression Sensitivity.

Mood induction

It was expected that the mood induction procedure would lead to comparable changes in sad mood in both groups. Smaller changes were expected for tension and irritability. Furthermore, it was expected that cognitive changes would only appear in the previously depressed group. A $2 \times 2 \times 3$ (time $\times$ group $\times$ mood rating) general linear model showed significant, or nearly significant, main effects of time, $F(1, 46) = 44.5$; $p < .001$; mood, $F(1, 46) = 3.7$; $p = .062$; and group (past depression), $F(1, 46) = 5.4$; $p = .024$; and significant interactions of time by mood, $F(1, 46) = 38.2$; $p < .001$; and time by past depression, $F(1, 46) = 5.4$; $p = .025$. This analysis was followed by separate 2×2 (time $\times$ group) general linear models for each of the three mood ratings, and for DAS scores. These analyses showed that the mood induction had a significant effect on all three mood ratings and on cognitions (all main effects of time were significant). The largest effect was on sadness (see Table 2). However, the interaction with group was only significant for irritability. In other words, the previously depressed group had a larger increase in irritability scores than the never depressed group, but not a larger increase in sadness, tension, and dysfunctional cognitions. In other words, the expected between-group difference in CR (as measured by DAS change scores) was not observed. As noted above, CR as measured by the LEIDS was higher in the previously depressed group, as were WBSI scores. The correlations of the DAS change score with the WBSI and the LEIDS total and subscale scores were low and non-significant.

Scrambled sentences task

The percentage of negative statements was analysed with a $2 \times 2 \times 3$ general linear model, with depression history and cognitive load as between-subjects variables, and valence instructions as within-subject variable. This yielded a significant main effect for valence instructions, $F(1, 42) = 6.8$; $p = .013$, and a nearly significant effect for cognitive load $F(1, 42) = 3.5$; $p = .069$, but not for depression history, $F(1, 42) = 0.03$; *ns*. The only significant interaction was between depression history and cognitive load: $F(1, 42) = 5.2$; $p = .028$. Table 3 shows that previously depressed individuals produced a higher percentage of negative sentences under cognitive load (in all three conditions), whereas cognitive load did not affect the performance of never depressed individuals. The three-way interaction was not significant, nor was the interaction of valence and load in the previously depressed sample.

Grammatical errors

A number of participants made one or more errors in the SST. Rarely, an incorrect sentence was produced, and somewhat more frequently, a 4- or 6-word sentence was produced. The analyses were repeated with the errors included (as long as a positive or negative meaning of the sentence was clear). The pattern of results as shown in Table 3 was identical in these analyses.

Relationship among measures of cognitive vulnerability

LEIDS scores, but not DAS change scores, correlated significantly with the percentage of negative sentences in the SST. Thought suppression was also correlated with the SST (see Table 4). Table 5 shows that LEIDS scores, but not DAS change scores, were significantly associated with frequency of thought suppression. NSE and HAV were

Table 2. Effects of mood induction on mood and cognitions

	Never depressed (N = 24)		Previously depressed (N = 24)		Significance of main and interaction effects		
	Pre	Post	Pre	Post	Group	Pre/post	Interaction
Sadness	0.7 (1.0)	2.7 (1.7)	1.2 (1.1)	4.0 (2.2)	p = .010	p < .001	p = .146
Irritability	0.2 (0.5)	0.6 (1.1)	0.6 (1.1)	2.2 (2.4)	p = .006	p < .001	p = .018
Tension	1.4 (1.1)	1.8 (1.6)	1.3 (1.7)	2.8 (2.7)	p = .328	p = .003	p = .068
Cognitions (DAS)	110.1 (18.7)	116.9 (18.8)	108.9 (24.9)	118.8 (31.9)	p = .954	p = .004	p = .572

Note. Mean scores, standard deviations in parentheses. DAS = Dysfunctional Attitudes Scale.

Table 3. Mean percentage of negative statements unscrambled by condition

	Previously depressed (<i>N</i> = 22)		Never depressed (<i>N</i> = 24)	
	Load	No load	Load	No load
Valence instructions				
Positive	9.8 (18.6)	0.5 (1.6)	1.7 (3.3)	1.0 (2.3)
Negative	94.9 (9.6)	90.1 (18.7)	97.6 (3.8)	96.8 (6.3)
None	11.0 (13.4)	7.1 (7.6)	5.8 (7.6)	9.1 (11.3)
Mean	38.5	32.6	35.0	35.6

Table 4. Correlations of suppression and cognitive reactivity with percentage of negative statements under load (*N* = 24) and no load (*N* = 22) conditions

	Cognitive load	
	No load	Load
Thought suppression		
WBSI total score	-.12	.56**
Frequency rating	-.24	.10
Success rating	.49*	-.21
Cognitive dysfunction		
DAS before mood induction	.04	.20
DAS after mood induction	-.12	.22
Cognitive reactivity		
DAS change score	-.17	.06
LEIDS: negative self-evaluation	-.26	.48*
LEIDS: acceptance/coping	.06	.16
LEIDS: indifference	-.20	.47*
LEIDS: harm avoidance	-.09	.34
LEIDS: total score	-.19	.52**

Notes. * $p < .05$, ** $p < .01$.

WBSI = White Bear Suppression Inventory, DAS = Dysfunctional Attitudes Scale, LEIDS = Leiden Index of Depression Sensitivity.

inversely related with success of thought suppression. These patterns were identical for previously depressed and never depressed groups (not shown).

Discussion

Participants who had been depressed in the past did not show larger mean CR scores (DAS change scores) than never depressed participants. Based on previous research, this finding was unexpected (Miranda & Persons, 1988; Miranda *et al.*, 1998; Van der Does, 2002a), but not unprecedented (Brosse *et al.*, 1999). Other studies using slightly different designs or mood induction procedures also failed to find differences in dysfunctional attitudes after priming between never depressed and previously depressed individuals (Dykman, 1997; Solomon, Haaga, Brody, & Kirk, 1998). Apparently, either the cognitive effects of mood inductions depend on unknown

Table 5. Correlations of thought suppression and cognitive reactivity, corrected for depressive symptoms

	Thought suppression		
	WBSI total (N = 48)	Frequency (N = 39)	Success (N = 39)
Cognitive reactivity			
DAS change score	0.01	0.06	− 0.05
LEIDS: negative self-evaluation	0.56***	0.25*	− 0.40*
LEIDS: acceptance/coping	0.24	0.11	− 0.07
LEIDS: indifference	0.56***	0.37*	0.03
LEIDS: harm avoidance	0.47***	0.39*	− 0.37*
LEIDS: total score	0.66***	0.39*	− 0.31

Notes. Partial correlations, BDI-II scores partialled out.
Two-tailed significance: **p* < .05, ***p* < .01, ****p* < .001.
WBSI = white bear suppression inventory, DAS = dysfunctional attitudes scale, LEIDS = Leiden index of depression sensitivity.

procedural differences, or these effects are sometimes obscured by an instrument that is not reliable enough. There are a number of reasons to believe that the problem lies with the instrument, not with procedures. Firstly, in the present study, the same procedures were used as in an earlier study in which DAS change scores were higher in previously depressed participants (Van der Does, 2002a). Secondly, the DAS has a number of known problems. It has 40 items, and the score range is 0–240. Typically, the mean score lies around 110 (with a *SD* of around 20), and even previously depressed participants’ scores increase only slightly after mood induction (less than 10 points). Furthermore, a 40-item scale seems too long for this particular purpose; the length of the questionnaire may contribute to diluting the effects of the mood inductions. Finally, to avoid repetition of the same 40 items within a 7-minute time frame, two parallel forms of the DAS are often used. There are serious doubts about whether these forms are actually interchangeable (Power *et al.*, 1994; Segal *et al.*, 1999). LEIDS scores, however, did show the theoretically expected differences between previously depressed and never depressed groups.

Thought suppression, as measured with the WBSI, also distinguished between individuals with, and without, a history of depression. Probably, the observed group differences in the present study are not specific to depression, because high WBSI scores are associated with many dimensions of psychopathology, particularly with obsessions, depression, and anxiety (Wegner & Zanakos, 1994; Muris *et al.*, 1996). In symptomatic patients, WBSI scores did not differentiate among patients with a mood disorder, an anxiety disorder, or psychosocial problems (V-code diagnosis), (Spinhoven & Van der Does, 1999).

The previously depressed group also exhibited the failure of mental control on the scrambled sentences task, which was first demonstrated by Wenzlaff and Bates (1998). Under conditions of cognitive load, these participants unscrambled a higher number of negative sentences. As argued by Wenzlaff and Bates, the combination of time pressure and cognitive load in this task may undermine efforts to keep negative thoughts from entering awareness. In the present study, the size of the effect was a little bit smaller than in Wenzlaff and Bates; difference between load and no-load conditions: 12% vs.

9%), and in contrast with Wenzlaff and Bates, the effect did not correlate with frequency of thought suppression, as measured with a single rating immediately after the task. The effect did correlate, however, with WBSI scores, which is probably a more psychometrically sound measure of thought suppression than a single rating. The present findings also differ from Wenzlaff and Bates' in that the cognitive load increased the percentage of negative sentences overall, whereas in Wenzlaff and Bates, the effect appeared with positive and neutral valence instructions, but not with negative valence instructions.

Thought suppression and the SST results also showed rather strong correlations with LEIDS scores. The intercorrelations among these different measures of cognitive vulnerability to depression provide indirect support for the position that during remission of a depressive episode, depressive cognitions do not become inactive (or dormant/latent), but rather are actively suppressed. In other words, thought suppression may be one of the mechanisms by which mental control is gained over depressive cognitions. This is, however, a short-term solution that may well exacerbate future problems. Thought suppression may work relatively well for a period of time, but under conditions of increased stress, when cognitive capacity is reduced, the mechanism may backfire. Ironic process theory (Wegner, 1994) predicts that thought suppression paradoxically intensifies unwanted thoughts. Under normal conditions, a monitoring system for negative thoughts works in the background of consciousness, serving to renew or intensify distraction efforts. However, when mental control is taxed and begins to falter, the vigilance system intrudes on awareness and makes unwanted thoughts more accessible than they would have been if mental control had never been attempted (Wenzlaff & Bates, 1998).

In this respect, there are a number of promising recent developments. Firstly, cognitive therapy seems to exert a more positive effect on CR than pharmacotherapy, thereby reducing vulnerability to future depressive episodes (Segal *et al.*, 1999). Secondly, mindfulness-based cognitive therapy (MBCT) has been shown to further reduce relapse rates, particularly in highly vulnerable patients (Teasdale *et al.*, 2000). MBCT is a group intervention designed to train recovered patients to disengage from dysphoria-activated depressogenic thinking (Segal, Williams, & Teasdale, 2002). The goal of mindfulness meditation is to be aware of, and open to, what is happening in all domains of experience in the moment, and to be able to shift attention. For instance, if one is focusing on one's own breathing, and attention wanders to negative thoughts and feelings, these are 'acknowledged and accepted', after which attention is re-directed to breathing (Kabat-Zinn, 1990; Segal *et al.*, 2002). Since this is probably repeated often during a mindfulness session, exposure to negative thoughts might be involved in the mechanism of action of MBCT. In other words, patients are actually taught the opposite of thought suppression.

The present study has a number of limitations. Firstly, the presence of emotional disorders other than depression and dysthymia was not assessed. Therefore, the presence of other emotional disorders could potentially account for the findings. However, we do not think this is very likely. If a sizable number of participants in the recovered group suffered from an anxiety disorder, for instance, then the BDI-II score of this group would have been substantially higher. A second limitation is that there was no other recovered-psychiatric control group, which makes it impossible to determine whether the LEIDS and the SST results are specific to depression, or a general vulnerability factor. As noted above, the WBSI is not specific to depression. Including a

psychiatric control group would be quite important for future studies on CR, since this has rarely been done.

In conclusion, the present study has provided further evidence that the LEIDS is a measure of cognitive vulnerability to depression, and that the scrambled sentences task also taps an aspect of cognitive vulnerability to depression. Because the mood induction experiment did not yield the expected results, it could not be confirmed that the LEIDS is a measure of CR. Interesting areas for future research involve the relationships, and possible overlap, with other measures of cognitive vulnerability, including the recently developed Depressed States Checklist (Teasdale & Cox, 2001), cognitive style (Alloy *et al.*, 1999), and rumination (Nolen-Hoeksema, 1991). Finally, an unexplored territory is the relationship of cognitive vulnerability with biological vulnerability indices, for example, hypothalamic-pituitary-adrenocortical (HPA) axis disturbance (Holsboer, 2001), or response to tryptophan depletion challenge (Moreno, Heninger, McGahuey, & Delgado, 2000; Van der Does, 2001). Providing that future studies confirm that the LEIDS measures CR, the significant correlations among the LEIDS, the SST and WBSI suggest a mechanism through which depressive cognitions become inactive.

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