Relationship Between Cognitive Avoidant Coping and Changes in Overgeneral
Autobiographical Memory Retrieval Following an Acute Stressor

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Abstract

According to the functional avoidance hypothesis, overgeneral autobiographical memory, the tendency to retrieve personal memories in a less specific format, might serve an affect-regulating function. Reducing the specificity of memories of negative events may prevent individuals from re-experiencing the associated painful emotions. This cognitive avoidance strategy might not only be employed by depressed and traumatized patients, but also by healthy individuals. In the present study we tested the hypothesis that the increase in memory overgenerality induced by an acute stressor is positively correlated with habitual (cognitive) avoidant coping. Participants ($N = 32$) were exposed to a Trier Social Stress Test. Cognitive avoidant coping was measured at the start of the experiment by means of the Mainz Coping Inventory. Before, immediately after, and 40 min after the Trier Social Stress Test, autobiographical memory specificity was assessed by means of the Autobiographical Memory Test. Cognitive avoidant coping was significantly correlated with an increase in categoric memories from pre to immediately post stressor, but not with change in overgeneral memories from pre to 40 min post stressor. The results of the present experiment provide further support for functional avoidance as one of the mechanisms underlying overgeneral memory.

Keywords: autobiographical memory specificity, cognitive avoidance, cortisol, affect-regulation, stress

1. Introduction

Specificity of autobiographical memory (AM) has been the subject of numerous studies over the past 20 years. These studies consistently show that a lack of AM specificity is a characteristic of suicidal and depressed patients (see Williams et al., 2007, for a review). AM specificity is typically assessed using a cue-word task, the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). In the AMT, respondents are presented with a series of emotional cue words and are asked to retrieve a specific memory in response to each cue word. Extensive research has shown that suicidal and depressed individuals retrieve significantly fewer specific and more categoric memories on the AMT compared to controls (see Williams et al., 2007, for a review). Specific memories are defined as memories that refer to an event that happened at a particular time and place and that did not last longer than one day (e.g., “when we went for a walk in the park and fed the ducks two weeks ago”). Categoric memories, on the other hand, summarize several similar events (e.g., “going for a walk in the park”). This difficulty retrieving specific personal memories is typically referred to as *reduced (autobiographical) memory specificity* or *overgeneral (autobiographical) memory* (OGM).

Throughout the years it has become clear that OGM is not only observed in clinical depression, but also related to a history of trauma (e.g., Hauer, Wessel, Geraerts, Merckelbach, & Dalgleish, 2008; for a review, see Williams et al., 2007). Reduced memory specificity has been observed in trauma related disorders such as posttraumatic stress disorder (PTSD; e.g., McNally, Litz, Prassas, Shin, & Weathers, 1994) and acute stress disorder (ASD; e.g., Harvey, Bryant, & Dang, 1988). Moreover, even in the absence of PTSD, people with a history of sexual or physical abuse or other serious (childhood) adversities have been found to be significantly less specific than people without a history of traumatic experiences (see Williams et al., 2007, for a review). Additionally, in several studies a significant association between OGM and the qualitative or quantitative degree of trauma has been demonstrated

(e.g., de Decker, Hermans, Raes, & Eelen, 2003; Hermans et al., 2004; Raes, Hermans, Williams, Brunfaut, et al., 2006; Raes, Hermans, Williams, & Eelen, 2005).

Recently, interest has grown in the mechanisms that might play a role in the development and maintenance of reduced AM specificity. In their *CaRFAX model*, Williams and colleagues (Williams, 2006; Williams et al., 2007) bring together three strongly interrelated processes that have shown to be involved in the origin of OGM, namely *Capture and Rumination*, *Functional Avoidance*, and reduced *eXecutive capacity and control*. Dalgleish and colleagues (Dalgleish et al., 2007; Dalgleish, Rolfe, Golden, Dunn, & Barnard, 2008) argue that the relative influence of each of these processes on memory specificity may be different in different groups: in depressed patients reduced executive capacity and control may play a greater role, while in trauma-exposed individuals functional avoidance is more likely to underlie OGM than reduced executive control.

In the *functional avoidance hypothesis*, also referred to as the *affect-regulation hypothesis*, reduced memory specificity is explained as a functional affect-regulating strategy, rather than a ‘deficit’ (Hermans et al., 2008; Raes, Hermans, de Decker, Eelen, & Williams, 2003; Williams et al., 2007). The core idea is that people adopt an overgeneral retrieval style to diminish the emotional impact of strongly negative events from the past. Individuals who have been confronted with traumatic events might experience the retrieval of specific memories about these adversities as emotionally painful. In time, they might learn to passively avoid this ‘punishing’ consequence of specifying personal memories by aborting memory retrieval at the stage of overgeneral memories. As such, reduced memory specificity can be considered a case of cognitive avoidance: retrieving memories in a less specific way is negatively reinforced by a reduction in negative affect. In this sense, reduced memory specificity for certain unpleasant events may be a natural and healthy coping strategy that can also be observed in nonclinical groups. It is interesting to note in this regard that a

considerable portion of the evidence for the functional avoidance hypothesis actually stems from studies in nonclinical samples (Hauer, Wessel, & Merckelbach, 2006; Hermans et al., 2008; Hermans, Defranc, Raes, Williams, & Eelen, 2005; Raes et al., 2003; Raes, Hermans, Williams, & Eelen, 2006, Study 1).

Whether the retrieval of nonspecific memories is beneficial in the long term may depend on the amount of flexibility with which an individual can switch between specific and nonspecific retrieval modes (Hermans et al., 2008). If one is able to reduce and augment memory specificity in a selective and flexible way, reduction of memory specificity may be part of a larger set of healthy coping strategies. However, if AM loses its flexibility and the memory retrieval process is chronically truncated at the level of categoric memories, one may become vulnerable for the development of depression or PTSD.

Three predictions that can be derived from the functional avoidance hypothesis have been supported in correlational and experimental studies. A first prediction is that if reduced memory specificity is a protective mechanism that diminishes the affective impact of aversive events, low specific individuals will experience less emotional impact of a stressful event. This prediction has been supported in three studies. In two experimental studies, Raes and colleagues (Raes et al., 2003; Raes, Hermans, Williams, & Eelen, 2006, Study 1; but see Philippot, Schaefer, & Herbette, 2003) found that, after being confronted with a stressful event, low-specific participants reported less affective distress, experienced fewer intrusions, and rated their intrusions as less unpleasant when compared to high-specific participants. In a prospective study, Hermans et al. (2008) found that low-specific students who failed at their first university exams, experienced less sustained emotional distress over a 9 week period when compared to high-specific students. Taken together, these findings provide support for short-term affect-regulatory benefits of reduced memory specificity.

A second prediction that derives from the functional avoidance hypothesis is that if people develop an overgeneral retrieval style to avoid traumatic memories and their associated negative emotions, reduced memory specificity will be significantly associated with avoidance of trauma-related memories. This prediction has been confirmed in a series of studies that have included the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). The IES assesses an individual's reaction to a stressful event. Its two subscales measure intrusions (IES Intrusions) and avoidance (IES Avoidance), two common symptoms of PTSD. Significant positive correlations between OGM and IES avoidance have been demonstrated in clinical and nonclinical samples (Brewin, Watson, McCarthy, Hyman, & Dayson, 1998; Hauer, Wessel, Engelhard, Peeters, & Dalgleish, 2009; Hauer et al., 2008; Hauer, Wessel, & Merckelbach, 2006; Kuyken & Brewin, 1995; Raes, Hermans, Williams, Brunfaut, et al., 2006; Stokes, Dritschel, & Bekerian, 2004; Wessel, Merckelbach, & Dekkers, 2002).

A third prediction that can be derived from the functional avoidance hypothesis is that if reduced memory specificity can be considered a case of cognitive avoidance, OGM will be particularly observed in individuals who exhibit a more general and pervasive avoidant coping style. Hermans, Defranc, Raes, Williams, and Eelen (2005) provided support for this prediction. They showed a significant negative correlation between memory specificity and avoidant coping (as measured by avoidance questionnaires) in a student sample: lower specificity was associated with higher scores on social behavioural avoidance, experiential avoidance and thought suppression.

A fourth prediction that can be derived from the functional avoidance hypothesis was tested in the present experiment. If reduced memory specificity is part of a broader avoidant coping style (Hermans et al., 2005) and if this coping strategy is flexibly employed in healthy individuals (Hermans et al., 2008), it might only become apparent under 'threatening'

conditions (i.e., akin to a socially anxious person who will only avoid or flee from social contacts in case there is a likelihood of negative social evaluation). One possible way to trigger a reduction in memory specificity may be to confront participants with an acute stressor. However, one would predict that such a stressor would only have a negative impact on memory specificity in participants who have an avoidant coping style. In this context, it is interesting to refer to the results of a series of post-hoc analyses on the data of Raes et al. (2003). For these analyses, participants were labelled as high or low cognitive avoiders, based on their scores on the avoidance subscale of the Mainz Coping Inventory (MCI; Krohne et al., 2000). It was found that, after being confronted with the stressor, high cognitive avoiders retrieved significantly fewer specific memories compared to low cognitive avoiders. This difference in memory specificity between high and low cognitive avoiders was not observed after a neutral task (Raes, Van den Broeck, & Hermans, 2005). However, a limitation of this study was that there was no pre-test of memory specificity.

The aim of the present study was to further investigate the relationship between habitual avoidant coping and the impact of an acute stressor on AM specificity in a nonclinical sample. Individual differences in cognitive avoidant coping were assessed before exposing the participants to an acute stressor. We extended previous work in a number of ways. First, while previous studies only measured memory specificity *after* the stressor (Raes, Van den Broeck, et al., 2005), the present study also included a baseline measure of memory specificity. Second, memory specificity was not only measured immediately after the stressor, but also 40 min later. This additional assessment allowed us to explore the duration of a stressor's effect on AM retrieval. Third, to be able to exclude participants who were not distressed by the intended stressor, we assessed cortisol levels before and after as a measure of the participants' level of distress. We planned to only include those participants whose cortisol levels increased from pre to post stressor in the analyses.

We hypothesized that, in participants who were distressed by the intended stressor (as indicated by increased cortisol levels from pre to post), the increase in memory overgenerality from pre to immediately post stressor would be significantly correlated with habitual avoidant coping. As we did not know how long an acute stressor would continue to affect AM retrieval after its cessation, we did not make predictions about the correlation between avoidant coping and change in memory overgenerality from pre to 40 min post stressor. However, based on the assumption that healthy individuals can augment and reduce memory specificity in a flexible way, we did not expect an acute stressor to induce a permanent reduction in memory specificity in nonclinical groups.

2. Method

2.1 Participants

Thirty-two (23 women) first-bachelor psychology students at the University of Leuven participated in this study. Their mean age was 19.25 years ($SD = 1.50$; range = 17-26). They were invited based on their scores on a Beck Depression Inventory (Beck, Steer, & Brown, 1996; van der Does, 2002) that was administered in a collective testing session 4 months prior to the experiment. We selected participants in such a way that their BDI-II scores covered the total BDI-II range (equal number of participants from each decile). They were asked not to eat, drink, smoke, or take medication at least 45 min prior to the experiment.

2.2 Materials

2.2.1 Autobiographical Memory Test (AMT; Williams & Broadbent, 1986; Dutch version by de Decker et al., 2003)

A self-administered AMT was used (Henderson, Hargreaves, Gregory, & Williams, 2002; Raes, Williams, & Hermans, 2009). Instructions followed the standard oral or written AMT, with the exception that they were written instead of read aloud by the experimenter. Participants were given 10 emotional cue words (five positive and five negative, strictly

alternating) and instructed to write down one specific memory in the space provided next to each cue word. A specific memory was defined as a memory that refers to one particular event that took place on a particular day and that did not last longer than one day. Examples of correct (specific) and incorrect (nonspecific) memories were given. Participants were informed that the event could be important or trivial and that it could have happened recently or a long time ago. In addition, they were instructed not to refer to the same event in response to two different cue words. No time limit was used: participants could fill out the AMT at their own pace. Three Dutch parallel versions of the AMT, matched for familiarity, imageability, and emotionality of the cue words, were administered (Raes et al., 2009). The order of the AMT versions was counterbalanced over participants.

Responses were coded as either *specific* (referring to an event that occurred at a particular time and place and lasted less than one day; e.g., “the romantic dinner with my girlfriend two weeks ago”), *categoric* (summarizing several similar events; e.g., “having a walk with my dog”), *extended* (referring to a period that lasted longer than one day; e.g., “our three-day trip to Paris last year”), *semantic associate* (verbal association to the cue or thought about the future; e.g., “my brother”), *same event* (referring to an event already mentioned) or *omission* (no response). Using this scoring procedure, previous studies in our lab obtained a good interrater agreement (e.g., $\kappa = .81$, Raes, Verstraeten, Bijttebier, Vasey, & Dalgleish, 2010). Proportional AMT indices, correcting for the number of omissions, were used in the analyses: Proportion Specific = number of specific memories/ (10 – number of omissions) and Proportion Categoric = number of categoric memories/ (10 – number of omissions).

2.2.2 Beck Depression Inventory, second edition (BDI-II; Beck et al., 1996; Dutch version by van der Does, 2002)

The BDI-II was used to assess self-reported levels of depressive symptoms during the past 2 weeks. Good reliability and validity have been reported for the Dutch version ($\alpha = .93$ in a student population; van der Does, 2002).

2.2.3 Mainz Coping Inventory (MCI; Krohne et al., 2000; Dutch version by Raes, Hermans, & Eelen, 2002)

In line with Raes, Van den Broeck, et al. (2005), the avoidance subscale of the MCI (Krohne et al., 2000) was used to assess habitual (cognitive) avoidant coping. The MCI is a stimulus-response inventory that assesses respondents' habitual preferences for cognitive avoidant and vigilant coping strategies. It comprises four physically threatening (e.g., waiting in the dentist's waiting room having toothache) and four ego-threatening situations (e.g., public speaking). For each situation, respondents are asked to indicate in a true-false response format which of five vigilant (e.g., information seeking, anticipation of negative event) and five cognitive avoidant coping strategies (e.g., denial, attention diversion) they would employ if confronted with the situation described. Measures of habitual vigilance (MCI-V) and cognitive avoidance (MCI-CA) are calculated by summing scored answers separately for vigilant and avoidant items, respectively, across all situations. Research has shown that both MCI scales have good reliability ($\alpha = .84$ for MCI-V and $\alpha = .84$ for MCI-CA) and good validity (Krohne et al., 2000).

2.2.4 Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993, 1993)

The TSST is a well established laboratory stress task. It consists of three parts, each of about 5 min duration: a preparation/ anticipation period, a public speech task, and a mental arithmetic task. First, the participant is instructed to prepare a 5 min speech in the context of a fictitious job interview in front of an audience, consisting of two 'behavioural experts' (who are in fact two assistant-experimenters wearing white coats). Following the 5 min preparation,

the participant has to present himself/herself and convince the audience of his/her capabilities during a 5 min speech, while being videotaped and voice-recorded. During this speech the ‘behavioural experts’ remain formal, cool, and aloof. Afterwards, the participant is asked to do a mental arithmetic task in which he/she has to serially subtract 17 from 2023 as quickly as possible, without making mistakes.

2.2.5 Cortisol

Salivary cortisol samples were obtained using Salivettes (Sarstedt, Ltd., Newton, NC), which are plastic tubes containing small cotton dental rolls. At instructed times (see 2.3), participants were asked to hold the cotton roll in their mouth until it was saturated with saliva. The samples were stored in the freezer until analysis. Cortisol concentrations are expressed as Nmol/L.

2.3 Procedure

After having been introduced to the experiment and given written informed consent, participants underwent a short relaxation procedure (5 min of relaxing music). Next, a first AMT (AMT_{pre}), the BDI-II, and the MCI were administered (in a fixed order; together with other instruments, not of interest for this study), followed by the TSST. Samples of saliva were taken immediately after the relaxation procedure (cortisol t1), immediately before the TSST (cortisol t2; 50-60 min after the first saliva sample), and 0, 10, 20, 30, and 40 min after completion of the TSST (resp. cortisol t3, t4, t5, t6, and t7). Two AMT’s were administered after the TSST: participants started the AMT_{post} between cortisol t3 and t4 and the AMT_{delayed} after cortisol t7.¹ The study was approved by the Ethical Committee of the Faculty of Psychology and Educational Sciences, University of Leuven.

2.4. Data analysis and reduction

We assumed that significant associations between cognitive avoidant coping and increase in memory overgenerality after the TSST would only be observed in participants who

experienced the TSST as a true ‘stressor’. Therefore, we selected those participants who showed increased cortisol levels from pre to post stressor. It has been consistently reported in studies using the TSST (e.g., Kirschbaum et al., 1993) that saliva cortisol concentrations do not peak immediately after cessation of stress, but about 10-15 min later. This was also the case in the present study (see Table 1): salivary cortisol was at its lowest after relaxation (t1) and reached its peak 10 min after the TSST (t4). For the main analyses we selected participants in which cortisol at t4 was higher than cortisol at t1. This ‘distressed group’ ($n = 20$, 13 women) thus consists of only those participants who have experienced (at least minimal) distress following the TSST.

To be able to test whether change in memory overgenerality from the AMT_{pre} to the $AMT_{post}/AMT_{delayed}$ correlated significantly with avoidant coping, we computed two sets of AMT change scores. $\Delta Proportion\ Specific_{pre,post}$ and $\Delta Proportion\ Categorical_{pre,post}$ (i.e., AMT change scores from AMT_{pre} to AMT_{post}) were calculated by subtracting the proportion of specific (categorical) memories on the AMT_{pre} from the proportion of specific (categorical) memories on the AMT_{post} . $\Delta Proportion\ Specific_{pre,delayed}$ and $\Delta Proportion\ Categorical_{pre,delayed}$ (i.e., AMT change scores from AMT_{pre} to $AMT_{delayed}$) were calculated by subtracting the proportion of specific (categorical) memories on the AMT_{pre} from the proportion of specific (categorical) memories on the $AMT_{delayed}$. Consequently, the higher the AMT change scores, the higher the increase in specific (resp. categorical) memories.

Two-sided statistical significance tests were used for all Pearson and partial correlation coefficients. The alpha level was set at .05.

3. Results

Table 1 contains the descriptive statistics in the total group and in the distressed group for the variables used in our analyses and the mean cortisol levels at all time points (t1-t7).

The mean score on the BDI-II (Table 1) indicates that the participants had experienced

minimal depressive symptoms during the two weeks prior to the experiment. The mean scores on the AMT_{pre} indicate that participants retrieved a specific memory in response to approximately 60% of the cues and that approximately 30 to 35% of non-specific memories were categoric.

(Table 1 about here)

Repeated measures ANOVA's with AMT as a within subjects variable showed no significant differences between the three AMT's in proportion of specific or categoric memories in the total group, resp. $F(2, 62) = 1.18, p = .316$ and $F(2, 62) = 0.67, p = .517$, or the distressed group, resp. $F(2, 38) = 0.03, p = .970$ and $F(2, 38) = 1.71, p = .194$. We can thus conclude that there was no general immediate or delayed effect of the TSST on memory overgenerality.

Based on our hypothesis, we expected MCI-CA to correlate positively with $\Delta\text{Proportion Categoric}_{\text{pre,post}}$ and negatively with $\Delta\text{Proportion Specific}_{\text{pre,post}}$. Analyses revealed a significant positive correlation between MCI-CA and $\Delta\text{Proportion Categoric}_{\text{pre,post}}$, $r(20) = .48, p < .05$. Thus, the more cognitive avoidant the participant, the larger the increase in categoric memories from pre to immediately post stressor. This correlation remained significant after controlling for BDI-II, $pr(20) = .50, p < .05$. However, MCI-CA was not significantly correlated with $\Delta\text{Proportion Specific}_{\text{pre,post}}$, $r(20) = .10, p = .69$. No significant correlations were observed between MCI-V and the AMT change scores, all $ps > .10$.

As we did not know how long an acute stressor would continue to affect AM specificity after its cessation, we did not make predictions about the correlations between MCI-CA on the one hand and $\Delta\text{Proportion Specific}_{\text{pre,delayed}}$ and $\Delta\text{Proportion Categoric}_{\text{pre,delayed}}$ on the other hand. Pearson correlation analyses revealed no significant correlations between MCI-CA and $\Delta\text{Proportion Specific}_{\text{pre,delayed}}$, $r(20) = .14, p = .55$, or $\Delta\text{Proportion Categoric}_{\text{pre,delayed}}$, $r(20) = .28, p = .23$. Thus, change in memory overgenerality (compared to

baseline) was significantly associated with cognitive avoidant coping immediately after the stressor but not after a time interval of 40 min.

4. Discussion

A significant correlation was demonstrated between increase in overgeneral (categoric) autobiographical memories following an acute stressor (i.e., the TSST) and cognitive avoidant coping, even after controlling for depression, in participants whose cortisol levels increased from pre to post stressor. Individuals with higher scores for cognitive avoidant coping showed larger increases in the retrieval of categoric memories from pre to immediately post stressor. In the affect-regulation or functional avoidance hypothesis reduced specificity of AM retrieval is conceived as a form of cognitive avoidance (Hermans et al., 2008; Raes et al., 2003; Williams et al., 2007). Importantly, it is assumed that nonclinical individuals use this avoidance strategy in a flexible way (Hermans et al., 2008) and, as a consequence, only exhibit it under certain conditions. The present study shows that confronting participants with an acute stressor is a successful way to trigger increased categorical memory retrieval in nonclinical samples. However, in line with our predictions, the present findings indicate that an acute stressor's impact on memory overgenerality is not equal for all participants but depends on the individual's general tendency to engage in (cognitive) avoidant coping.

No significant correlations were observed between cognitive avoidant coping and changes in memory overgenerality from pre to 40 min post stressor. This finding is in line with the assumption that healthy individuals can switch between specific and nonspecific AM retrieval in a flexible way. The present results provide a first indication that in nonclinical individuals increases in overgeneral AM retrieval induced by a mild stressor may only arise within 30-40 min after cessation of the stressor. However, further studies, in which memory specificity is assessed at fixed time intervals (e.g., every 10 min) after cessation of a stressor,

are warranted to investigate the course of memory specificity following stressors of different intensities in healthy individuals.

Of the two indices of change in memory specificity from pre to post stressor, namely increase in proportion of specific memories and increase in proportion of categoric memories, only the latter showed significant associations with avoidant coping. One possibility may be that, given the rather small sample, the nonsignificance of the associations with the first index is caused by a lack of power. However, within the research domain of AM specificity, it is common to find significant relationships with only one of the AMT-indices, i.e., number/proportion of specific memories or number/proportion of categoric memories (for an illustration, see Williams et al., 2007, Tables 1 and 2). Given the fact that there are different types of non-specific memories, of which categoric memories is only one, both indices are not totally complementary. The inconsistent results may thus indicate that the two indices do not measure exactly the same construct. It would be interesting to investigate this issue in more detail in future research.

In the context of the present findings, it is interesting to refer to the results of a recent study on the relationships between stress-induced cortisol levels and memory specificity by Tollenaar, Elzinga, Spinhoven, and Everaerd (2009). Although the authors did not intend to test the present hypothesis, the data are relevant since the authors included a significance test of the difference in memory specificity between participants who had been exposed to a TSST and participants in a no-stress control condition. However, the data showed no effect of the stressor on the amount of overgeneral memory.

The results of the present experiment point to two factors that may have accounted for the nonsignificant results of Tollenaar et al (2009). First, due to a variety of individual difference variables (e.g., level of self-confidence, level of social anxiety, level of experience with public speech), the TSST may not have induced a sufficient amount of distress to affect

memory specificity in some participants. Second, not all participants in this study may have exhibited an avoidant coping style. Given that previous research has shown that reduced memory specificity is part of a broader avoidant coping style (Hermans et al., 2005), one could assume that particularly high avoiders may regulate their affect by reducing memory specificity following a stressful event. The present results support this assumption.

In future studies it would be interesting to adapt the present procedure in two ways. A first addition would be the assessment of self-reported (negative) affect before and after the stressor. This would allow one to test an additional prediction derived from the affect-regulation/ functional avoidance hypothesis, namely that if OGM is an affect-regulating strategy, increased categorical retrieval would be significantly related to less negative affect following a stressor. However, importantly, we believe that we provided support for the affect-regulation/ functional avoidance hypothesis in the present study by demonstrating a significant, yet context-dependent, association between avoidant coping and OGM in a nonclinical sample.

Second, we would recommend to include a control condition with a nonstressful control task. As the present experiment did not include a control condition in which memory specificity was repeatedly assessed in the absence of a stressor, we cannot rule out the possibility that cognitive avoidance is related to increased categoric retrieval from a first to second AMT, independent from the administration of a stressor in the meantime. However, there are no indications in the literature that increase in memory overgenerality due to repeated assessment of memory specificity is associated with avoidance. For example, in a recent study in a student sample, no significant correlations between avoidant coping and change in memory specificity from a first to a second AMT were observed if both AMT's were administered under neutral conditions (Debeer, Raes, Williams, & Hermans, 2010).

In future studies, it would be interesting to also address the following limitations of the present study. First, we did not include a measure of (past) trauma exposure. It would be interesting to incorporate this in a future study, since trauma exposure and posttraumatic morbidity are known to be related to (a) avoidant coping (Olf, Langeland, & Gersons, 2005), (b) AM specificity (for a review, see Williams et al., 2007) and (c) basal cortisol levels (Olf et al., 2005). In addition, current or past diagnoses of depression or PTSD should be assessed.

Second, the possible mediating role of other variables was not examined. One possible mediator for the observed relationship between avoidant coping and increased categorical retrieval following the stressor, could be rumination, given that rumination has shown to be related to both avoidant coping (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) and OGM (Williams et al., 2007). Another possible mediator could be reduced executive resources. In our view, the use of cognitive avoidance strategies during exposure to a stressor is likely to consume executive resources. This reduction in executive resources may, in turn, cause difficulties in retrieving specific autobiographical memories (for a more thorough discussion on the association between reduced executive capacity and OGM, see Dalgleish et al., 2007). It would be interesting to investigate the role of rumination and executive resources in a future study in this research line.

Finally, the present experiment was conducted in a nonclinical sample. As a result, we do not know whether our results generalize to clinical samples of emotionally disturbed patients. Therefore, future studies should investigate the effect of an acute stressor on AM specificity in depressed or traumatized patients. OGM in patients with emotional disorders might represent an end-state in which AM has lost its flexibility (Hermans et al., 2008). Consequently, an acute stressor may not have an impact on memory specificity in these clinical groups.

In summary, the current study showed, for the first time to our knowledge, that increase in memory overgenerality following a stressor is associated with cognitive avoidant coping in nonclinical individuals. The results of the present experiment provide further support for functional avoidance as one of the underlying mechanisms of OGM, by pointing to the possibility that a stressful event is followed by an increase in AM overgenerality in high avoiders.

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Footnotes

- ¹ Participants were allowed to read a magazine during the spare time between the AMT_{post} and the AMT_{delayed} (during which cortisol t4, t5, and t6 were assessed).

Table 1

Descriptive statistics for AMT_{pre} , AMT_{post} , $AMT_{delayed}$, $BDI-II$, and MCI and mean cortisol levels at all time points in the total ($N = 32$) and the distressed group ($N = 20$)

		Total group		Distressed group	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AMT_{pre}	Proportion Specific	0.63	0.20	0.60	0.19
	Proportion Categorical	0.11	0.09	0.14	0.10
AMT_{post}	Proportion Specific	0.57	0.22	0.61	0.22
	Proportion Categorical	0.13	0.14	0.09	0.12
$AMT_{delayed}$	Proportion Specific	0.58	0.24	0.60	0.23
	Proportion Categorical	0.14	0.15	0.11	0.12
$BDI-II$		8.12	6.61	8.60	6.02
MCI	CA	19.84	6.82	18.20	6.14
	V	21.91	6.58	21.95	7.60
Cortisol	t1	3.72	1.73	3.76	1.97
	t2	3.85	1.95	4.42	2.12
	t3	5.28	3.13	6.76	3.01
	t4	6.77	4.64	8.93	4.40
	t5	5.90	4.01	7.75	3.98
	t6	4.74	2.89	6.07	2.85
	t7	3.99	2.22	4.95	2.23

Note. AMT_{pre} = Autobiographical Memory Test administered before the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), AMT_{post} = Autobiographical Memory Test administered immediately after the TSST, $AMT_{delayed}$ = Autobiographical Memory Test administered 40 min after the TSST, $BDI-II$ = Beck Depression Inventory – second edition, MCI = Mainz Coping Inventory (subscales: CA = cognitive avoidance, V = vigilance), cortisol t1 = after relaxation (50-60 min before TSST), cortisol t2 = immediately before TSST, cortisol t3 = immediately after TSST, cortisol t4 = 10 min after TSST, cortisol t5 = 20 min after TSST, cortisol t6 = 30 min after TSST, cortisol t7 = 40 min after TSST. All cortisol concentrations are expressed as Nmole/L.