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Training the Forgetting of Negative Words: The Role of Direct Suppression and the Relation to Stress Reactivity

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SUMMARY

Recent research has demonstrated that people can be trained to forget negative material. This experiment assessed the possible benefit of direct suppression in addition to the benefit of thought substitutes (indirect suppression) on subsequent attempts to recall words. We also investigated the association between recall following suppression training and subsequent responses to an acute laboratory stressor. After learning cue-target word pairs, participants completed a training phase in which they practiced suppressing targets and recalling substitutes or simply recalling substitutes with no instruction to suppress. Our results show similar effects of suppression condition on forgetting. Importantly, however, the absence of direct suppression predicted mood change in response to a subsequently presented laboratory stressor. These results suggest that direct suppression is not necessary for forgetting to occur, but it seems to protect against negative emotional consequences of interference-induced forgetting. Copyright © 2010 John Wiley & Sons, Ltd.

Research on the interaction between mood and memory suggests that individual differences in forgetting can have a powerful impact on stress reactivity and mood regulation. Individual differences in the accessibility of mood-incongruent material, for example, predict the ability to regulate negative mood states (Joormann & Siemer, 2004; Smith & Petty, 1995). Remembering positive events and forgetting negative events is associated with increased well-being over the lifespan (Charles, Mather, & Carstensen, 2003). In contrast, emotional disorders are frequently associated with the presence of intrusive negative thoughts and memories that can, in turn, impair the ability to regulate negative affect following exposure to stressors (see Nolen-Hoeksema, Wisco, & Luybomirsky, 2008 for a review). Depression, for example, is associated with a mood-congruent memory bias that makes negative memories more accessible and may play an important role in the sustained negative affect that characterizes depressive episodes (see Joormann, 2008; Nolen-Hoeksema et al., 2008, for reviews). Similarly, post-traumatic stress disorder is associated with intrusive, negative memories that are difficult to control (see Ehlers, Hackman, & Michael, 2004; Rubin, Berntsen, & Bohni, 2008, for reviews) and appear to play an important role in the maintenance of this disorder.

Given the role of memories in everyday mood regulation and their role in the maintenance of emotional disorders, it is important to note recent evidence of suppression-

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induced forgetting. Specifically, experiments using Anderson and Green's think/no-think (TNT) task (Anderson & Green, 2001) have demonstrated that participants' direct suppression of individual words facilitates forgetting on subsequent tests. A standard TNT paradigm consists of three main parts: A learning phase during which participants learn cue-target word associations to criterion, a training phase during which they practice recalling a subset of the targets and practice suppressing others (TNT training) and a final phase in which memory for all targets is tested. Anderson and Green demonstrated that participants' recall of suppressed targets dropped below recall of baseline words that were not cued during training. Thus, repeatedly preventing a target from coming to mind decreases the accessibility of that word on the subsequent memory test. Levy and Anderson (2002) used the term *direct suppression* to refer to suppression by means of trying to prevent the thought from coming to mind, and they used *indirect suppression* to describe suppression achieved through retroactive interference or inhibition caused by retrieving alternative thoughts.

Anderson and Green's (2001) finding of below-baseline suppression has been replicated several times (e.g. Anderson et al., 2004; Hertel & Gerstle, 2003; Wessel, Wetzels, Jelicic, & Merckelbach, 2005); recent studies have also provided evidence for below-baseline forgetting of emotional words using the TNT paradigm (Joormann, Hertel, Brozovich, & Gotlib, 2005). Other studies, however, suggest that below-baseline forgetting does not come easily for everyone. Instructions for direct suppression failed to incur forgetting in a dysphoric sample (Hertel & Gerstle, 2003) and, using a related task, in participants diagnosed with PTSD (Cottencin et al., 2006). These results indicate that, unlike healthy controls, individuals diagnosed with emotional disorders may have difficulty forgetting as a consequence of direct suppression.

In addition, the mechanisms underlying suppression-induced forgetting in the TNT paradigm have been increasingly studied. Hertel and Calcaterra (2005), for example, demonstrated that when participants were provided with substitute words to think about while suppressing thoughts of targets, forgetting of neutral words was enhanced. Subsequent studies have demonstrated that thought substitutes can be used to improve suppression-induced forgetting of negative words by currently depressed participants (Joormann, Hertel, LeMoult, & Gotlib, 2009) and by repressors (Hertel & McDaniel, 2009). Joormann et al. demonstrated that diagnosed depressed participants who were provided with either positive or negative substitutes produced below-baseline forgetting, but those who were not given this strategy did not.

These findings provide initial evidence that training participants to suppress negative material increases forgetting. Even in a clinically depressed sample, forgetting was achieved when direct suppression was combined with the use of thought substitutes, which serve indirect functions. Yet several questions remain. Although previous research suggests that direct suppression of negative words leads to successful forgetting, other research has questioned whether forgetting could be explained solely by indirect interference processes (Bulevich, Roediger, Balota, & Butler, 2006). When we designed this experiment, all TNT studies had used direct suppression instructions (sometimes combined with thought substitutes to facilitate indirect suppression) and therefore had not been able to address this important question. In addition, although these studies have shown that we can train forgetting of negative material, even in clinical samples, it remains unclear whether suppression training indeed affects people's reactivity to stressors.

This study was designed to address two issues. The first issue concerned the importance of direct suppression attempts in establishing below-baseline forgetting in the TNT

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paradigm. The addition of direct instructions to not think about the targets in response to their cues might facilitate later forgetting beyond what is incurred by indirect effects of retroactive interference from the practice of recalling substitutes. This outcome would suggest that direct suppression plays a separable role from the strategic use of substitutes (see Bulevich et al., 2006; Hertel & Calcaterra, 2005). The second issue concerned the role of suppression of negative material in subsequent encounters with stressful tasks. Based on the importance of negative thoughts and memories in stress reactivity and emotion regulation (Joormann, 2008; Nolen-Hoeksema et al., 2008), participants with the most difficulty forgetting negative material might also show more emotional reactivity (for a related finding, see Hertel & McDaniel, 2009). In this relation, however, the mechanism of forgetting should also be considered. The correlation between forgetting and emotional reactivity should depend on how forgetting is experienced. Forgetting of negative events achieved *via* direct suppression might be experienced as self-efficacious and indicative of superior cognitive control, whereas forgetting achieved less deliberately might challenge one's feelings of competence, particularly when subsequent tasks are cognitively challenging. To explore these possible consequences of forgetting we asked participants to solve anagrams and perform mental arithmetic under stressful conditions. For those in the indirect suppression condition, forgetting should 'prime' their reaction to the stressful cognitive tasks; for those in the direct suppression condition, successful forgetting might serve as a cognitive vaccine against stress (see Holmes, Lang, & Shah, 2009).

METHOD

Overview

The TNT procedure consisted of four different phases. During the learning phase, participants memorized cue-target word pairs. Each pair consisted of an emotionally neutral cue and either a neutral or a negative target (e.g. *stalk-celery*; *fabric-lice*). Participants were required to reach the criterion of correctly recalling 66% of targets before moving on to Phase 2, the substitute-learning phase. During this phase, participants learned to associate one-third of the cues (the Suppress cues) with a new substitute word (e.g. *fabric-art*). All substitute words were neutral and replaced an original target word that was negative. Participants also received instructions on how to use the substitutes; however, the instructions differed depending on whether participants were randomly assigned to the direct or indirect suppression condition. Participants in the direct condition were explicitly told to use the substitutes to help them not think about the original targets. Participants in the indirect condition were simply asked to learn the substitutes; no mention was made of not thinking about the original targets. In Phase 3, the training phase, cues were distributed across three categories: (1) Baseline cues were not presented during this phase, (2) respond cues were presented in green font and participants practiced responding with the original target, and (3) suppress cues were presented in red font and participants practiced responding with the new substitute in accordance with the instructions for their condition. During Phase 4, the final test phase, participants were unexpectedly asked to recall all *original* targets (e.g. *stalk-celery*; *fabric-lice*), regardless of category during the training phase. Following final recall, participants completed a two-part laboratory stressor. Sad mood was assessed before and after the stressor. To conclude the laboratory session, participants completed the Beck Depression Inventory-Second Edition (BDI; Beck, Steer, & Garbin, 1988; Beck & Steer, 1993) and demographics questionnaires.

Participants and design

Fifty-six University of Miami students (26 women, 30 men) were recruited from psychology classes. The mean age was 19.85 years ($SD = 3.33$). An additional three students were not included in the final sample because they failed to meet the learning criteria. Participants received either course credit or $15 per hour, depending on their course requirements. Participants were randomly assigned to either the direct or indirect condition of suppression training and to one of three counterbalancing conditions, which rotated the cues that were assigned to each cue category (baseline, respond, suppress), subject to the constraint of equal numbers of participants per condition.[1]

Questionnaires

Participants completed the BDI (Beck et al., 1988), which is a 21-item self-report questionnaire assessing the severity of current depressive symptoms. In addition, participants completed a demographics questionnaire, in which they provided information about their age and sex.

TNT materials

Word pairs were taken from Hertel and McDaniel (2009). A total of 36 cues[2] were grouped into three sets of 12 for assignment to the training categories of baseline, suppress and respond, according to the counterbalancing scheme. These sets of 12 were balanced on word frequency (Kucera & Francis, 1967), forward strength of association from cue to target and to substitute (Nelson, McEvoy, & Schreiber, 1998), concreteness and emotional valence of targets and substitutes. When cues served in the baseline category, they were assigned a negative target. Suppress cues were assigned both a negative target and a neutral substitute. Respond cues were assigned a neutral target. An additional six cues served as buffers and practice items. Five were paired with neutral targets and one was paired with a negative target and neutral substitute (see Hertel & McDaniel, 2009, for details regarding the word pair creation).

Procedure

Participants completed the four phases of the TNT task: Learning phase, substitute learning phase, training phase and final test phase. All tasks were run on Superlab Pro software (Version 4.07; Cedrus Corporation, San Pedro, CA). Immediately following, participants were exposed to an acute stressor, and participants reported their sadness on an 11-point Likert scale before and after the stressor. Laboratory sessions concluded with participants completing the BDI and demographics questionnaires. Each component is described in more detail below.

[1]One counterbalancing condition was assigned two extra participants (one in the direct, one in the indirect condition).

[2]Eighteen of the cues (six in each set of 12) were homographs, used by Hertel and McDaniel (2009) to address an issue unrelated to the purposes of the current research. The neutral substitutes for the negative targets were always associated with alternative meanings of the homograph cues. The data in the current experiments were evaluated initially by including a factor for materials (homographs *vs.* non-homographs), and all associated effects were non-significant.

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Learning phase

Cue-target pairs appeared sequentially for 5 seconds each at the centre of the monitor in black font on a light grey background. Participants were asked to form a mental image of each pair and then to rate the vividness of this image from 1 (not vivid) to 7 (very vivid) immediately following each pair. The 36 experimental pairs were ordered in a randomized block design such that each block of six cue-target pairs contained two pairs from each category (baseline, suppress and respond). Whereas blocks were presented in a consistent order, the order within blocks was randomized anew for each participant. Each block was preceded by one filler pair.

Following the initial learning task, recall of all 42 word pairs was assessed. Cues were presented sequentially for 5.2 seconds each or until the participant responded with the corresponding target. Regardless of response, the correct target appeared in blue font for 2 seconds following the cue offset. Participants repeated this test until they were able to pass the learning criterion of recalling at least 66% of the targets in each cue category. If participants were unable to pass the learning criterion on the fourth attempt, they were thanked and dismissed.

Substitute learning phase

For the cues assigned to the suppress category, participants learned neutral words to serve as substitutes for the original targets. Before participants learned the cue-substitute word pairs, they received one of two sets of instructions, depending on the condition to which they were randomly assigned. Participants randomly assigned to the direct condition were explicitly told to use the (to-be-learned) substitutes in order to help them not think about the original target. The experimenter stressed the importance of not thinking about or responding with the original targets. In contrast, participants in the indirect condition were simply asked to learn the new cue-substitute pairs. The experimenter made no mention of not thinking about the original targets to participants in this condition. Cue-substitute pairs were shown in black font for 5 seconds each, and participants read them aloud. The pairs were presented within the same blocks used for the cue components during the learning phase, and order within the blocks was randomized.

Training phase

During the training phase, each cue was presented 12 times for 3 seconds. Participants practiced replying with the original target to respond cues and with the new substitute to suppress cues. Respond cues were presented in green whereas suppress cues were presented in red. Baseline cues did not appear in this phase. If participants did not recall the correct target during the allotted time on respond trials, it was displayed in blue font for 500 milliseconds. On suppress trials, the substitute was similarly displayed, regardless of participants' response. Cues were ordered in the same randomized block design used in the learning phase, with the exception of the never-presented baseline cues.

Final test phase

In order to test participants' recall of the original targets, all 42 cues were presented for 4 seconds each, and participants were asked to respond with the original words learned in the first phase. If a second word came to mind, they were told to report it as well. However, emphasis was placed on reporting the original targets, regardless of whether they were paired with baseline, suppress, or respond cues. The six filler cues appeared first, followed by the 36 experimental cues, which were presented according to the same randomized

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block design described previously. If participants reported more than one word, a second test was administered in which the experimenter read the two responses in the order of their utterance and asked participants to choose the original target.

Stressor task

Participants were next asked to rate their mood before and after exposure to an acute laboratory stressor. They indicated the extent to which they felt sad on a scale from 0 (not at all) to 10 (very much so).

Following the first mood rating, participants were exposed to a two-part stressor. First, they took part in an anagram task (adapted from MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). Participants were informed that they had 5 minutes to solve as many anagrams as possible but they were allowed only 30 seconds to solve each anagram. A backward counting clock in the upper right corner of the screen reminded participants of this time limit. If the correct solution was not provided within 30 seconds, the computer automatically advanced to the next anagram. Words were adapted from Bushman, Roediger, Balota, and Butler (2005) and were of varying difficulty and commonality. Five unsolvable anagrams were added in order to increase the difficulty of the task. Anagrams were presented in random order.

The second stress task is part of the well used Trier Social Stress Task (Kirschbaum, Pirke, & Hellhammer, 1993). Participants counted backwards aloud from 2,083 to zero in 13-step sequences as quickly and accurately as possible for 5 minutes. Pencil and paper or any automatic calculating device was prohibited. When a mistake was made, the experimenter said 'error' and asked the participant to start again at 2,083. After the 5 minutes had elapsed, participants completed the second mood rating.

RESULTS

Participant characteristics

Twenty-eight participants were assigned to the direct or indirect suppression condition. Conditions did not differ significantly according to age; $t(50) = 0.66$, $p = .510$ ($M_{\text{Direct}} = 20.15$, $SD = 4.57$; $M_{\text{Indirect}} = 19.54$, $SD = 1.24$). Nor did they differ significantly according to BDI score, $t(51) = 1.85$, $p = .070$ ($M_{\text{Direct}} = 7.28$, $SD = 7.29$; $M_{\text{Indirect}} = 12.18$, $SD = 11.27$).[3]

Preliminary analyses

Initial analyses were conducted to examine whether participants' performance during the learning phase differed based on whether participants were assigned to the direct or indirect condition. The two conditions did not significantly differ according to number of attempts required to pass the learning criterion, $t(54) = 1.12$, $p = .266$ ($M_{\text{Direct}} = 1.86$, $SD = 0.76$; $M_{\text{Indirect}} = 1.82$, $SD = 0.67$). In addition, the number of words recalled on the final attempt was analysed using a mixed-design analysis of variance (ANOVA), with a between-subjects factor for suppression condition (direct, indirect) and a within-subject factor for cue category (baseline, suppress, respond). The main effect of cue category, $F(2, 108) = 3.63$, $p = .03$, is explained by participants recalling significantly more targets to

[3]Four participants did not provide age data (two in the direct, two in the indirect condition), and three participants did not complete the BDI (all in the direct condition).

respond cues ($M = 10.57$, $SD = 1.40$) than to baseline cues ($M = 10.07$, $SD = 1.19$), $t(55) = 2.58$, $p = .013$. No other significant differences among cue categories were found. The main effect of suppression condition, $F(1, 54) = 1.26$, and the suppression condition by cue category interaction, $F(1, 54) = 1.02$, were not significant.

Final recall

To examine the mechanisms underlying successful forgetting of negative material, the proportions of words correctly recalled on the final test were analysed in a mixed-design ANOVA, with a between-subjects factor for suppression condition (direct *vs.* indirect) and a within-subject factor for cue category (baseline *vs.* suppress). Recall of targets associated with baseline cues (baseline targets), which were never presented during the training phase, served as the comparison condition for evaluating the forgetting of targets associated with suppress cues (suppress targets). Recall of targets associated with respond cues was not included in the analysis because performance was nearly perfect ($M = 99.9\%$). To reduce error variance we also included a between-subjects factor for the counterbalancing conditions (of which there were three levels); effects involving this factor are not reported.

The main effect of cue category was significant, $F(1, 50) = 71.97$, $\text{MSE} = 108.44$, $p < .001$, $\eta^2 = .59$. Importantly, participants recalled more baseline targets ($M = 91.70\%$, $SD = 9.47$) than suppressed targets ($M = 75.13\%$, $SD = 16.01$), indicating below-baseline forgetting. Next, although below-baseline forgetting seemed to be slightly greater in the direct condition, the predicted interaction of condition with cue category was not found $F(1, 50) = 1.88$, $\text{MSE} = 2.83$, $p = .176$, $\eta^2 = .036$. Figure 1 depicts the mean percentage of targets recalled during the final test for participants in the direct and indirect conditions. The main effect of condition was also not significant, $F(1, 50) = 2.05$, $\text{MSE} = 6.58$, $p = .159$, $\eta^2 = .039$.

Relation between forgetting and stress reactivity

To investigate the relation between intentional forgetting and reactivity to stress, we examined the correlation between participants' performance during the final test phase and

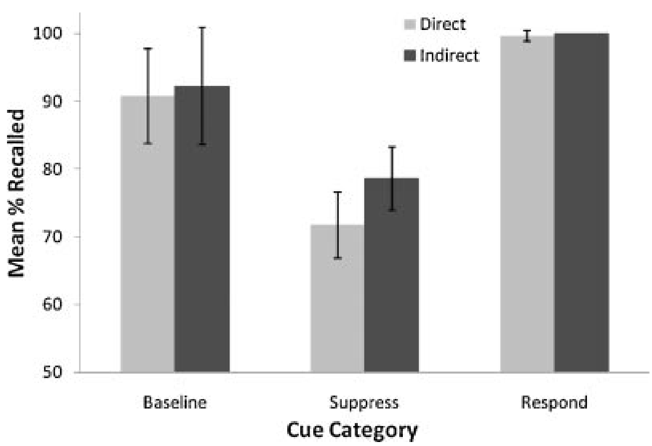

Figure 1. Mean percentage of targets recalled in the two conditions (direct, indirect) for each cue category (baseline, suppess, respond). Error bars represent +/−1 standard error

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change in sad mood ratings in response to the stressor.[4] We first evaluated the first-order correlations between sad mood change (post-stressor mood minus pre-stressor mood) and recall of suppressed targets and baseline targets within each training condition. The correlation between mood change and the number of baseline targets recalled was examined in order to evaluate whether mood change was associated with recall, apart from attempts to suppress. Within the group of participants assigned to the direct condition, sad mood change was not significantly correlated with recall of suppressed targets ($r(26) = .22$, $p = .259$) or baseline targets ($r(26) = .19, p = .331$). A different pattern of findings emerged for the indirect condition. In this condition, sad mood change was significantly correlated with recall of both suppressed targets ($r(26) = -.48$, $p = .010$) and baseline targets ($r(26) = -.60$, $p = .001$).

To assess whether condition (direct *vs.* indirect) moderated the relation between forgetting of negative material and changes in mood in response to the laboratory stress task, we conducted a hierarchical regression analyses to predict sad mood change. All continuous variables were centred in order to facilitate interpretation, and suppression condition was coded using effect coding (indirect = 1; direct = 0). BDI and recall of baseline targets were entered in Step 1 to control for individual differences in depressive symptoms and in general memory functioning. Recall of suppressed targets, suppression condition and their interaction were entered in Step 2. The regression model in Step 1 predicted 9.02% of the variance in sad mood change, $F(2, 50) = 2.48$, $p = .094$. Step 2 explained significantly more variance in sad mood change, R^2 change = .138, $F(3, 47) = 2.80$, $p = .05$. The interaction explained unique variance in sad mood change, $\beta = -.37$, $t(47) = 2.62$, $p = .012$. No other factor emerged as a significant predictor. Follow-up simple slope analyses were conducted within the indirect and direct conditions, controlling for BDI and recall of baseline targets. These analyses revealed that recall of suppressed targets was a significant predictor of sad mood change in the indirect but not direct condition. Within the indirect condition, poor recall of to-be-suppressed targets was associated with significantly greater sad mood change in response to stress, $\beta = -.20$, $SE = 0.08$, $t(47) = 2.44, p = .018$. Within the direct condition, however, the association was non-significant, $\beta = .18$, $SE = 0.12$, $t(47) = 1.47$, $p = .148$.

DISCUSSION

The current study was designed in part to investigate the contribution of direct suppression to substitute-aided forgetting in the TNT paradigm. To our knowledge at the time of design, this was the first study to test whether attempting direct suppression benefits forgetting of words, over-and-above using thought substitutes. When participants use substitutes in order to aid suppression of the original targets—either spontaneously (Hertel & Calcaterra, 2005) or in response to experimental instruction (Hertel & Calcaterra, 2005; Joormann et al., 2009)—below-baseline forgetting can be obtained through an indirect process of retroactive interference or retrieval-induced forgetting. Bulevich et al. (2006) suggested that these indirect effects might be sufficient for suppression-induced forgetting of targets in the TNT paradigm and that direct attempts to suppress thoughts of the targets therefore are not necessary. In our design, this suggestion was evaluated by giving or withholding instructions for direct suppression but providing a consistent basis for indirect suppression

[4]Participants reported significantly more sad mood after the stressor than before, $t(55) = 2.13$, $p = .038$.

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(primarily to control for the fact that participants often voluntarily use substitutes). Interestingly, direct attempts not to think about the target did not significantly improve forgetting on the subsequent test. Recently, Tomlinson, Huber, Reith, and Davelaar (2009) have shown a similar outcome by asking participants to merely press a key when cues were presented. These outcomes, however, do not imply that suppression-induced forgetting cannot be achieved by direct means. Bergstrom, de Fockert, and Richardson-Klavehn (2009) have just as recently shown similar effects of direct and substitute-aided suppression on a same-cue test (similar to the one used here), but differential effects on a test with independent (novel) cues. In the same vein, we cannot rule out the possibility that direct suppression attempts were voluntarily employed by our participants as they attempted to recall the substitutes. Indeed, the successful recall of substitutes might occasionally invite attempts to prevent targets from entering consciousness. These issues underscore the importance of continued investigations of strategies for forgetting in situations in which remembering is undesirable.

Our results also demonstrated an important connection between forgetting and stress reactivity that takes into consideration the way that forgetting is experienced. Participants who recalled fewer suppressed targets felt sadder in response to the stressor, *only* if suppression had been accomplished indirectly. It is possible that participants who were instructed to suppress the negative targets interpreted forgetting as an understandable outcome of intentional suppression, whereas participants whose suppression was merely incidental to the learning of new words might have interpreted forgetting as a failure. These differences in interpretation might have influenced their reactivity to the subsequent forced-failure stressor. Future studies should test this hypothesis by assessing perceptions of self-efficacy or competence.

Successful direct suppression, on the other hand, seemed to vaccinate participants against an emotional reaction to the cognitive stressors. Moreover, although it was non-significant, the correlation between suppression-induced forgetting and reactivity in the direct condition was in the opposite direction to what was found in the indirect condition. This possible relation deserves further investigation in order to discover if memory for negative events following multiple attempts to not think about them produces sadness in response to stress. Such a pattern is especially important given that it is reminiscent of poor cognitive control during rumination.

The current study has limitations that are important to note. For one, it focused on a non-clinical population. The primary aim, however, was not to investigate intentional forgetting in psychopathology (see Cottencin et al., 2006; Geraerts & McNally, 2008; Joormann et al., 2005, 2009) but instead to investigate the mechanisms underlying successful forgetting of negative material and their relation to stress reactivity. Given the initial evidence of a connection between forgetting deficits and stress reactivity, future research might examine whether it can also be found in clinical samples.

A related concern arises from the finding that, in the current sample, BDI scores were slightly, although non-significantly, higher in the indirect condition than in the direct condition. On the chance that the suppression conditions differed in dysphoric mood at the outset, BDI scores were partialled out in the regression analyses and the forgetting–reactivity association was found within the indirect condition. Another possibility, however, is that BDI scores differed due to the manipulation that produced changes in sad-mood reports. Regardless, future studies should consider individual differences in depressive symptoms in this task by measuring depressed mood in the beginning of the session.

A second limitation is that the current study focused only on the suppression of negative material. Although research emphasizes the impact of intrusive negative thoughts and memories on risk for psychopathology, recent studies have shown that clinical populations differ from healthy controls in their processing of positive material as well (e.g. Deveney & Deldin, 2004; LeMoult, Joormann, Sherdell, Wright, & Gotlib, 2009). For example, in addition to enhanced memory for negative stimuli, depressed participants show impaired memory for positive material. Furthermore, the ability to recall positive events has been associated with increased well-being (Mather & Carstensen, 2005). It may therefore be important to examine whether and how individual differences in memory for positive information influence stress reactivity. A related limitation is that our study examined forgetting of individual words. Clearly, future research should use materials with greater ecological validity. Similarly, the use of stressor tasks that are not strictly cognitive in nature and measures of stress that extent beyond self-reports (e.g. neuroendocrine measures) constitute important future directions.

In summary, impairments in the successful forgetting of negative material may have important consequences for individuals' reactivity to acute stressors and thereby increase risk for psychopathology. We provided first evidence for an association between forgetting and stress reactivity by noting the protective role of intentional suppression. Given the importance of stress in the onset of psychopathology (see Monroe, 2008 for a review), future research on training in controlled suppression of negative material could have important implications for interventions.

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