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**The Benefits of Expressive Writing on  
Overgeneral Memory and Depressive Symptoms**

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**The Benefits of Expressive Writing on  
Overgeneral Memory and Depressive Symptoms**

**by**

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For my family,  
the greatest source of my strength, happiness, and love.

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# **The Benefits of Expressive Writing on Overgeneral Memory and Depressive Symptoms**

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Two decades of research suggest that a non-specific style of autobiographical memory retrieval—known as overgeneral memory—may be a cognitive style that increases depression vulnerability. Recent theorizing and empirical evidence suggest the mechanisms underlying overgeneral memory include rumination and avoidance. This study provided a preliminary investigation of the effectiveness of an expressive writing intervention, which has been found to reduce rumination and avoidance, in reducing overgeneral memory, with the ultimate goal of preventing future depressive symptoms among non-depressed college students.

Two hundred and seven non-depressed college students completed the expressive writing intervention, in addition to a one-month and six month follow-up assessment. Participants were randomized one of three writing conditions: traditional expressive writing, specific expressive writing, or control writing. Participants in the traditional and specific expressive writing conditions were instructed to write about their deepest

thoughts and feelings about an emotional event; the specific expressive writing condition contained the additional instruction that participants describe the events in a vivid and detailed manner. Participants in the control condition were instructed to write about a neutral topic (i.e., time management). All groups wrote for 20 minutes on three consecutive days.

Study results showed that compared to participants in the control writing condition, participants in the traditional and specific expressive writing conditions demonstrated significantly greater autobiographical memory specificity at the six-month follow-up, but not at the one-month follow-up. Furthermore, the observed increase in autobiographical memory specificity for the expressive writing conditions could not be attributed to change in depressive symptoms over the same time interval. Results revealed that the effect of the traditional expressive writing intervention on increased autobiographical memory specificity was partially mediated by a reduction in avoidance assessed at the one-month follow-up. The hypothesis that rumination would partially mediate the effect of the expressive writing intervention on increased autobiographical memory specificity was not supported. Despite preliminary evidence that an expressive writing intervention compared to a control writing condition is effective in increasing autobiographical memory specificity over a six-month period for initially non-depressed college students, it remains to be seen if increased autobiographical memory specificity decreases vulnerability to future depressive symptoms.

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## CHAPTER ONE

### Introduction

Depression is a common disorder with serious consequences. In any given year, approximately 14.8 million American adults are affected by major depressive disorder (Kessler, Chiu, Demler, & Walters, 2005) and by the year 2020, the World Health Organization expects depression to become the second leading cause of the global burden of disease. Lifetime prevalence rates for major depression are as high as 20% for women and 12% for men (Kessler, McGonagle, Swartz, & Blazer, 1993). Moreover, estimates suggest that at least 60% of individuals who have experienced one episode of depression will go on to experience another episode, with each episode further increasing the risk of relapse (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, 4th edition text revision, 2000). Also, more than half of all suicides occur in persons suffering from depression, and individuals with depression are 30 times more likely to commit suicide than the general population (Barracough, Bunch, Nelson, & Sainsbury, 1974).

Given the serious and recurrent nature of depression, an important goal among researches from a cognitive perspective has been to identify mental processes that render individuals vulnerable to developing the disorder. By identifying these cognitive patterns, or vulnerability mechanisms, interventions can be developed that specifically target these variables with the hope of preventing depressive relapse. Two decades of research suggest that a non-specific style of autobiographical memory retrieval—known as overgeneral memory—may be a trait-like cognitive style that increases depression vulnerability.

Overgeneral memory refers to the tendency to recall autobiographical information from one's past in a general, as opposed to a specific, manner. By definition, overgeneral memories lack a specific reference to a particular date and time and often describe a general category of events. The classic paradigm used to measure overgeneral memory is the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). On the AMT, participants are instructed to retrieve specific memories in response to cue words. It has been documented that on the AMT, people suffering from depression often fall short of accessing specific memories, and instead provide memories that are overgeneral (see Williams et al., 2007 for a review). Overgeneral memory is also associated with delayed recovery from depression (e.g., Brittlebank, Scott, Williams, & Ferrier, 1993; Dalgleish, Spinks, & Yiend, 2001a; Peeters, Wessel, Merckelbach, & Boon-Vermeeren, 2002). Furthermore, it appears that an overgeneral style of retrieval does not disappear upon recovery from depression (Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, Leibetseder, & Fartacek, 2000; Williams & Dritschel, 1988) and predicts future depression (Gibbs & Rude, 2004; Mackinger, Loschin et al.; Mackinger, Pachinger et al.; van Minnen, Wessel, Verhaak, & Smeenk, 2005).

Why would overgeneral memory contribute to depression? People often draw on specific past failures and successes to solve current problems, set future goals, and anticipate future outcomes. In this context, it is conceivable that reduced access to specific memories could lead to variety of negative outcomes related to depression such as difficulties imagining a positive future and difficulties setting realistic and achievable goals (e.g., Dickson & Bates, 2006; Goddard, Dritschel, & Burton, 1998).

Given evidence that overgeneral autobiographical memory may render individuals more vulnerable to developing depression, it is of great interest whether overgeneral memory can be reduced by psychological intervention, thereby preventing the onset of depression. However, only three studies have investigated the effects of psychological treatment on overgeneral memory. Further research endeavors aimed at reducing overgeneral memory through theoretically informed interventions are clearly needed. Recent theorizing and empirical evidence suggest the mechanisms underlying overgeneral memory include rumination and cognitive avoidance (Williams, 2006; Williams et al., 2007). Thus, the first aim of the current study was to evaluate the usefulness of an expressive writing intervention (Pennebaker, 1989; 1997), which has been found to reduce rumination and facilitate emotional processing (Gortner, Rude, & Pennebaker, 2006), in reducing overgeneral memory.

To this end, undergraduate college students who were not currently depressed were recruited from the Educational Psychology subject pool. Participants were randomly assigned to one of three writing conditions: 1) traditional expressive writing, specific expressive writing, or control writing. Participants in the traditional and specific expressive writing conditions were instructed to write about their deepest thoughts and feelings about an emotional event; the specific expressive writing condition contained the additional instruction that participants describe the events in a vivid and detailed manner. The specific expressive writing group was included based on the logic that explicitly encouraging participants to focus on the detailed aspects of their past experiences may increase the intervention's effectiveness on the ability to retrieve specific autobiographical memories. Participants in the control condition were instructed to write

about a neutral topic (i.e., time management). All groups wrote for 20 minutes on three consecutive days. Participants completed a computerized version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), the commonly used methodology to assess overgeneral memory, immediately before receiving the intervention (Time 1) and one month following the intervention (Time 2). It was predicted that the expressive writing interventions would result in reduced overgeneral memory (increased autobiographical memory specificity), whereas no equivalent change was expected for the control condition.

The second aim of the study was to explore *how* the expressive writing intervention might influence overgeneral memory. The expressive writing intervention was explicitly chosen for its potential to target two of the mechanisms that are thought to contribute to overgeneral memory - rumination and cognitive avoidance. The benefits of the expressive writing intervention on reduced overgeneral memory were expected to operate through the intervention's direct influence on rumination and avoidance (i.e., rumination and avoidance will mediate the effect of the expressive writing intervention on overgeneral autobiographical memory). Therefore, in addition to the AMT, participants also completed measures of rumination, avoidance, and depression symptoms immediately before receiving the intervention (Time 1) and one month following the intervention (Time 2).

Ultimately, the purpose in attempting to reduce overgeneral memory is the potential to prevent future depressive symptomatology. Therefore, participants completed a measure of depressive symptoms six months following the intervention (Time 3). It was anticipated that the expressive writing intervention would result in reduced overgeneral

memory, which in turn would result in lower rates of future depressive symptoms. In other words, autobiographical memory specificity was predicted to mediate the benefits of the expressive writing intervention on follow-up depressive symptoms.

As mentioned previously, the expressive writing intervention was also predicted to reduce rumination and avoidance, which are also prospectively linked to depression (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). In line with current theoretical models of overgeneral memory, it was hypothesized that rumination and avoidance, in addition to overgeneral memory, would each partially mediate the effects of the expressive writing intervention on depressive symptoms assessed at the six-month-follow-up (Time 3).

In summary, this study provided a preliminary investigation of the effectiveness of Pennebaker's expressive writing paradigm (1989, 1997) in reducing overgeneral memory, with the ultimate goal of preventing future depressive symptoms among currently non-depressed college students. Uncovering the mechanisms of action of the writing intervention on possible reductions in overgeneral memory will go far to validate current theories, or shed light on new ideas, regarding the processes that are thought to contribute to overgeneral memory. Furthermore, exploring the effects of rumination, avoidance, and overgeneral memory in predicting future depressive symptoms will contribute to the understanding of processes that increase and reduce depression vulnerability.

## CHAPTER TWO

### Review of the Literature

Nearly all forms of psychotherapy rely on the ability of clients to recall specific events from their past. These autobiographical memories, regardless of whether they took place during childhood or just yesterday, provide the material that is processed during therapy sessions. Clearly, the ability to recall specific events from the past plays an important role in recovering from psychological distress. An emerging body of literature suggests that the ability to recall specific memories may play an important role in the onset and maintenance of psychological distress as well and, particularly, the onset and maintenance of depression.

This review begins by providing a historical and theoretical context for research on overgeneral memory. The review continues with a description of the common methodology used to assess overgeneral memory. Next, the evidence suggesting that overgeneral memory is trait-like cognitive marker that may increase depression vulnerability is discussed. After explaining the mechanisms that are thought to contribute to overgeneral memory—avoidance and rumination—it becomes clear why expressive writing may be an appropriate intervention to reduce overgeneral memory, thus potentially preventing the onset or recurrence of depression.

#### *Overgeneral Autobiographical Memory*

Autobiographical memory refers to “the aspect of memory that is concerned with the recollection of personally experienced past events” (Williams et al., 2007).

Autobiographical memories provide us with stability in our sense of self by linking our past experiences, including our thoughts and emotions, with our present sense of who we

are. Some theorists even maintain that autobiographical memories are, in fact, a part of the self (Conway & Pleydell-Pearce, 2000).

Given the central role autobiographical memory plays in our mental functioning, researchers from a cognitive perspective have been interested in the functions of autobiographical memory in depression. Cognitive theories of depression (Beck, 1967; Beck, Rush, Shaw, & Emery, 1979) contend that negatively biased information processing plays a critical role in perpetuating and maintaining depression. Early work from this tradition focused on negative biases in the recollection of autobiographical memories (for reviews, see Blaney, 1986; Coyne & Gotlib, 1983). For example, numerous studies found that depression was associated with an increased likelihood of recalling negative memories (e.g., Clark & Teasdale, 1982) and with speeded access to negative memories (e.g., Lloyd & Lishman, 1975).

*First overgeneral memory study.* Emerging from this general body of literature was the inadvertent discovery by Williams and Broadbent (1986) that when asked to recall *specific* autobiographical memories in response to positive and negative cue words, hospital inpatients who had recently attempted suicide by self-poisoning, compared with nondepressed controls, were more likely to provide memories that were inappropriately general, rather than memories that referred to specific events. The observed differences in memory specificity between the suicidal patients and the controls could not be accounted for by deficits in semantic processing or by the time period from which memories were recalled (distant or more recent event). Moreover, Williams and Broadbent reported that many of the suicidal patients acknowledged their difficulty in recalling specific memories.



The discovery that suicidal patients tend to recall autobiographical memories that lack specificity has been replicated with marked success (Evans, Williams, O'Loughlin, & Howells, 1992; Kaviani, Rahimi-Darabad, & Naghavi, 2005; Pollock & Williams, 2001; Williams, 1996; Williams & Dritschel, 1988). Williams and Broadbent's (1986) now famous study has since spawned three decades of empirical work on the phenomenon that has come to be known as overgeneral memory. Although early studies focused on overgeneral memory in suicidal patients, the majority of studies have examined overgeneral memory among individuals with depression.

*Definition of overgeneral memory.* Overgeneral memory refers to the tendency to recall autobiographical information from one's past in a general, as opposed to a specific, manner. Overgeneral memories lack a specific reference to a particular date or time and often describe a general category of events. For example, "I enjoy going to coffee shops every Sunday" would be considered overgeneral, whereas "I enjoyed having coffee with Susan last Tuesday" would be a specific memory. By definition, specific memories refer to a particular event that lasted one day or less (Williams, Teasdale, Segal, & Soulsby, 2000). Before discussing the literature linking overgeneral memory and depression, it is important to describe The Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), the most commonly used methodology to assess overgeneral memory.

#### *The Autobiographical Memory Test*

*Description of the AMT.* The classic paradigm used to assess overgeneral memory is the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). On the AMT, participants are instructed to recall a *specific* event that took place in their past in response to cue words. Participants are told that a specific memory is an event that

occurred within the span of one day – no more. The instructions also indicate that participants should try their best to recall a different memory for each cue. Participants are typically offered corrective feedback on the first few trials to ensure adequate understanding of task instructions. Traditionally, the memories are verbally recalled by the participant and recorded by the experimenter. On the self-administered version of the AMT, participants write or type their responses below each cue word. The memory responses are later coded for specificity to obtain an estimate of overgeneral memory.

*Computerized adaptation of the AMT.* In a recent adaptation of the traditional AMT, Rekart, Mineka, and Zinbarg (2006) developed and examined the efficacy of a self-administered computerized version of this task. Within a sample of college students, their results replicated the central finding in the overgeneral memory literature that dysphoric participants provided memory responses that were less specific and more overgeneral than non-dysphoric participants. Particularly encouraging was the sensitivity of the computerized AMT to detect group differences in a non-clinical college student sample.

The computerized version of the AMT has several advantages over the traditional administration. Specifically, the computerized administration offers greater participant anonymity and provides increased standardization in administration procedures. Whereas the traditional AMT can take up to 30 minutes to administer to each participant, the computerized version is self-administered, and therefore more time and cost efficient. Conversely, a disadvantage of the computerized administration is the inability to provide corrective feedback during practice trials.

*Inconsistencies involving the use of the AMT.* Several aspects of the AMT have varied considerably across studies. First, there has been variability regarding the type and number of cue words. Typically, the cue words are equally distributed among words chosen to evoke positive and negative emotions. Several studies have also included a proportionate number of neutral/non-emotional cue words (e.g., Pollack & Williams, 2001). Although many studies have used the ten cue words (five positive and five negative) from the original AMT (Williams & Broadbent, 1986), researchers have also developed new lists of cue words (e.g., Raes et al., 2006; Williams et al., 2000). These new lists of cue words have varied in length. For instance, Mansell and Lam (2004) used only two cue words (one positive and one negative), while others studies have used as many as 30 cue words (Ramponi, Barnard, & Nimmo-Smith, 2004).

Second, studies have varied in the maximum amount of time that is allotted for participants to respond to each cue word. For example, this latency time has ranged from 30 seconds (e.g., Watkins & Teasdale, 2001) to two minutes (e.g., Peeters et al., 2002; Wessel, Meeren, & Peeters, 2001). The maximum response time may be important because it could influence the likelihood that participants will be able to retrieve a specific memory. Nevertheless, relative to studies that have used restricted latencies, studies that have allowed participants an unlimited amount of time to respond have reported comparable effects (e.g., Harvey, Bryant, & Dang, 1998; Rekart et al., 2006).

Finally, there has been variation in the literature regarding the way that overgeneral memory is operationalized. As mentioned previously, the memories that are recalled on AMT are eventually coded to obtain an estimate of overgeneral memory. Memories are coded as specific if they refer to a specific event that happened at a

particular place and time and did not last longer than 24 hours (Williams & Broadbent, 1986). Roughly half of the existing studies define overgeneral memory as a lack of specificity and, in turn, use the number of specific memories in their analyses. In other words, memories that are not specific are considered overgeneral. Rather than use the number of specific memories as the estimate, the remaining studies have used the number of overgeneral memories as the estimate in their analyses. Although the distinction between these two methods is subtle, using the number of specific memories as the estimate of overgeneral memory involves the assumption that omission responses (i.e., a failure to provide any memory) are overgeneral memories (van Vreeswijk & de Wilde, 2004). However, in a recent review of the overgeneral memory literature, Williams et al. (2007) suggested that overgeneral memory can be detected by using either a lack of specificity or the presence of overgenerality as the outcome variable. As a final point, in concordance with the literature and for ease of expression, the term overgeneral memory as used throughout this review and study will refer both to a lack of specificity and to the presence of overgeneral memory.

In summary, there has been wide variation involving the use of the AMT. This variation could lead to inconsistent findings across studies and may obscure the ability to detect effects involving overgeneral memory (van Vreeswijk & de Wilde, 2004). On the other hand, the large number of studies that have documented the presence of overgeneral memory could be taken as evidence that the AMT is relatively robust regarding variations in administration. Williams and colleagues recently suggested that researchers diversify the methods they use to assess overgeneral memory, as new methods of assessment might elucidate new mechanisms that contribute to overgeneral memory (Williams et al., 2007).

### *Overgeneral Memory and Depression Vulnerability*

*Correlational evidence.* A number of correlational studies have examined overgeneral memory in the context of depression fairly extensively and have provided evidence that overgeneral memory may render individuals more vulnerable to developing depression. There is substantial evidence that overgeneral memory is elevated among currently depressed individuals relative to non-depressed controls. For example, Williams and Scott (1988) found that inpatients diagnosed with major depressive disorder (MDD) provided significantly more responses on the AMT that were overgeneral compared to non-depressed controls, who were matched for age and level of education. Regarding MDD, this effect has been replicated in numerous cross-sectional studies involving outpatients (Barnhofer, De Jong-Meyer, & Kleinpass, 2002; Goddard, Dritschel, & Burton, 1996, 2001; Kuyken & Dalgleish, 1995; Moore, Watts, & Williams, 1988; Puffet, Jehin-Marchot, Timsit-Berthier, & Timsit, 1991; Wessel et al., 2001), cancer patients (Brewin, Watson, McCarthy, Hyman, & Dayson, 1998), participants with comorbid borderline personality disorder (Kremers, Spinhoven, & Van der Does, 2004), and adolescents diagnosed with a first episode of major depression (Park, Goodyer, & Teasdale, 2002). Additional studies have found that overgeneral memory is also associated with sub-clinical levels of depression (Goddard, Dritschel, & Burton, 1997; Moffitt, Singer, Nelligan, & Carlson, 1994; Ramponi et al., 2004; Rekart et al., 2006).

Because relapse rates for depression are as high as 80% (Judd, 1997), the presence of overgeneral memory in formerly depressed individuals would lend further support to the notion that overgeneral memory is a trait-like marker that is associated with depression. Several studies have provided such evidence by comparing levels of

overgeneral memory between groups of participants who have never experienced depression and participants who have been depressed in the past but are not currently depressed. Results from three studies have demonstrated that relative to controls with no lifetime history of MDD, adolescents (Park et al., 2002) and adults (Mackinger, Pachinger et al., 2000; Spinhoven, Bockting, Kremers, Schene, & Williams, 2007) with previous MDD who were currently in remission displayed significantly more overgeneral memory on the AMT. Moreover, each of these studies demonstrated that the reported effects were not due to group differences in current depressive symptoms.

The fact that overgeneral memory is observable among formerly depressed individuals, as well as currently depressed individuals, suggests that overgeneral memory persists into remission and is not merely a function of depressed mood. In fact, a consistent finding throughout the literature is that overgeneral memory is not dependent on current mood. For example, Brittlebank et al. (1993) reported that among participants with MDD, baseline levels of overgeneral memory predicted depressive symptoms seven months later, after controlling for baseline levels of depressive symptoms. Importantly, levels of overgeneral memory remained stable over the follow-up period and did not appear to change as depressive symptoms remitted. This finding has been replicated in several additional studies (e.g., Dalgleish, Spinks, & Yiend, 2001b; Mackinger et al., 2004; Peeters et al., 2002), but see Brewin, Reynolds, and Tata (1999) for contradictory results.

*Prospective evidence.* Several studies have attempted to show that overgeneral memory is prospectively related to the onset of depression. Consistent with diathesis-stress models of depression (e.g., Abramson, Metalsky, & Alloy, 1989; Beck, 1967),

there is evidence that overgeneral memory (the diathesis) may increase the negative impact of stressful life events to engender depression. For example, after controlling for initial levels of depressive symptoms, overgeneral memory has been found to predict future depressive symptoms in nonclinical samples exhibiting varying levels of depression following failed in vitro fertilization (van Minnen et al., 2005), the birth of a child (Mackinger, Loschin et al., 2000), and negative life events (Gibbs & Rude, 2004).

#### *Overgeneral Memory and Other Clinical Groups*

It is worth noting that overgeneral memory has been investigated in several other clinical groups. Overgeneral memory has not been found in individuals with generalized anxiety disorder (e.g., Burke & Mathews, 1992) or social phobia (Wenzel, Jackson, & Holt, 2002). Among individuals with obsessive-compulsive disorder (e.g., Wilhelm, McNally, & Baer, 1997) and borderline personality disorder (e.g., Arntz, Meeren, & Wessel, 2002; Kremers et al., 2004), overgeneral memory was only present for individuals with co-morbid diagnoses of MDD. In contrast, several studies have found evidence of overgeneral memory in posttraumatic stress disorder (PTSD) after controlling for current depressive symptoms (e.g., McNally, Lasko, & Macklin, 1995; McNally, Litz, Prassas, Shin, & Weathers, 1994). Interestingly, these studies reveal that it is the symptomatology of PTSD, particularly the intrusion and avoidance of autobiographical memories, that contributes to overgeneral memory rather than the exposure to traumatic events (Moore & Zoellner, 2007). Intrusions and avoidance are common in both PTSD and depression (Reynolds & Brewin, 1999) suggesting that it may be the overlap in symptoms that accounts for the presence of overgeneral memory in both disorders.

### *How Does Overgeneral Memory Contribute to Depression?*

*Impaired problem solving.* Overall, there is accumulating evidence that an overgeneral style of autobiographical memory retrieval possibly represents a trait-like cognitive style that is causally related to the development of depression. This begs the question: Why does overgeneral memory contribute to depression? First, there is evidence that overgeneral memory impairs interpersonal problem solving ability (e.g., Goddard et al., 1996, 1997, 1998; Goddard, Dritschel, & Burton, 2001; Williams et al., 2006). People often draw on specific past experiences to successfully navigate social interactions (e.g., “How did I make friends last time I moved?”). When faced with difficult situations, individuals who are not able to access specific memories will be at a disadvantage as they are only able to generate a limited number of solutions to their problems (Williams et al., 1996).

*Inability to imagine the future.* Second, there is evidence that overgeneral memory impairs the ability to imagine the future (e.g., Dickson & Bates, 2006; Williams et al., 1996). Recent fMRI evidence revealed striking overlap in the neural pathways involved in recalling past events and imagining future events (Addis, Wong, & Schacter, 2007). In fact, the authors propose that from an evolutionary perspective, the primary function of the episodic memory system may be to store and retrieve specific autobiographical memories in order to predict and imagine the future. The ability to reference past failures or successes to set future goals and the ability use past experiences to anticipate future outcomes is clearly adaptive. In this context, reduced access to specific memories could lead to variety of negative outcomes related to depression such as difficulties imagining a positive future and difficulties setting realistic and achievable goals.



### *Models of Autobiographical Memory in Normative Functioning*

The current understanding of the overgeneral memory phenomenon is based on Conway's (2005; Conway & Pleydell-Pearce, 2000; Conway, Singer, & Tagini, 2004) highly regarded Self-Memory System (SMS) which describes a framework for understanding autobiographical memory in normative functioning. According to the SMS model, information that is encoded from life experiences is stored in two distinct memory systems based on the content of the information. The first system, referred to as the autobiographical knowledge base, contains temporally defined conceptual autobiographical knowledge. The information within this system is arranged in an interconnected, hierarchical manner, ranging from abstract to more specific knowledge. For example, knowledge of particular lifetime periods (e.g., "When I was in college") would be represented further up the hierarchy than knowledge of general events (e.g., "Studying for final exams at the end of each semester"). The second memory system, which is lower in the hierarchy than the autobiographical knowledge base, stores information that has been encoded from specific life experiences in the form of episodic memories. Episodic memories contain detailed records of specific sensory-perceptual-affective experiences (Tulving, 2002; Wheeler, Stuss, & Tulving, 1997). Tulving also notes that episodic memories often contain visual images and involve an awareness of oneself in the past, termed auto-noetic consciousness.

### *Construction of Autobiographical Memories*

According to the SMS model, specific autobiographical memories are constructed when autobiographical knowledge (conceptual information) joins with corresponding episodic memories (sensory-perceptual-affective information). Supervisory control

processes (executive processes) oversee and guide this construction process.

Neuroanatomical evidence has revealed that conceptual autobiographical knowledge and the supervisory control processes involve frontal-temporal networks (prefrontal anterior-temporal), whereas episodic memories are stored in posterior networks (Conway, 2005; Conway, Pleydell-Pearce, & Whitecross, 2001). Evidence from several EEG studies has demonstrated that recalling a specific autobiographical memory involves the gradual spread of activation throughout the brain that originates in the frontal regions (control processes), spreads through the temporal regions (where autobiographical knowledge is stored), and eventually reaches the posterior regions of the brain (where episodic memories are stored). The experience of recalling a specific autobiographical memory involves “the gradual interlocking of control processes with the autobiographical memory knowledge base and especially sensory-perceptual episodic memories” (Conway, 2005, p. 622).

In summary, autobiographical memories are not stored in the brain as complete records of past experiences; rather, they are constructed when conceptual level autobiographical knowledge from one part of the brain (e.g., Walking my dog every morning) joins with information regarding specific experiences (e.g., When I met my neighbor David) from another part of the brain. Retrieving a specific memory is thought to occur through an intentional and consciously directed search process known as *generative* retrieval (Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway et al., 2004). When presented with a cue on the ATM, the first step typically involves elaborating the cue by generating a number of semantic associations. The associations are

used to access information further down the specificity hierarchy. Through an iterative process of elaborating and searching, specific memories are eventually reached.

#### *Overgeneral Memory as Truncated Search*

Overgeneral memory responses are thought to occur when the generative retrieval process is terminated before episodic memories are accessed (Williams et al., 2007; Williams et al., 2006). As a result, memories for specific events are not accessed and the response remains at the level of conceptual autobiographical knowledge. Stated simply, overgeneral memories are the result of a truncated memory search.

#### *Mechanisms that Contribute to Overgeneral Memory: CaR-FA-X*

In an integration of the Self-Memory System model and the empirical literature on overgeneral memory, Williams and colleagues have recently proposed the CaR-FA-X model to summarize the mechanisms that lead to overgeneral memory (Williams, 2006; Williams et al., 2007). CaRFAX refers to the three mechanisms that are proposed to contribute to overgeneral memory: capture and rumination (CaR), functional avoidance (FA), and executive deficits (X). According to the model, these mechanisms either independently or in combination contribute to overgeneral memory. In addition, the model acknowledges that these mechanisms also have a direct influence on depression that is independent of their contribution to overgeneral memory. Finally, the model suggests that overgeneral memory is not merely an epiphenomenon of the underlying processes, but rather overgeneral memory is also proposed to play a causal role in bringing about depression. In reviewing these mechanisms, particular attention will be paid to the way these mechanisms contribute to overgeneral memory and depression in currently depressed and formerly depressed individuals.

### *Functional Avoidance and Overgeneral Memory*

*Functional avoidance hypothesis.* Overgeneral memory is thought to result from a dysfacilitation of the retrieval process which occurs before specific episodic memories are accessed (Williams et al., 2007). Because episodic memories contain detailed sensory information such as vivid mental images and strong affect, they have the potential to produce a significant disturbance in mood when they are recalled. In fact, laboratory evidence has found that greater detail in retrieved memories is associated with higher levels of self-reported emotional feelings at the time of retrieval (Schaefer & Philippot, 2005).

According to the functional avoidance hypothesis, individuals may truncate their memory search to avoid the negative affect that may accompany recalling specific memories (Williams, 1996). This strategy can be *functional* to the extent that it remains flexible. However, for some people, avoiding specific memories by remaining at a general level of description appears to develop into a rigid and habitual cognitive style. The type of cognitive avoidance that contributes to overgeneral memory may also develop and operate outside conscious awareness.

*Research linking avoidance and overgeneral memory.* Avoidance is most often associated with experiences of trauma and is a defining symptom of PTSD. However, there is growing evidence that avoidance is also associated with depression. Considering that aversive early life experiences are associated with depression (Brewin, Andrews, & Gotlib, 1993) and also that severe psychological stressors often precipitate depression, it is reasonable to assume that individuals who are depressed, or who have experienced depression, utilize avoidance strategies to manage negative memories. Indeed, several

studies have demonstrated that depressed (Brewin et al., 1999; Kuyken & Brewin, 1994; Reynolds & Brewin, 1998; Spenceley & Jerrom, 1997) and formerly depressed individuals (Spenceley & Jerrom) exhibit avoidance symptoms.

Three studies have specifically investigated an association between avoidance and overgeneral memory in samples of depressed participants. Kuyken and Brewin (1995) found that avoidance of memories of childhood physical or sexual abuse, as measured by the avoidance subscale of the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), was significantly associated with overgeneral memory in women with MDD. In a study of depressed cancer patients, Brewin et al. (1998) found that avoidance, also measured by the IES, was associated with overgeneral memory after controlling for severity of depression. In contrast, Brewin et al. (1999) failed to find an association between avoidance and overgeneral memory in a sample of individuals with MDD. Similarly, Gibbs and Rude (2004) did not find a correlation between avoidance and overgeneral memory in a nonclinical sample of college students. However, the authors raise an important issue related to these nonsignificant findings: Overgeneral memory may be most pronounced when avoidance operates on a nonconscious level of processing suggesting that self-report measures may be an imperfect means to assess avoidance of specific autobiographical memories.

Finally, there is evidence that individuals with greater overgeneral memory may also exhibit cognitive avoidance across other domains. In a nonclinical sample of college students, Hermans, Defranc, Raes, Williams, and Eelen (2005) found that overgeneral memory was positively correlated with social behavioral avoidance (Cognitive Behavioural Avoidance Scale; Ottenbreit & Dobson, 2004), experiential avoidance

(Acceptance and Action Questionnaire; Hayes et al., 2004), and thought suppression (White Bear Suppression Inventory; Wegner & Zanakos, 1994). The authors suggest that attempts to regulate negative affect by avoiding specific memories is also related to a tendency to use avoidant strategies to manage distressing thoughts, feelings, and interpersonal situations. In sum, the relatively few studies that have directly investigated the association of avoidance and overgeneral memory in depressed samples demonstrate some support for the hypothesis that avoidance contributes to overgeneral memory among individuals who are currently or formerly depressed.

#### *Avoidance and Depression Vulnerability*

Although avoiding specific memories may provide some short-term relief from negative affect, in the long run, avoidance may actually perpetuate depression vulnerability. For example, in a prospective study of clinically depressed participants, Brewin et al. (1999) found that avoiding autobiographical memories was predictive of depressive symptoms at 6-month follow-up after controlling for initial levels of depressive symptoms.

A recent laboratory investigation provides compelling evidence that avoiding specific memories is related to the onset and maintenance of depression. Dalgleish and Yiend (2006) randomly assigned dysphoric and nondysphoric participants to one of two conditions. The experimental condition involved suppressing a pre-identified distressing autobiographical memory while under a cognitive load that involved a stream of consciousness writing task. The control condition was identical to the experimental condition except that participants were not instructed to suppress the pre-identified autobiographical memory. Drawing on the related thought suppression literature (e.g.,

Wenzlaff & Bates, 2000; Wenzlaff, Rude, & West, 2002; Wenzlaff, Wegner, & Roper, 1988), Dalgleish and Yiend predicted that for dysphoric participants, attempting to suppress a distressing memory would lead to relatively speeded access to other negative autobiographical memories on a subsequent task, compared to the condition that did not involve memory suppression. They predicted no significant differences between conditions for the nondysphoric participants. Results confirmed their predictions. Attempts by dysphoric individuals to avoid negative specific memories led to the paradoxical effect of increasing activation of more negative memories. This important finding illustrates how suppressing negative autobiographical memories has downstream consequences that could perpetuate depressive symptoms.

#### *Rumination and Overgeneral Memory*

*Rumination hypothesis.* In addition to the role of avoidance, there is accumulating evidence that rumination also contributes to overgeneral memory. According to the “rumination hypotheses”, during the initial cue elaboration phase of generative retrieval, individuals may become trapped in ruminative processing which interferes with the retrieval process (Williams, 1996). For example, the cue word “successful” may prompt the elaboration “I’ll never be able to find a job”, which triggers ruminative processing. This example also demonstrates how both positive and negative emotional cue words can potentially induce rumination.

*Research linking rumination and overgeneral memory.* A link between rumination and overgeneral memory has been reported in several experimental investigations. In a sample of dysphoric and depressed participants, Watkins, Teasdale, and Williams (2000) found that compared to a brief rumination induction, a distraction condition decreased

overgeneral memory. This effect remained after controlling for possible changes in mood state. Watkins and Teasdale (2001; 2004) extended this finding by demonstrating, in a sample of clinically depressed participants, that a brief experiential self-focus induction (e.g., “focus your attention on your experience of...”) significantly reduced overgeneral memory, whereas an analytical-evaluative self-focus induction (e.g., “Think about the way you...”) maintained overgeneral memory. It is important to point out that the analytical self-focused induction may not have acted to increase overgeneral memory in these studies because the participants were currently depressed and therefore likely to naturally be exhibiting high levels of rumination. Nonetheless, these findings suggest that it is the analytical-evaluative aspect of rumination (self-focused attention) that contributes to overgeneral memory, at least for currently depressed individuals. On the other hand, an experiential mode of self-focused attention, one that encourages curiosity rather than judgment, appears to have beneficial effects on overgeneral memory.

Extending this work, Barnard, Watkins, and Ramponi (2006) induced an analogue of rumination in healthy, nondysphoric individuals. According to the authors, rumination involves continuously generating thoughts from the same self-schema. In support of this idea, results demonstrated that a manipulation involving repeatedly generating self-related information about *one* narrow superordinate self-related theme (designed to model analytical rumination) increased overgeneral memory compared to a manipulation that involved repeatedly generating information about *different* superordinate self-related themes. Whereas both manipulations involved thinking about self-related information, continuously generating information on a *singular* theme, versus *different* themes, appears to be a critical component in the type of rumination that affects overgeneral



memory. The authors posit that during ruminative processing (both naturalistically and as modeled in their study) the higher level schema (theme) remains constant, thus attention is drawn towards individual thoughts which are constantly changing (this is based on the logic that the mind is naturally drawn to *changes* in the internal environment). Therefore, this process is self-perpetuating and the number of themes remains limited. This restricted number of themes limits the information that individuals can draw on when attempting to elaborate cue words and retrieve specific memories.

By piecing apart the different components of rumination, Watkins and Teasdale (2001; 2004) and Barnard et al. (2006) have demonstrated that it is the perseverative, analytical style of thinking about self-related material that may be especially likely to contribute to overgeneral memory. Furthermore, these studies lend strong support to the rumination hypothesis by showing that reducing rumination leads to decreased overgeneral memory (Watkins & Teasdale) and that increasing rumination leads to increased overgeneral memory (Barnard et al.).

*How rumination processes become activated.* Recent theorizing and empirical work has begun to explore *how* ruminative processes initially become activated during generative retrieval. The basis for understanding this mechanism lies in the intimate connection between the autobiographical knowledge base and higher-level self-representations, or self-schemas, which contain information about personal attitudes, values, and beliefs and guide information processing (Conway, 2005). Information stored in the autobiographical knowledge base exemplifies and contextualizes self-schemas. During autobiographical memory retrieval, the emotional cue words on the AMT as well as the material that is generated through elaborations of the cue words may map onto the

content of negative self-schemas triggering ruminative processing (Dalgleish et al., 2003).

Two recent studies have demonstrated support for this hypothesis. Moreover, these studies begin to provide some answers as to how rumination may influence overgeneral memory among depression-vulnerable persons. Spinhoven et al. (2007) found that formerly depressed participants retrieved fewer specific memories in response to negative and positive cue words (e.g., “helpful”) that were associated with highly endorsed dysfunctional attitudes (e.g., “I should be able to please everybody”). Moreover, this effect remained after controlling for age, education, current depressive symptoms, and number of previous episodes of depression. Using a slightly different method to test this hypothesis, Crane, Barnhofer, and Williams (2007) investigated the effects of AMT cues that matched participant’s self-guides (ought, ideal, and feared selves) on autobiographical memory specificity in never-depressed and formerly depressed participants. For never-depressed participants, there was no significant correlation between cue self-relevancy and specificity ( $r = -.07, p > .70$ ). In contrast, for formerly-depressed participants, there was a highly significant correlation; the greater the number of AMT cues that were self-relevant, the fewer the number of specific memories ( $r = -.69, p < .001$ ). Both of these effects were independent of current mood.

Overall, there is evidence that self-relevant cue words are more likely to contribute to overgeneral memory, and there is evidence that rumination contributes to overgeneral memory. However, research has yet to provide evidence that these processes are directly linked – that is, that self-relevant cue words induce rumination which then leads to overgeneral memory. Although speculative at this point, Crane et al., (2007)

suggest that in formerly depressed individuals, cues may prime latent negative self-schemas. This notion is supported by evidence that latent negative self-schemas can be detected when formerly depressed individuals undergo self-focus manipulations (Hedlund & Rude, 1995). Because information arising from latent negative self-schemas is likely discrepant from current goals or active models of the self, attention may be drawn to this information (Conway, 2005; Conway et al., 2004; Pyszczynski & Greenberg, 1987). In an effort to maintain a coherent present self-image, formerly depressed individuals may become engaged in ruminative processing in an attempt to reduce the discrepancy. As a result, the ability to retrieve specific memories will be impaired.

#### *Rumination and Depression Vulnerability*

In addition to the evidence that rumination may contribute to overgeneral memory, a sizable body of work has investigated the role of rumination in contributing to depression vulnerability. According to the response style theory of depression (Just & Alloy, 1997; Nolen-Hoeksema, 1991), individuals who ruminate in response to mildly dysphoric moods are at an increased risk of becoming depressed and remaining depressed for longer periods of time.

Research has supported the notion that rumination prolongs episodes of depression (e.g., Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1993; Nolen-Hoeksema, Parker, & Larson, 1994). There is also prospective evidence that rumination predicts clinical depression after controlling for initial levels of depressive symptoms (Just & Alloy, 1997; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). For example, using a community sample of 1,132 individuals, Nolen-Hoeksema (2000) found that a

ruminative way of responding to distress predicted clinically diagnosed episodes of major depression the following year after controlling initial depression status and depressive symptoms. Furthermore, among individuals with no prior history of depression, rumination also predicted new onsets of major depression.

A recent focus in the literature on rumination and depression has been on identifying the components of rumination that are particularly maladaptive. For example, it has become evident that the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991), the most commonly used measure to assess rumination, is multifactorial (e.g., Conway, Csank, Holm, & Blake, 2000; Trapnell & Campbell, 1999; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Treynor et al. found that the items on the RRS loaded on two factors that they labeled Brooding (e.g., “Think, ‘Why can’t I handle things better?’”) and Reflection (e.g., “Go away by yourself and think about why you feel this way”). Although evidence suggests that both factors are associated with concurrent depression, thought suppression, and attempts to inhibit emotional experience (Rude, Maestas, & Neff, 2007; Treynor et al.), Treynor et al. found that only the Brooding factor was predictive of subsequent increases in depression. Rude et al. suggest that it is the judgmental and evaluative aspects of rumination that distinguish ruminative processing from other benign forms of self-focused attention.

#### *Executive Deficits and Overgeneral Memory*

Finally, the CaRFAX model and empirical evidence suggest that executive deficits contribute to overgeneral memory (Dalgleish et al., 2007). Executive processes oversee the autobiographical memory construction process by initiating the memory search process, sustaining progress towards the goal of retrieving a memory, evaluating

accessed information, inhibiting unrelated information, insuring that the retrieved information is in fact a memory, and eventually terminating the retrieval processes when the goals of the search have been reached. It is conceivable that deficits in executive functioning would impair the ability to retrieve specific memories. Indeed, executive deficits may account for the fact that overgeneral memory is often found in individuals with frontal lobe injuries (e.g., Baddeley & Wilson, 1986). Although executive deficits do not appear to completely explain the overgeneral effect in depressed and formerly depressed participants, they likely compound retrieval problems. For example, a reduced working memory could affect the ability to inhibit irrelevant information that contributes to rumination.

*Attempts to Reduce Overgeneral Memory: Psychological Interventions*

Given the evidence suggesting that overgeneral memory may play a role in the onset and maintenance of depression, it is of great interest whether overgeneral memory can be reduced through psychological intervention. However, only three studies to date have investigated the effects of psychological treatment on overgeneral memory in the context of depression. Williams et al. (2000) found that an intervention involving eight sessions of mindfulness-based cognitive therapy (MBCT; Teasdale, Segal, & Williams, 1995), administered in a group setting, was successful in reducing overgeneral memory among formerly depressed participants. Serrano, Latorre, Gatz, and Montanes (2004) found that a four-session intervention involving practice in recalling specific autobiographical memories from different life periods (e.g., childhood, adolescents) was successful in reducing overgeneral memories among clinically depressed and dysphoric older adults. Despite Serrano et al.'s encouraging results, it can not be ruled out that a

possible change in depression symptoms due to the intervention may have accounted for the observed reduction in overgeneral memory. In addition, conclusions regarding the success of these interventions are limited because both studies lacked an active placebo control group. In the third study that attempted to modify overgeneral memory, Spinhoven et al. (2006) randomly assigned formerly depressed participants to an intervention involving eight sessions of group cognitive therapy or to a control condition involving treatment as usual. Contrary to the authors' prediction, group cognitive therapy had no differential effect on overgeneral memory assessed at a three-month follow-up compared to treatment as usual.

Unfortunately, none of these intervention studies investigated potential mechanisms of action of their selected interventions which would help explain these differential effects. Spinhoven et al. (2006) speculate that their cognitive therapy intervention may have actually promoted an analytical, evaluative form of self-focus. Although they do not elaborate this point, it can be inferred that encouraging participants to identify negative and dysfunctional thoughts and to *change* these thoughts – which was the primary focus of their cognitive therapy intervention - may have inadvertently encouraged participants to take a critical and judgmental attitude towards their thoughts and feelings. In contrast, Williams et al. (2000) hypothesize that their mindfulness-based cognitive therapy intervention was successful in reducing overgeneral memory because it encouraged participants to take a nonjudgmental stance towards their thoughts, feelings, and experiences. In turn, Williams et al. (2000) propose that individuals may be less likely to truncate the memory search in an effort to avoid negative affect associated with specific memories. It is unclear from their explanation if mindfulness is thought to lead to

the resolution of negative affect associated with specific memories, or if individuals simply become more tolerant of the negative affect. Either way, there is preliminary evidence that interventions that promote emotional acceptance and discourage self-judgment may be especially useful in reducing overgeneral memory.

Further research endeavors aimed at reducing overgeneral memory through theoretically informed interventions are clearly needed. Drawing from two decades of theory and research, there is reason to believe that an expressive writing intervention may be especially useful in reducing overgeneral memory thus preventing future onsets of depression. After providing an overview of the expressive writing paradigm and briefly reviewing the empirical findings that have been generated with this intervention, I will discuss the specific mechanisms through which expressive writing may affect overgeneral memory and depression.

### *Expressive Writing*

In a landmark study, Pennebaker and Beall (1986) empirically investigated the potential benefits of written emotional disclosure on mental and physical health. The results of this study showed that although writing about one's deepest thoughts and feelings surrounding traumatic experiences (i.e., expressive writing) was associated with increased distress immediately following the writing session, those who engaged in expressive writing demonstrated greater improvements in physical health over the months following the session. Inspired by these intriguing findings, an impressive body of empirical work has emerged over the past two decades that has explored - and found remarkable support for - the therapeutic benefits of expressive writing.

### *Pennebaker's Expressive Writing Paradigm*

The basic expressive writing paradigm involves randomly assigning participants to either an expressive writing condition or a control writing condition. Both groups spend approximately 20 minutes a day for several consecutive days writing on an assigned topic. Participants in the experimental condition are instructed to write about their deepest thoughts and feeling about an emotional issue, whereas participants in the control condition are asked to write about superficial topics, such as time management.

*Effects of expressive writing on physical health.* Using the expressive writing paradigm, numerous studies have provided support for the benefits of expressive writing on a wide variety of physiological and psychological outcomes across diverse samples (for reviews see Frisina, Borod, & Lepore, 2004; Pennebaker, 1997; Smyth, 1998). Health benefits associated with expressive writing include, but are not limited to, improved immune functioning in individuals with HIV (Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004), fewer medical appointments for cancer-related morbidity in breast cancer patients (Stanton et al., 2002), and lower systolic and diastolic blood pressure in individuals with high blood pressure (McGuire, Greenberg, & Gevirtz, 2005).

The expressive writing paradigm has demonstrated benefits for healthy individuals as well. For example, relative to people in control writing conditions, people who write about emotional experiences have shown a reduction in the number of illness related physician visits in the months following the interventions (e.g., Pennebaker, Colder, & Sharp, 1990; Pennebaker & Francis, 1996; Pennebaker, Kiecolt-Glaser, & Glaser, 1988). Beyond health related outcomes, expressive writing has also proved beneficial for improving college students' grade point averages (e.g., Pennebaker et al.,



1990), reducing absenteeism from work (Francis & Pennebaker, 1992), and helping professionals find new jobs quicker after being laid off from work (Spera, Buhrfeind, & Pennebaker; 1994).

*Effects of expressive writing on depression symptoms.* Compared to the abundance of studies that have investigated the physiological benefits of expressive writing, the number of studies that have specifically investigated the effects of expressive writing on depression or depressive symptoms is rather small. However, the evidence that does exist is encouraging. For example, Lepore (1997) found that compared to control participants, college students who engaged in expressive writing demonstrated a significant decline in depressive symptoms, as measured by the depressive subscale of the SCL-90-R, over the month preceding an exam. Also in a sample of college students, Epstein, Sloan, and Marx (2005) found that expressive writing was associated with a significant decline in one month follow-up depressive symptoms on the Depression and Anxiety Stress Scale (Lovibond & Lovibond, 1995). Compared to a control condition, Solano, Donati, Pecci, Persichetti, and Colaci (2003) found that patients who had engaged in expressive writing demonstrated lower depressive symptoms on the SCL-90 following a relatively minor surgical procedure. Finally, Sloan and Marx (2004) found that women with PTSD symptoms who engaged in expressive writing showed a significant reduction in depressive symptoms on the Beck Depression Inventory – Second Version (BDI-II; Beck, Steer, Ball, & Ranieri, 1996) at a one-month follow-up, while no equivalent reduction was found for control participants.

Gortner et al. (2006) recently extended these findings by applying the expressive writing paradigm to a sample of formerly depressed college students. Based on the notion

that written emotional disclosure is proposed to counteract inhibitory strategies such as thought suppression and avoidance (e.g., Pennebaker, 1989, 1997), the authors hypothesized that people who tend to suppress their emotions would be especially likely to benefit from expressive writing. In support of their prediction, formerly depressed students who were also less expressive (above the mean on the Emotion Regulation Questionnaire; Gross & John, 2003) showed significantly lower depressive symptoms on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) at a six-month follow-up in the expressive writing group, but not in the control writing group.

Finally, a recent meta-analysis on 146 studies (including published and unpublished articles, unpublished doctoral dissertations, and conference papers) that have investigated Pennebaker's expressive writing paradigm in randomized experiments highlights the potential of an expressive writing paradigm to lower depressive symptoms (Frattaroli, 2006). Within this larger group of studies, an analysis of the 27 studies that included outcome variables related to depression revealed that depression symptoms were shown to improve as a result of written disclosure, with a mean unweighted effect size of  $r = .073, p < .043$ . This effect size is comparable to the overall effect size of expressive writing on a diverse range of positive outcomes (147 studies; mean unweighted effect size  $r = .075, p = 3 \times 10^{-9}$ ). Although the effect size for depression outcomes is significant, it might be considered small by some standards. However, as Frattaroli points out, given that the intervention is very brief, extremely cost-effective, yet still shows the ability to produce positive effects, this effect size is indeed meaningful. Moreover, the fact that across many different studies, people in the experimental writing groups are

significantly more likely than people in control groups to express that the writing exercise was helpful, and overall, a positive experience, suggests that expressive writing is an intervention that people may actually utilize and adhere to.

*Expressive Writing to Reduce Overgeneral Memory and Prevent Depression*

As reviewed earlier, the mechanisms that are proposed to contribute to overgeneral memory include rumination and avoidance. Independent of their contribution to overgeneral memory, evidence suggests that rumination and avoidance, in addition to overgeneral memory, are potentially related to the development of depression.

Theoretical and empirical evidence suggests that expressive writing may be especially beneficial in lowering rumination and avoidance, thereby reducing overgeneral memory and potentially preventing the onset or recurrence of depressive symptoms.

*Relationship between avoidance and rumination.* Individuals may avoid specific memories because recalling specific events may bring about negative affect. Avoiding specific memories, however, is cognitively taxing and prone to fail, especially in the face of competing cognitive demands, which leads to a rebound in negative thoughts that may promote rumination (Daggleish & Yiend, 2006; Wenzlaff & Luxton, 2003; see Wenzlaff & Wegner, 2000 for a review). And even though rumination may be motivated by attempts to resolve self-discrepancies and come to a greater understanding of past experiences (Lyubomirsky & Nolen-Hoeksema, 1993; Papageorgiou & Wells, 2001; Watkins & Baracaia, 2001), it has been argued that ruminative processing is clouded by negative self-judgments which exacerbates negative affect and prevents the successful resolution of distressing experiences (Rude et al., 2007).

### *How Will Expressive Writing Reduce Rumination and Avoidance?*

To summarize, both rumination and avoidance can be conceptualized as strategies to manage negative emotions associated with specific autobiographical memories – yet neither process is helpful. Moreover, both processes suggest that the material surrounding the distressing memories is not fully understood or integrated into existing self-schemas (Pennebaker, 1993; Pennebaker & Seagal, 1999). Likely, these memories primarily involve images and emotions, but lack a coherent narrative and are only weakly integrated with general autobiographical knowledge (Conway, 2005). By encouraging participants to explore their thoughts and feelings in a non-judgmental manner, expressive writing may counteract natural tendencies toward ruminative processing. Expressive writing may facilitate a more productive form of emotional processing that leads to new insights and to a greater understanding of past experiences and, ultimately, discrepant evaluations and negative emotions can be resolved and assimilated into current self-schemas (Pennebaker, 1997; Pennebaker & Seagal, 1999). This integration and resolution of distressing memories may decrease access to depressive cognitive structures, thus offsetting rumination and rendering avoidance no longer necessary.

*Empirical evidence.* In addition to the theoretical account discussed above, there is some empirical evidence that bears on the ability of expressive writing to reduce rumination and avoidance. In a previously described study, Gortner et al. (2006) reported that among formerly depressed college students who were also less emotionally expressive, expressive writing was significantly associated with a reduction in the brooding (i.e., self-critical) aspect of rumination at a six-month follow-up. Reductions in the brooding aspect of rumination were further found to mediate the benefits of

expressive writing on follow-up depressive symptoms. Klein and Boals (2001) found that college students assigned to write about their thoughts and feelings surrounding negative life experiences demonstrated greater reductions in intrusive and avoidant thoughts, compared to college students assigned to write about positive experiences or trivial topics. In addition, there is preliminary evidence that expressive writing improves working memory (Klein & Boals). An increased working memory capacity would aid attempts to inhibit irrelevant information that is accessed during memory retrieval which leads to rumination. Finally, Schoutrop, Lange, Hanewald, Davidovich, and Salomon (2002) reported that writing about recent traumatic experiences brought about significant reductions in avoidance behavior. Overall, there is encouraging empirical evidence that expressive writing may be beneficial in reducing rumination and avoidance, thus reducing overgeneral memory and, ultimately, preventing future depression symptomatology among currently non-depressed college students.

#### *Study Aims and Hypotheses*

Accumulating evidence suggests that an overgeneral style of autobiographical memory retrieval may render individuals more vulnerable to developing depression. Therefore, psychological interventions specifically designed to target increased autobiographical memory specificity may aid in preventing future depressive symptomatology and major depressive disorder. This study provided a preliminary investigation of the effectiveness of Pennebaker's expressive writing paradigm (1989; 1997) in reducing overgeneral memory, with the ultimate goal of preventing future depressive symptoms. Because the specific interest was in evaluating expressive writing as a preventative intervention, currently non-depressed ( $BDI \leq 12$ ) college students were

recruited for the study sample. In addition, utilizing a relatively homogeneous sample of currently non-depressed participants made it possible to investigate overgeneral memory without the potential confounds of depression severity.

In keeping with Pennebaker's typical expressive writing paradigm, the current study included an expressive writing condition (referred to as the *traditional expressive writing condition* in this study) and a control writing condition. As in prior expressive writing studies, participants in the traditional expressive writing group were instructed to write about their very deepest thoughts and feelings about any difficult or emotionally disturbing events they had experienced. The control condition was instructed to write about a neutral topic (i.e., time management). The current study also included a third novel writing condition referred to as the *specific expressive writing condition*. Identical instructions asked participants in the traditional and specific expressive writing conditions to write about their very deepest thoughts and feelings about any difficult or emotionally disturbing events they had experienced; however, the specific expressive writing condition contained the following additional instruction: "It is most important that you describe the events you write about in a vivid and detailed way. For example, you might include a precise description of the exact images, thoughts, and emotions that come to mind as you write."

The specific expressive writing group was included based on the logic that explicitly encouraging participants to focus on the detailed aspects of their past experiences may increase the intervention's effectiveness on the ability to retrieve specific autobiographical memories. In support of this notion, Serrano et al. (2004) found that a four-session intervention involving practice in recalling specific autobiographical

memories from different life periods was successful in reducing the recall of overgeneral memories. On the other hand, there is also evidence that having participants focus on the specific aspects of their past experiences may not be effective in reducing overgeneral memory. For instance, Spinhoven et al. (2006) found that having participants keep diaries of specific positive events had no effect on the retrieval of specific memories to positive or negative cue words at a three-month follow-up.

In addition to questions regarding the general effectiveness of the specific expressive writing intervention, there was interest in whether the specific and traditional expressive writing conditions would affect overgeneral memory through the same mediating processes. Given that the primary writing instructions were identical across both the specific and traditional expressive writing conditions, it could be expected that both conditions would demonstrate similar mechanisms of action (i.e., reductions in rumination and avoidance) on possible reductions in overgeneral memory. However, Pennebaker and Chung (2007) have suggested that "forcing individuals to write about a particular topic or in a particular way may cause them to focus on the writing itself rather than the topic and the role of their emotions in the overall story" (p.268). This suggests that specific expressive writing condition may not facilitate the emotional processing that is necessary to reduce rumination and cognitive avoidance.

Despite this limited and somewhat contradictory evidence regarding the potential effectiveness of the specific expressive writing condition in reducing overgeneral memory, the specific expressive writing condition was included for exploratory purposes. Accordingly, no specific hypotheses were proposed concerning differences between the traditional and specific expressive writing conditions.

### *Study Aim 1*

The first aim of the study was to evaluate the effectiveness of two expressive writing interventions (traditional and specific), compared to a control writing condition, in increasing autobiographical memory specificity. To this end, participants were randomly assigned to one of three writing conditions: 1) traditional expressive writing, 2) specific expressive writing, or 3) control writing. All groups wrote for 20 minutes on three consecutive days. Participants completed a computerized version of the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), the commonly used methodology to assess overgeneral memory, immediately before receiving the intervention (Time 1) and one month following the intervention (Time 2).

### *Hypothesis 1: Effects of the Intervention on Autobiographical Memory Specificity*

It was hypothesized that participants in the traditional and specific expressive writing conditions would display increased autobiographical memory specificity (i.e., lower levels of overgeneral memory) one month following the intervention (Time 2), compared to participants in the control condition.

### *Study Aim 2*

The second aim of the study was to explore *how* the expressive writing intervention might influence overgeneral memory. There is encouraging theoretical and empirical evidence that expressive writing may be beneficial in reducing rumination and cognitive avoidance - two of the mechanisms shown to contribute to overgeneral memory. The study explored if reductions in rumination and avoidance served as mechanisms of action (i.e., mediators) of the expressive writing intervention on possible increases in autobiographical memory specificity. Therefore, in addition to the AMT,



participants also completed measures of rumination, avoidance, and depression symptoms immediately before receiving the intervention (Time 1) and one month following the intervention (Time 2).

*Hypothesis 2: Factors that Mediate the Effects of the Intervention on Overgeneral Memory*

It was hypothesized that rumination and avoidance would mediate the effects of the expressive writing intervention on autobiographical memory specificity assessed at Time 2. Specifically, it was predicted that participants in the traditional and specific expressive writing conditions would demonstrate reduced rumination and avoidance, which in turn would be associated with increased autobiographical memory specificity.

*Study Aim 3*

Independent of their contribution to overgeneral memory, evidence suggests that rumination and avoidance, in addition to overgeneral memory, may contribute to the development of depression. Accordingly, the final aim of the study was to evaluate if possible reductions in rumination, avoidance, and autobiographical memory brought about by the expressive writing intervention had a protective effect on the development of future depressive symptoms. Therefore, participants completed a measure of depressive symptoms six months following the intervention (Time 3).

*Hypothesis 3: Factors that Mediate the Effect of the Intervention on Follow-up Depressive Symptoms*

It was predicted that rumination, avoidance, and overgeneral memory would each partially mediate the effects of the expressive writing intervention on depressive symptoms at the six-month follow-up (Time 3). Specifically, participants in the

intervention group were expected to demonstrate reductions in Time 2 rumination, avoidance, and overgeneral memory, which in turn would be associated with reduced depressive symptoms at Time 3.

## CHAPTER THREE

### Methodology

#### *Participants*

Study participants were students enrolled in undergraduate educational psychology courses at the University of Texas at Austin during the fall of 2006. Participants were deemed eligible for the study if they a) indicated by self-report during the departmental pre-screening that they were not currently experiencing an episode of depression, and b) scored 12 or lower on the Beck Depression Inventory (BDI; Beck et al., 1961; see Gortner et al., 2006 for a similar classification procedure). A total of 207 participants completed all three assessment sessions and thus comprised the study sample. The mean age of participants was 20.9 years ( $SD = 1.77$ ), and 70% of the sample were women. Three percent of the participants were classified as freshman, 9.2% as sophomores, 19.8% as juniors, and 67.6% as seniors. Study participants indicated they belonged to the following racial/ethnic categories: Asian (23.2%), Black (4.9%), Hispanic (18.4%), Native American (1%), White (52.2%), and Other (1.9%).

The study was conducted from 2006-2007 and was approved by the Institutional Review Board. Participants received course credit in exchange for completing the Time 1 and Time 2 assessments. Participants received \$10 following completion of the Time 3 assessment.

#### *Sample Selection, Randomization, and Attrition*

As summarized in Figure 1, the study sample was drawn from a pool of 396 undergraduate students who indicated by self-report during the departmental pre-screening that they were not currently depressed. Specifically, the initial pool of 396

participants marked "no" in response to the following question: Do you feel you are currently experiencing an episode of depression? Of these, 21 students chose not to participate in the study citing a variety of reasons (e.g., dropped educational psychology course and no longer needed to fulfill the research requirement; chose to complete an alternative assignment to fulfill course credit). From this initial pool, 375 participants consented to participate in the study and were randomized into intervention groups using a random number table. All 375 participants completed the initial online assessment session. Of these, 324 participants met study inclusion criteria by scoring 12 or lower on the Beck Depression Inventory. The 51 participants who scored 13 or greater on the BDI were allowed to complete the study and receive full course credit, but their data were not included in the analyses. Two participants failed to complete the writing task and were excluded from the study. A total of 322 participants successfully completed the Time 1 assessment (i.e., measures and writing task). A total of 309 participants completed the one-month follow-up (Time 2). Despite efforts to contact participants by phone and email, 102 participants were lost between Time 2 and Time 3 (six-month follow-up). The attrition between Time 2 and Time 3 could be attributed to the fact that participants were required to complete the Time 1 and Time 2 assessments to fulfill the departmental research participation requirement, whereas participation in the Time 3 assessment had no bearing on course credit. Because over half of the sample were college seniors, it is also possible that participants had graduated from college and moved between the Time 2 and Time 3 assessment, which made contacting them difficult. A total of 207 participants completed all three assessment sessions and thus comprise the study sample.

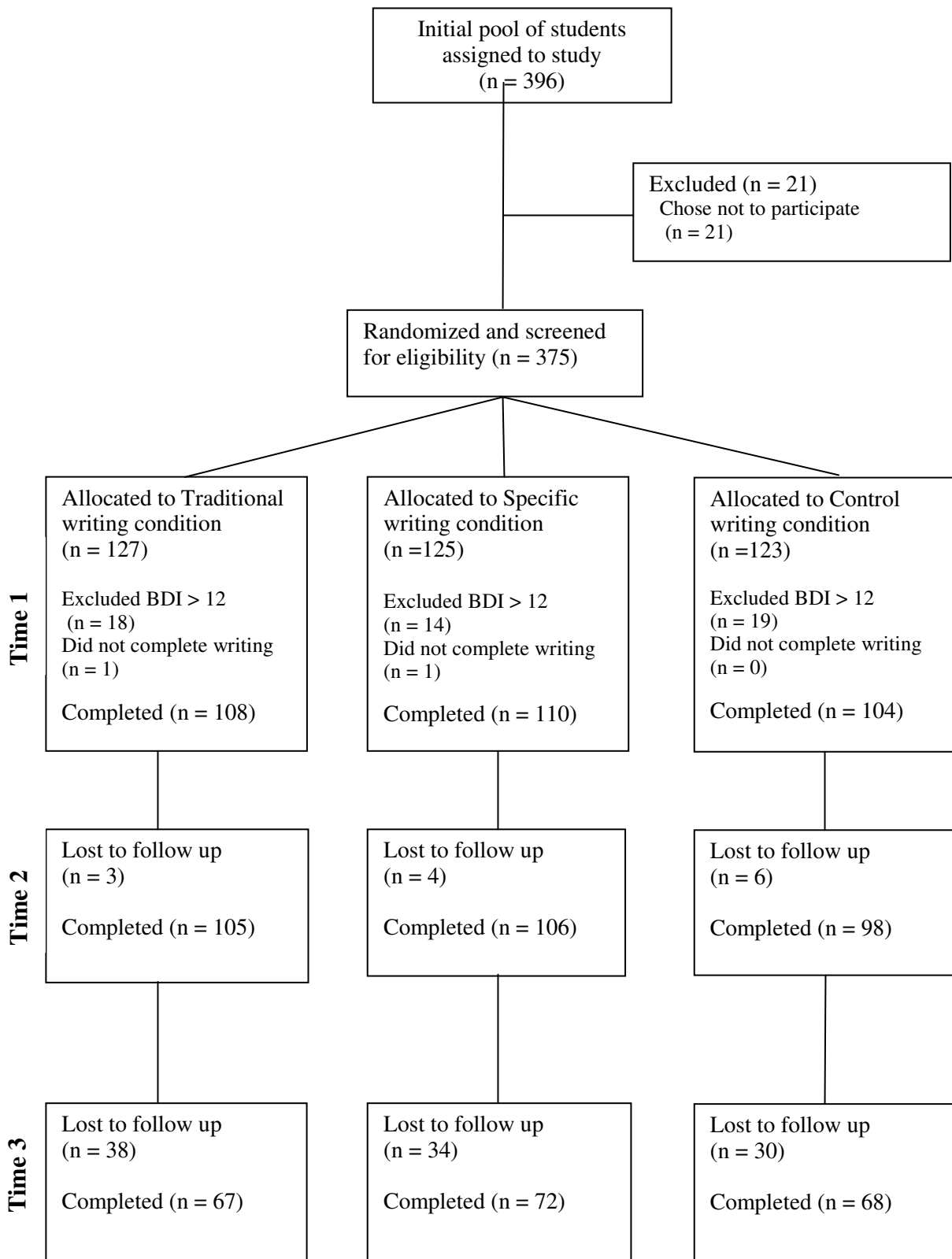


Figure 1. Flow of participants through each phase of the study.

## *Measures*

### *Autobiographical Memory Test*

A computerized version of the Autobiographical Memory Test (AMT) was used to assess overgeneral memory (Rekart et al., 2006; Williams & Broadbent, 1986).

Participants were instructed to type a *specific* event (or memory) in response to 18 cue words that were presented one at a time on a computer screen. Following the procedures of Rekart et al., participants were offered an unlimited amount of time to provide a response. Three equivalent lists of 18 cue words (Lists A, B, and C) were used in the study (Watkins et al, 2000; See Appendix A for word lists). Each list contained six positive (e.g., happy, relieved), six negative (e.g., guilty, hopeless), and six neutral (e.g., grass, gigantic) cue words. Participants were randomly assigned, within each writing condition, to receive List A, B, or C in a counterbalanced order across Times 1, 2, and 3.

The instructions for the computerized version of the AMT are as follows (Rekart et al., 2006):

The focus of this study is events that have happened in your life.

You will be shown some words on the computer screen. For each word or phrase, think of event that happened to you that the word reminds you of. The event could have happened recently (yesterday, last week) or a long time ago. It might be an important event, or a trivial event.

Just one more thing: The memory you recall should be a specific event.

So in response to the word ‘fun’ – it would not be OK to say, ‘I always enjoy a good party’ because that does not mention a specific event. But it would be OK to say ‘I had fun at my 21<sup>st</sup> birthday celebration’ because

that is a specific event. It is also important to try to recall a different memory or event for each cue word or phrase.

*Coding AMT Responses.* Participants' responses were coded by three research assistants who were blind to treatment condition and time of assessment. Responses were initially classified as specific or nonspecific. Specific memories are those that occurred within the span of one day – no more. For example, “When I locked my keys in the car last week” would qualify as a specific memory. Each nonspecific memory was further classified as a) an extended memory (e.g., “My honeymoon in Mexico.”), b) a categorical memory (e.g., “Car trips with my family when I was a kid.”), c) a semantic association (e.g., ““This makes me think of my ex-wife.”), d) an omission, (“I can’t think of anything”), e) or a repeated memory.

Raters were trained to high rates of reliability to code the AMT responses. Training involved extensive practice in coding sample responses. Once raters reached high levels of interrater agreement on sample responses, they began coding responses from the study. To assess interrater reliability, I independently coded a random sample of 10% of the responses from each rater and obtained acceptable reliability ( $K = .83 - .92$ ), comparable with previous studies (e.g., Raes, Hermans, De Decker, Eelen, & Williams, 2003). The number of specific memories on the AMT was used to operationalize overgeneral memory.

### *Depression Symptoms*

The Beck Depression Inventory (BDI; Beck et al., 1961), a widely used, self-report measure of depressive symptomatology, was used to assess participants' level of current depressive symptoms. The scale contains 21 items that are each rated on a scale

of 0-3, with scores ranging from 0 to 63. Higher scores are indicative of greater emotional distress. Although the BDI is not a diagnostic instrument, it has high content validity in that it measures many of the symptoms considered to be indicative of depression. In addition to measuring specific symptoms of depression, the BDI is able to detect low levels of emotional distress. The BDI has demonstrated high reliability in nonclinical samples (Cronbach's alpha = .81, range .73-.92), and correlates highly with clinical ratings of depression (Beck, Steer, & Garbin, 1988).

The Inventory to Diagnose Depression-Lifetime Version (IDDL-L; Zimmerman & Coryell, 1987) was used to diagnose a lifetime history of depression. The IDD-L is a 22-item inventory designed to assess both the symptoms and severity of depression. The items closely correspond to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). Participants are asked to recall a week in their lives when they felt most depressed. Each item consists of five statements assessing the degree to which one has experienced a specific symptom of depression. Total scores range from 0 to 88, with higher scores indicating more severe depression. In addition, participants indicate whether they felt that way for more or less than two weeks. Using clinical ratings as a criterion measure, the IDD-L has demonstrated good sensitivity (74%) and specificity (93%), with an acceptable level of agreement between the inventory and the clinical rating ( $K = .60$ ; Zimmerman & Coryell, 1987).

### *Rumination*

The Ruminative Response Scale of the Response Style Questionnaire (RRS; Nolen-Hoeksema & Morrow, 1991) was used to assess levels of rumination. The RRS is



a self-report measure that contains 22-items describing responses to a depressed mood that are focused on the self (e.g., “Think ‘Why do I react this way?’”), symptoms (e.g., “Think about how hard it is to concentrate”), or consequences of the mood (“Think ‘I won’t be able to do my job if I can’t snap out of this’”). Items are rated on a four-point Likert scale (1-almost never, 4-almost always); high scores indicate greater rumination. The RRS has demonstrated good internal consistency (Cronbach's alpha = .89; Nolen-Hoeksema & Morrow). The RRS demonstrated good internal consistency in the present sample (Time 1 Cronbach’s alpha = .88).

Treynor et al. found that the items on the RRS loaded on two factors which they labeled Brooding (e.g., “Think, ‘Why can’t I handle things better?’”) and Reflection (e.g., “Go away by yourself and think about why you feel this way”). Although evidence suggests that both factors are associated with concurrent depression, thought suppression, and attempts to inhibit emotional experience (Rude et al., 2007; Treynor et al., 2003), Treynor et al. found that only the Brooding factor was predictive of subsequent increases in depression. The Brooding subscale score was calculated using the five items identified by Treynor et al.

### *Avoidance*

The White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) was used to assess the tendency to avoid or suppress distressing thoughts. The WBSI is a self-report measure containing 15 items that are rated on a five-point Likert scale (1-strongly disagree, 5-strongly agree); higher scores indicate greater thought suppression. The WBSI has also been shown to have strong internal consistency and test-retest reliability

(Muris, Merckelbach, & Horselenberg, 1996). The WBSI demonstrated good internal consistency in the present sample (Time 1 Cronbach's alpha = .87).

### *Procedures*

#### *Time 1-Initial Assessment*

Participants were sent an email with a link to the study website, which contained a detailed description of the study. Participants were asked to read and electronically sign the consent form, which described the study, any anticipated risks associated with participation, and the limits of confidentiality. If participants had questions or concerns regarding the study, confidentiality, or consent, they were instructed to contact the principal investigator by telephone or email and refrain from continuing the study. All study data was stored on a password protected secure web server. Once consented, participants completed demographic information, followed by the AMT, the BDI, the IDD-L, the RRS, and the WBSI.

#### *Expressive Writing Intervention*

Participants were randomized using a random number table into one of three intervention groups: 1) Traditional expressive writing, 2) specific expressive writing, or 3) control writing. Participants in each condition engaged in three writing sessions, each lasting 20 minutes, on three consecutive days (c.f., Pennebaker, 1989; Pennebaker, 1997). For all three conditions, the first writing session began immediately upon completion of the Time 1 assessment. Participants completed the writing sessions online in a location of their choosing. The webpage displayed the writing instructions and a timer throughout the writing exercise. A written and audible alert notified the participants when 20 minutes had passed and time was up.

Instructions for the Traditional writing condition were as follows:

For the next 3 days, I would like for you to write about your very deepest thoughts and feelings about any difficult or emotionally disturbing events you have experienced in your life. In your writing, I'd like you to really let go and explore your very deepest emotions and thoughts. Don't worry about grammar or spelling- that is not important. The only rule is that you write continuously for the full 20 minutes. All of your writing will be completely confidential.

Instructions for the Specific writing condition were as follows:

For the next 3 days, I would like for you to write about your very deepest thoughts and feelings about any difficult or emotionally disturbing events you have experienced in your life. I'd like you to really let go and explore your very deepest emotions and thoughts. In your writing it is most important that you describe the events you write about in a vivid and detailed way. For example, you might include a precise description of the exact images, thoughts, and emotions that come to mind as you write. Don't worry about grammar or spelling- that is not important. The only rule is that you write continuously for the full 20 minutes. All of your writing will be completely confidential.

Instructions for the control condition varied over the three days. The instructions for the first session were as follows:

What I would like you to write about over the next 3 days is how you use your time. Each day, I will give you different writing assignments on the way you spend your time. In today's writing, I want you to describe what you did yesterday from the time you got up until the time you went to bed. In your

writing, I want you to be as objective as possible. Please do not write about your emotions or opinions. The idea is to provide a factual description of your day. For example, you might start when your alarm went off and you got out of bed. You could include the things you ate, where you went, which buildings or objects you passed by as you walked from place to place. The most important thing in your writing, however, is for you to describe your days as accurately and as objectively as possible. The only rule is that you write continuously for the full 20 minutes. All of your writing will be completely confidential.

For the following two sessions, participants in the control writing condition were asked to write about how they have used their time within the past 24 hours (Day 2), and how they plan to use their time during the next 2 weeks (Day 3).

*Time 2 - One-Month Follow-Up Assessment*

One month following the intervention, participants in all three writing conditions were sent an email with a link to complete the following measures: AMT, BDI, RRS, and WBSI.

*Time 3 - Six-Month Follow-Up Assessment*

Six months following the intervention, participants in all three writing conditions were sent an email with a link to complete the following measures: AMT and BDI.

## CHAPTER FOUR

### *Results*

The means, standard deviations, and intercorrelations of the study variables for the traditional expressive writing, the specific expressive writing, and the control conditions are presented in Tables 1, 2, and 3 respectively. For the traditional expressive writing condition, AMT specificity scores at Time 1 were significantly correlated with Time 1 rumination (RRS) and depressive symptoms (BDI), but not avoidance (WBSI; see Table 1). For the specific expressive writing condition, AMT specificity scores at Time 1 were significantly correlated with avoidance (WBSI), but not Time 1 depression (BDI) and rumination (RRS; see Table 2). For the control writing condition, AMT specificity scores at Time 1 were not significantly correlated with Time 1 depression (BDI), avoidance (WBSI), and rumination (RRS; see Table 3).

Table 1

*Means, Standard Deviations, and Intercorrelations of Study Variables for Participants in the Traditional Expressive Writing Condition*

Traditional Expressive Writing Condition ( $n = 67$ )										
Study Variables	1	2	3	4	5	6	7	8	9	10
1. BDI Time 1	—	-.27*	.40**	.72**	.49**	-.06	.35**	.36**	.43**	-.11
2. AMT Time 1		—	-.03	-.31*	-.13	.57**	-.21	-.10	-.23	.27*
3. WBSI Time 1			—	.48**	.36**	-.16	.75**	.43**	.44**	-.27*
4. RRS Time 1				—	.42**	-.19	.40**	.52**	.40**	-.23
5. BDI Time 2					—	-.10	.42**	.80**	.33**	-.14
6. AMT Time 2						—	-.07	-.23	-.24*	.40**
7. WBSI Time 2							—	.41**	.50**	-.31*
8. RRS Time 2								—	.38**	-.20
9. BDI Time 3									—	-.34**
10. AMT Time 3										—
<i>M</i>	5.07	11.64	42.36	9.25	4.37	10.54	36.87	8.27	4.39	13.46
<i>SD</i>	3.46	4.21	11.43	6.38	5.06	4.15	11.57	7.69	4.92	3.25

*Note.* BDI = Beck Depression Inventory, AMT = Autobiographical Memory Test - Number of Specific Memories, WBSI = White Bear Suppression Inventory, RRS = Ruminative Response Scale.

\*  $p < .05$ . \*\*  $p < .01$ .

Table 2

*Means, Standard Deviations, and Intercorrelations of Study Variables for Participants in the Specific Expressive Writing Condition*

Study Variables	Specific Expressive Writing Condition ( $n = 72$ )									
	1	2	3	4	5	6	7	8	9	10
1. BDI Time 1	—	-.13	.37**	.67**	.44**	-.01	.48**	.40**	.40**	.10
2. AMT Time 1		—	-.30*	-.04	.10	.43**	-.16	.02	-.11	.31**
3. WBSI Time 1			—	.46**	.29*	.32**	.68**	.38**	.27*	-.17
4. RRS Time 1				—	.38**	-.10	.55**	.54**	.37**	-.02
5. BDI Time 2					—	-.16	.60**	.90**	.59**	-.26*
6. AMT Time 2						—	-.16	-.17	-.08	.48**
7. WBSI Time 2							—	.64**	.44**	-.20
8. RRS Time 2								—	.53**	-.28*
9. BDI Time 3									—	-.10
10. AMT Time 3										—
<i>M</i>	5.80	11.60	43.38	10.36	5.19	10.90	40.44	10.15	5.24	12.96
<i>SD</i>	3.48	4.04	10.07	7.47	6.60	4.47	13.40	10.30	4.36	3.53

*Note.* BDI = Beck Depression Inventory, AMT = Autobiographical Memory Test - Number of Specific Memories, WBSI = White Bear Suppression Inventory, RRS = Ruminative Response Scale.

\*  $p < .05$ . \*\*  $p < .01$ .

Table 3

*Means, Standard Deviations, and Intercorrelations of Study Variables for Participants in the Control Writing Condition*

Control Writing Condition ( $n = 68$ )										
Study Variables	1	2	3	4	5	6	7	8	9	10
1. BDI Time 1	. —	-.10	.12	.38**	.34**	.01	.16	.20	.23	.12
2. AMT Time 1		—	-.12	.07	.12	.61**	-.15	.16	.08	.23
3. WBSI Time 1			—	.56**	.24	.03	.73**	.34**	.31*	-.01
4. RRS Time 1				—	.48**	.12	.66**	.63**	.40**	-.12
5. BDI Time 2					—	.10	.40**	.75**	.43**	-.02
6. AMT Time 2						—	-.10	.13	.14	.35**
7. WBSI Time 2							—	.54**	.41**	-.19
8. RRS Time 2								—	.37**	-.08
9. BDI Time 3									—	-.01
10. AMT Time 3										—
<i>M</i>	6.12	11.65	42.94	10.43	5.21	12.25	40.07	9.31	5.62	10.71
<i>SD</i>	2.77	4.19	9.86	7.17	5.15	4.21	9.37	7.70	5.80	3.53

*Note.* BDI = Beck Depression Inventory, AMT = Autobiographical Memory Test - Number of Specific Memories, WBSI = White Bear Suppression Inventory, RRS = Ruminative Response Scale.

\*  $p < .05$ . \*\*  $p < .01$ .



## *Sample Characteristics*

### *Attrition Analyses*

Of the 322 participants who met study inclusion criteria and successfully completed the Time 1 assessment, 207 completed all three assessment sessions and thus comprise the study sample. To evaluate the effects of attrition, *t*-tests and chi-square analyses were conducted on demographic variables and baseline measures to examine possible differences among study completers ( $n = 207$ ) and non-completers ( $n = 115$ ). There was no significant difference in dropout rates across treatment conditions,  $\chi^2(2, n = 322) = .15, p = .93$ . Relative to completers, non-completers were more likely to be men, (completers = 30.4% vs. non-completers = 43.5%,  $\chi^2(1, n = 322) = 5.52, p = .02$ ). Study completers also had significantly higher Time 1 AMT specificity scores ( $M = 11.64, SD = 4.12$ ) compared to non-completers ( $M = 9.71, SD = 4.84$ ),  $t(70) = -3.78, p < .001, r = .20$ ). Although the size of this effect would be considered small, the study hypotheses were reanalyzed (where applicable) using data from study non-completers. Including data from non-completers did not change the pattern of results. There were no significant differences between study completers and non-completers on baseline measures, including the BDI, WBSI, IDD-L, and the RRS (all  $p$  values  $> .20$ ). Additionally, no significant group differences were found with regards to race/ethnicity, classification (e.g., freshman, sophomore, ect.), and age (all  $p$  values  $> .30$ ).

### *Tests of Group Differences on Demographic Characteristics and Baseline Measures*

Separate one-way ANOVAs and chi-square analyses were conducted to explore possible differences on demographic variables and baseline measures among participants randomized to the traditional expressive writing condition ( $n = 67$ ), the specific

expressive writing condition ( $n = 72$ ), and the control writing condition ( $n = 68$ ). Sample demographic and baseline characteristics and tests of group differences are summarized in Table 4. There were no significant differences in demographic characteristics among participants in the three writing conditions (all  $p$  values  $> .40$ ). Additionally, there were no significant differences among participants assigned to the three writing conditions on Time 1 measures (all  $p$  values  $> .20$ ). In separate analyses not reported here, the IDD-L was entered as a covariate when examining study hypotheses. The use of this covariate did not significantly influence results.

Table 4

*Demographic and Baseline Characteristics by Intervention Group*

Characteristic	Intervention Group				<i>p</i> <sup>a</sup>
	Combined	Traditional	Specific	Control	
<i>n</i>	207	67	72	68	
Age <i>M (SD)</i> , <i>y</i>	20.86 (1.77)	20.72 (1.13)	20.93 (2.11)	29.91 (1.89)	.74
Women (%)	70.0	68.7	69.4	72.1	.90
Race (%)					.50
Asian	23.2	25.4	27.8	16.2	
Hispanic	18.4	19.4	20.8	14.7	
White	52.2	49.3	47.2	60.3	
Other	6.3	6.0	4.2	8.8	
Classification					.96
Freshman	3.4	3.0	2.8	4.4	
Sophomore	9.2	10.4	8.3	8.8	
Junior	19.8	16.4	23.6	19.1	
Senior	67.6	70.1	65.3	67.6	
Time 1 <i>M (SD)</i>					
BDI	5.68 (3.27)	5.07 (3.46)	5.81 (3.48)	6.12 (2.78)	.16
AMT	11.63 (4.12)	11.64 (4.21)	11.60 (4.04)	11.65 (4.19)	.99
WBSI	42.90 (10.42)	42.36 (11.43)	43.38 (10.10)	42.94 (9.86)	.85
RRS	10.02 (7.02)	9.30 (6.38)	10.36 (7.50)	10.43 (7.17)	.55
IDD-L	23.43 (21.40)	24.68 (22.98)	22.08 (19.98)	23.42 (21.39)	.78

*Note.* BDI = Beck Depression Inventory, AMT = Autobiographical Memory Test - Number of Specific Memories, WBSI = White Bear Suppression Inventory, RRS = Ruminative Response Scale, IDD-L = Inventory to Diagnose Depression-Lifetime Version.

<sup>a</sup> *p* is for intervention group comparisons with one-way ANOVAs and chi-square tests

### *AMT Preliminary Analyses*

The mean number of specific memories obtained on the Autobiographical Memory Test (AMT) at the Time 1 assessment collapsed across the three writing conditions was 11.63 ( $SD = 4.12$ ;  $M$  proportion of specific memories = .70,  $SD = .23$ ). This estimate is similar to those reported in the literature (e.g., Raes et al., 2006; Williams et al., 2000). The number of specific memories on the AMT was used to operationalize overgeneral memory in the current study. Although not reported here, the study results were also analyzed using the following variables to operationalize overgeneral memory: 1) number of non-specific memories, 2) the proportion of specific memories to total responses (excludes omissions), and 3) the proportion of non-specific memories to total responses (excludes omissions). A similar pattern of results was obtained using these variables, which is consistent with recent guidelines suggesting overgeneral memory can be detected by using either a lack of specificity or the presence of overgeneral memory (Williams et al., 2007).

Recall that participants were randomly assigned, within each condition, to receive AMT List A, List B, and List C in a counterbalanced order across Time 1, Time 2, and Time 3 (the lists were the same as those used in the Watkins et al., 2000 study). To verify the equivalency of AMT Lists A, B, and C, a one-way between groups (Time 1 List A, B, or C) ANOVA was conducted with Time 1 AMT specificity scores as the dependent variable. The difference between the mean Time 1 AMT scores across lists A ( $M = 11.42$ ), B ( $M = 11.38$ ), and C ( $M = 12.08$ ) was not significant suggesting the words lists can be considered equivalent. Further, three separate mixed between-within subjects ANOVAs were conducted for each writing condition to assess for possible differences in

order of AMT list administration on AMT scores across Time 1, Time 2, and Time 3. For all three writing conditions there were no significant interactions (list administration order x time), suggesting AMT scores did not differ according to the order in which the AMT lists were administered (all  $p$ 's for interaction term  $> .15$ ).

### *Examination of Hypotheses*

#### *Hypothesis 1: Effects of the Intervention on Autobiographical Memory Specificity*

It was hypothesized that participants in the traditional and specific expressive writing conditions would display increased autobiographical memory specificity (i.e., lower levels of overgeneral memory) one month following the intervention (Time 2) compared to participants in the control condition.

*Results of Hypothesis 1.* The participants in the study were selected to be currently not depressed (i.e., BDI scores  $\leq 12$ ), which reduces the potential confound of current depressive symptoms on possible increases in autobiographical memory specificity. Nevertheless, because it is possible that the intervention may have had the unintended effect of reducing depressive symptoms, which in turn could have influenced AMT performance, BDI scores were analyzed first. A univariate analysis of covariance (ANCOVA) was conducted on Time 2 BDI scores, with Time 1 BDI scores held as a covariate. Results revealed that after controlling for Time 1 BDI scores, the intervention did not have a significant effect on Time 2 BDI scores  $F(2, 203) = .06, p = .94$ , partial eta squared = .001. Examinations of means revealed that all conditions showed a reduction in depression symptoms from Time 1 to Time 2 (see Table 5). To be conservative, Time 2 BDI scores were entered as a covariate when examining possible changes in AMT scores.

To evaluate the effectiveness of the writing intervention on Time 2 autobiographical memory specificity, a univariate analysis of covariance (ANCOVA) was conducted on Time 2 AMT specificity scores, with Time 2 BDI scores and Time 1 AMT specificity scores held as covariates. Means and standard deviations are shown in Table 5. Preliminary checks were conducted to ensure there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of inter-correlations, homogeneity of regression slopes, and reliable measurement of the covariate.

Results revealed that Time 2 BDI scores were not significantly related to Time 2 AMT scores,  $F(2, 202) = 2.17, p = .14$ , partial eta squared = .01. Time 1 AMT scores were significantly related to Time 2 AMT scores  $F(2, 202) = 82.14, p < .001$ , partial eta squared = .29. Results also revealed a significant effect of the intervention on Time 2 AMT specificity scores after controlling for the effects of Time 1 AMT and Time 2 BDI scores,  $F(2, 202) = 4.35, p = .01$ , partial eta squared = .04. Planned comparisons of adjusted means revealed that, contrary to prediction, participants in the control condition showed significantly greater AMT specificity at Time 2 compared to participants in the traditional writing condition,  $t(202) = -2.83, p = .01$ , partial eta squared = .04, and the specific writing condition,  $t(202) = -2.16, p = .03$ , partial eta squared = .02. There was no significant difference between the traditional and specific writing conditions,  $t(202) = .72, p = .47$ , partial eta squared = .003. This pattern of results holds if Time 2 BDI scores are not controlled for in the analysis.

*Exploratory Analyses for Hypothesis 1.* Although the traditional and specific expressive writing interventions did not demonstrate improvements in AMT specificity at the one-

month follow-up, it is of interest if the intervention had an effect on AMT specificity measured at the six-month follow-up (Time 3). Therefore, a univariate analysis of covariance (ANCOVA) was conducted on Time 3 AMT specificity scores, with Time 3 BDI scores and Time 1 AMT specificity scores held as covariates. Means and standard deviations are shown in Table 5. Time 3 BDI scores were not significantly related to Time 3 AMT scores,  $F(2, 200) = 2.90, p = .09$ , partial eta squared = .01. Time 1 AMT scores were significantly related to Time 3 AMT scores  $F(2, 200) = 15.20, p < .001$ , partial eta squared = .07. Results also revealed a significant effect of the intervention on Time 3 AMT specificity scores after controlling for the effects of Time 1 AMT and Time 3 BDI scores,  $F(2, 200) = 12.49, p = .001$ , partial eta squared = .11. Planned comparisons of adjusted means revealed that compared to the control condition, the traditional expressive writing condition,  $t(200) = 4.6, p < .001$ , partial eta squared = .10, and the specific expressive writing condition  $t(200) = 3.95, p < .001$ , partial eta squared = .07, showed significantly greater AMT specificity at Time 3. The difference between the traditional and specific writing conditions was not significant,  $t(202) = -.75, p = .45$ , partial eta squared = .003.

Table 5

*Means and Standard Deviations of Outcome Measures by Intervention Group at Times 1, 2, and 3*

	<u>Intervention Group</u>					
	Traditional <i>n</i> = 67		Specific <i>n</i> = 72		Control <i>n</i> = 68	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>BDI</b>						
Time 1	5.07	3.46	5.80	3.48	6.12	2.77
Time 2	4.37	5.06	5.19	6.60	5.21	5.15
Time 3	4.39	4.92	5.24	4.36	5.62	5.80
<b>AMT</b>						
Time 1	11.64	4.21	11.60	4.04	11.65	4.19
Time 2	10.54	4.15	10.90	4.47	12.25	4.21
Time 3	13.46	3.25	12.96	3.53	10.71	3.53
<b>WBSI</b>						
Time 1	42.36	11.43	43.38	10.07	42.94	9.86
Time 2	36.87	11.57	40.44	13.40	40.07	9.37
Time 3	—	—	—	—	—	—
<b>RRS</b>						
Time 1	9.25	6.38	10.36	7.47	10.43	7.17
Time 2	8.27	7.69	10.15	10.30	9.31	7.70
Time 3	—	—	—	—	—	—

*Note.* BDI = Beck Depression Inventory, AMT = Autobiographical Memory Test - Number of Specific Memories, WBSI = White Bear Suppression Inventory, RRS = Ruminative Response Scale.



*Hypothesis 2: Factors that Mediate the Effects of the Intervention on Overgeneral Memory*

It was hypothesized that rumination and avoidance, as measured by the RRS and the WBSI respectively, would mediate the effects of the intervention on autobiographical memory specificity assessed at Time 2. Specifically, it was predicted that participants in the traditional and specific expressive writing conditions would demonstrate reduced rumination and avoidance, which in turn would be associated with increased autobiographical memory specificity. The purpose of this hypothesis was to examine the mechanisms of action of the intervention.

*Results of Hypothesis 2.* To meet the initial criteria of mediation, there must be an effect to be mediated (i.e., the predictor variable must have a significant effect on the outcome variable; Baron & Kenny, 1986). As revealed in the results for the first hypothesis, the treatment conditions (i.e., traditional and specific expressive writing) actually led to decreased autobiographical memory specificity one month following the intervention (Time 2). Because there was no initial effect to be mediated, it can be concluded that Hypothesis 2 was not supported.

*Exploratory Analyses for Hypothesis 2.* Despite a lack of support for Hypothesis 2, recall that exploratory analyses revealed that the expressive writing intervention did have a significant effect on autobiographical memory specificity measured six months following the intervention (Time 3). Therefore, the presence of rumination (as measured by the RRS) and avoidance (as measured by the WBSI) as possible mediators of the effect of the intervention on Time 3 autobiographical memory specificity was tested. It is important to note that after controlling for baseline levels of rumination and avoidance,

separate ANCOVAs revealed that the specific expressive writing condition did not have a significant effect on any of the proposed mediator variables, thus this treatment group was excluded from the following mediational analyses. Subsequently, the variable for the intervention was represented by one dummy-coded variable (traditional expressive writing = 1; control condition = 0).

*Overview of mediational analyses.* The mediation hypotheses were tested with path analysis using the structural equation modeling (SEM) program AMOS 6.0. This procedure is fundamentally the equivalent of the classic regression method to test for mediation developed by Barron and Kenny (1986). Although Barron and Kenny's method is more common in the published literature, a number of researchers have named SEM as the preferred method to test for mediation due to a number of advantages SEM offers (e.g., Baron & Kenny, 1986; Frazier, Tix, & Barron, 2004; Hoyle & Smith, 1994; Keith, 2006). For example, path analysis with SEM software allows mediation hypotheses to be tested in a single model, easily accommodates additional predictor variables, and also provides a convenient way to test the significance of the indirect (i.e., mediated) effect using bootstrapping procedures (Bollen & Stine, 1990; Keith, 2006; MacKinnon, Lockwood, & Williams, 2004; Shrout & Bolger, 2002).

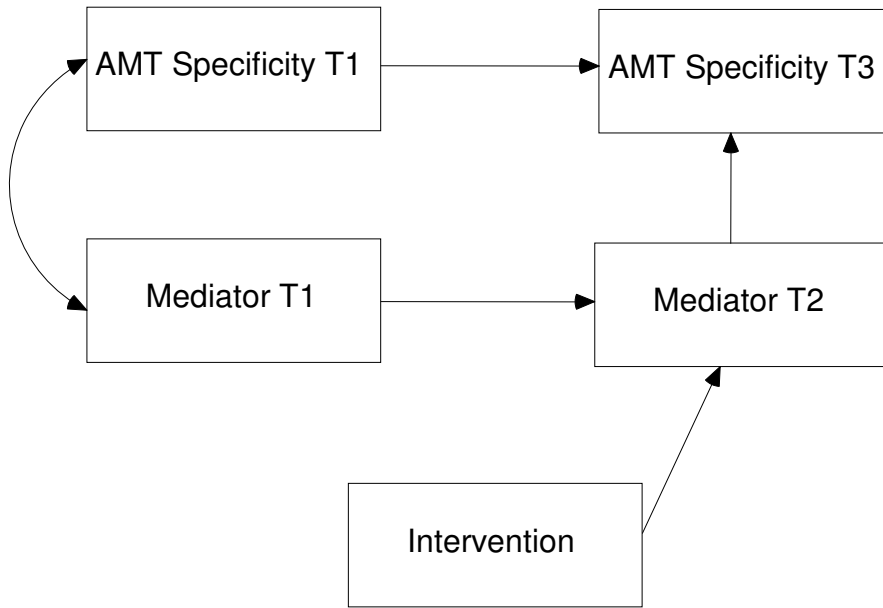
The mediational hypotheses were tested by comparing the fit of two nested path models. In the first model (see Figure 2, Model 1), paths from the intervention to the proposed mediator, and paths from the proposed mediator to autobiographical memory specificity were estimated. Also in the first model, the direct effect of the intervention on autobiographical memory specificity was not estimated (i.e., was fixed to zero). Model 1 also contained paths controlling for baseline autobiographical memory specificity and the

baseline assessment of the proposed mediator variable. This model had 5 degrees of freedom. Model 1 was compared to the second path model (see Figure 2, Model 2), which was identical to the first model with the addition of a direct path from the intervention to autobiographical memory specificity (i.e., the path was freely estimated). Model 2 contains 4 degrees of freedom. Because the models are nested, the chi-square statistic for Model 1, in which the direct path from the intervention to autobiographical memory specificity was fixed to zero, was compared to the chi-square statistic for Model 2, in which the corresponding path was freely estimated. If the chi-square difference test indicated that Model 1 does not fit the data significantly worse than Model 2 (i.e., the chi-square test was nonsignificant), then Model 1, which does not contain a direct path from the intervention to autobiographical memory specificity, was accepted. Assuming that the accepted model provides an adequate fit to the data, full mediation is supported. Alternatively, if the difference in the chi-square test indicated that Model 1 does fit the data significantly worse than Model 2 (i.e., the difference in the chi-square test is significant), then the paths in the model should still be examined for the presence of a partial mediation.

Further support of full or partial mediation was obtained by testing the statistical significance of the indirect effect (i.e., the mediated effect – the effect of the intervention on autobiographical memory specificity through the proposed mediator) using bootstrapping procedures (Preacher & Hays, 2004; Shrout & Bolger, 2002). Bootstrapping is a resampling method that derives empirical estimates of standard errors and confidence intervals (Keith, 2006; Kline, 2005).

The models were tested using maximum likelihood estimation. Overall model fit was assessed with the chi-square goodness of fit index ( $\chi^2$ ), the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Current standards recommend that CFI values greater than .95, and RMSEA and SRMR values less than approximately .06 suggest good model fit (Hu & Bentler, 1999). Changes in chi-square values relative to changes in degrees of freedom (chi-square difference tests) were used to compare nested models.

Model 1



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Model 2

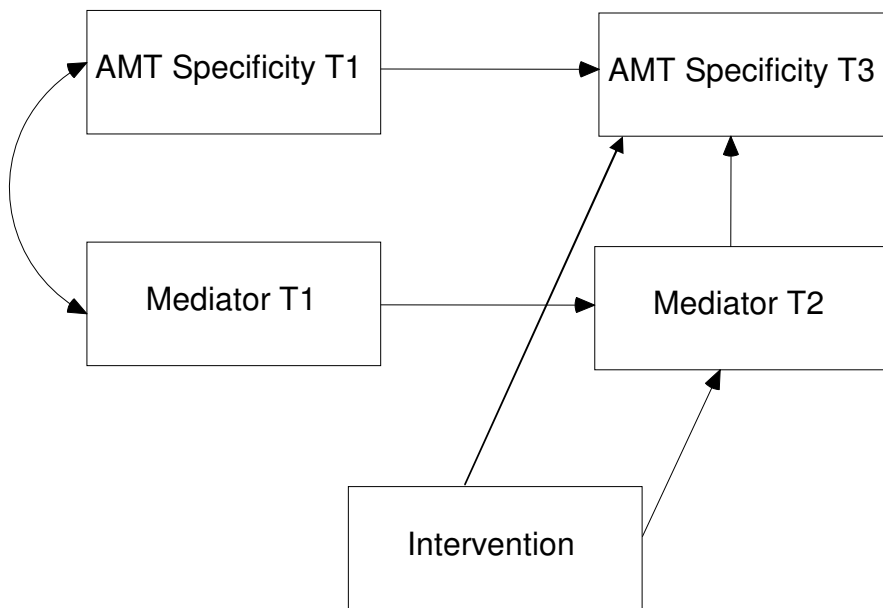


Figure 2. Models tested in mediational analysis.

*Results of mediational analyses.* The results of the mediational analyses are presented in Table 6. As illustrated in this table, the WBSI is the only variable that met the criteria for partial mediation. More specifically, for the WBSI, a chi-square difference test revealed that Model 2, which included a direct path from the intervention to autobiographical memory specificity, provided a better fit to the data than Model 1, which constrained the corresponding direct path to zero,  $\Delta\chi^2(1, N = 135) = 19.30, p = .00$ . Therefore, the direct path from the intervention to autobiographical memory specificity was freely estimated. The path estimates for Model 2 revealed that after controlling for baseline levels of autobiographical memory specificity, participants in the traditional expressive writing condition, compared to participants in the control writing condition, demonstrated a significant increase in Time 3 autobiographical memory specificity (Intervention  $\rightarrow$  AM Specificity,  $B = 2.54, \beta = .35, p < .001$ ). After controlling for baseline scores on the WBSI, participants in the traditional expressive writing condition, compared to participants in the control writing condition, also demonstrated a significant reduction in avoidance on the WBSI (Intervention  $\rightarrow$  Mediator,  $B = -2.78, \beta = -.13, p = .02$ ). In addition, after controlling for initial levels of autobiographical memory specificity, reductions in avoidance were significantly associated with increased autobiographical memory specificity at Time 3 (Mediator  $\rightarrow$  AM Specificity,  $B = -.07, \beta = -.20, p = .01$ ). Furthermore, bootstrap with 5,000 resamples to derive the 95% confidence interval for the indirect effect of the intervention on Time 3 autobiographical memory specificity via the WBSI (i.e., the proposed mediator) revealed that the indirect effect was indeed significant (Intervention  $\rightarrow$  AM Specificity,  $B = .19, \beta = .03, p = .02$ , two-tailed).

Taken together, these results are consistent with the hypothesis that the effect of the traditional expressive writing intervention on Time 3 autobiographical memory specificity was partly mediated through a reduction in avoidance, as measured by the WBSI, which was specifically targeted by the intervention. Contrary to prediction, rumination, as measured by the RRS, did not mediate (or partially mediate) the effect of the traditional expressive writing intervention on Time 3 autobiographical memory. Additional analyses not reported here also tested the RRS Brooding subscale as a possible mediator and results were not significant.

Table 6

*Tests of Proposed Mediators and Model Fit Statistics*

Proposed Mediator	Model	$\chi^2$	df	$\Delta\chi^2$	CFI	RMSEA	SRMR	<u>Direct Effects</u>			<u>Indirect Effect</u>
								Intervention → Mediator	Mediator → AMT Specificity	Intervention → AMT Specificity	Intervention → AMT Specificity
WBSI	1	24.76**	5		.86	.17	.10	-2.78*	-.09**		
	2	5.46	4	19.30**	.99	.05	.04	-2.78*	-.07**	2.54**	.19**
RRS	1	24.92**	5		.76	.17	.11	-.28	-.08*		
	2	3.51	4	21.41**	1.0	.00	.04	-.28	-.07	2.69**	.02

*Note.* WBSI = White Bear Suppression Inventory; RRS = Ruminative Response Scale;  $\chi^2$  = chi-square;  $\Delta\chi^2$  = Change in chi-square statistics between Model 1 and Model 2; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.  
\*  $p < .05$ . \*\*  $p < .01$ .



*Hypothesis 3: Factors that Mediate the Effect of the Intervention on Follow-up Depressive Symptoms*

It was predicted that rumination, avoidance, and overgeneral memory would each partially mediate the effects of the expressive writing intervention on depressive symptoms at the six-month follow-up (Time 3). Specifically, participants in the intervention group were expected to demonstrate reductions in Time 2 rumination, avoidance, and overgeneral memory, which in turn would be associated with reduced depressive symptoms at Time 3.

*Results of Hypothesis 3.* According to Baron and Kenny (1986), to meet the initial criterion of mediation, the expressive writing intervention must have a significant effect on the primary outcome variable (Time 3 depressive symptoms). In other words, there must be an initial effect to be mediated. Unfortunately, after controlling for Time 1 depressive symptoms, the intervention did not have a significant effect on Time 3 depressive symptoms,  $F(2,201) = .33, p = .72, \text{partial } \eta^2 = .003$ , thus Hypothesis 3 was not supported and no further analyses were conducted to test for potential mediators.

## CHAPTER FIVE

### Discussion

#### *Summary and Discussion of Findings*

##### *Is Expressive Writing Effective in Decreasing Overgeneral Memory?*

Study results provide preliminary evidence that an expressive writing intervention, compared to a control writing condition, is effective in increasing autobiographical memory specificity over a six-month period for currently non-depressed college students. Specifically, results revealed that compared to the control condition, both the traditional expressive writing condition and the specific expressive writing condition showed significantly greater autobiographical memory specificity at the six-month follow-up (Time 3). Furthermore, there was no significant change in depressive symptoms from baseline to Time 3 suggesting the observed increase in autobiographical memory specificity for the expressive writing conditions could not be attributed to change in depressive symptoms. The results of this study are consistent with findings from the two existing studies that have successfully demonstrated that overgeneral memory can be reduced through psychological intervention (Serrano et al., 2004; Williams et al., 2000). Importantly, this is the first study to include an active control group, increasing confidence that reductions in overgeneral memory can be attributed to the direct effects of the expressive writing intervention.

Based on meta-analytic findings that expressive writing studies showed the greatest benefits on psychological health outcomes when follow-up assessments occurred within one month of the intervention (Frattaroli, 2006), it was originally hypothesized that increased autobiographical memory specificity would be observed among the

expressive writing conditions, compared to the control condition, one month following the intervention (Time 1). Significant differences between the expressive writing (traditional and specific) and control conditions, however, were not observed on the AMT until the six-month follow-up. A tentative explanation for this finding is that the intervention may have taken a relatively longer period of time to effect change in the mechanisms proposed to underlie autobiographical memory specificity (e.g. avoidance). For instance, a number of studies employing the expressive writing paradigm report that participants who write about emotional upheavals continue to talk with others about their writing topics in the months following the experiment (e.g., Pennebaker & Chung, 2007). It may take several months of continued social/emotional disclosure, which facilitates emotional processing and counteracts tendencies to avoid painful affective material, to influence increased autobiographical memory retrieval. It is also true that benefits of expressive writing on physical health outcomes have often not been manifest until several months following the intervention (e.g., Smyth, Stone, Hurewitz, & Kaell, 1999).

#### *How Does Expressive Writing Influence Overgeneral Memory?*

Study results provide initial evidence that avoidance serves as a mechanism of action of the traditional expressive writing intervention on increased autobiographical memory specificity. More specifically, after controlling for baseline levels of autobiographical memory specificity and avoidance, the effect of the traditional expressive writing intervention, compared to the control condition, on increased autobiographical memory specificity at the six-month follow-up (Time 3) was partially mediated by a reduction in avoidance at the one-month follow-up (Time 2). It is important to note that the original hypothesis predicted that avoidance, assessed at the

one-month follow-up, would mediate the effect of the intervention on increased autobiographical memory specificity, also assessed at the one-month follow-up. Because there was no initial effect to be mediated (i.e., the intervention did not have the predicted effect on autobiographical memory specificity at the one-month follow-up), the original hypothesis was not supported. Nonetheless, the results from exploratory analyses actually present a stronger case that a reduction in avoidance partially explains the effect of the intervention on increased autobiographical memory specificity because changes in avoidance temporally preceded changes in autobiographical memory specificity.

The finding that the traditional expressive writing intervention was associated with a decreased tendency to avoid or suppress distressing thoughts corroborates proposed theoretical accounts of the underlying mechanisms that explain the effectiveness of expressive writing. Specifically, this result would support the notion that writing about one's deepest thoughts and feelings surrounding traumatic experiences counteracts tendencies to avoid distressing material and facilitates cognitive and emotional processing (Pennebaker, 1997; Pennebaker & Seagal, 1999). This finding is consistent with prior studies that have demonstrated reductions in intrusive and avoidant thinking for negative life events (Klein & Boals, 2001) and avoidant behavior (Schoutrop et al., 2002) following expressive writing interventions.

The finding that an experimentally manipulated reduction in avoidance was associated with increased autobiographical memory specificity at follow-up also has important theoretical implications regarding processes proposed to contribute to overgeneral memory. Specifically, this finding builds upon prior correlational evidence that overgeneral memory is associated with cognitive avoidance, even among nonclinical

college student samples (Hermans et al., 2005). And importantly, this result furthers support for the prevailing *functional avoidance hypothesis*- the idea that the tendency to recall memories in an overgeneral manner may reflect a habitual cognitive avoidant style originally motivated by attempts to avoid negative affect associated with specific memories (Williams, 1996). Although the current finding cannot speak directly to the question of why individuals initially develop the tendency to avoid specific memories (presumably to guard against negative affect associated with recalling specific memories), study results provide the first known empirical evidence that modifying the tendency to engage in cognitive avoidance through psychological intervention is associated with increased autobiographical memory specificity. Viewed in the context of Conway's (2005) Self-Memory System model of autobiographical memory, this finding would be consistent with the notion that individuals who are less likely to engage in cognitive avoidance may be less likely to prematurely truncate the memory search process and more likely to attempt to "search" for specific memories.

The hypothesis that rumination would partially mediate the effect of the expressive writing intervention on increased autobiographical memory specificity was not supported. This hypothesis was not supported primarily due to the fact that levels of rumination for the traditional and control conditions one month following the intervention were not significantly different, after controlling for baseline levels of rumination. Exploratory analyses also showed a similar pattern of results for the Brooding subscale of the RRS.

It is curious that the writing intervention did not have a differential effect on rumination across the traditional and control writing conditions. However, the only

known study to report a reduction in rumination (as assessed by the RRS Brooding subscale) following Pennebaker's expressive writing intervention, involved a sample of formerly depressed college students who were also less emotionally expressive (Gortner et al., 2006). One possible explanation is that expressive writing only shows beneficial effects on rumination among individuals with a greater tendency to suppress their emotions. In contrast to Gortner et al.'s study, the current study sample included both formerly and never depressed participants, which also may have reduced power to detect significant effects.

Because participants in the current sample were selected to be not depressed, and numerous studies have reported strong correlations between rumination and depression, one would expect relatively low levels of rumination in the current study sample. Based on principles of regression to the mean, one would expect participants in the current study to demonstrate an increase in rumination from Time 1 to Time 2. In this context, it is interesting that mean scores on the RRS for the traditional and control writing conditions indicate that participants in both conditions demonstrated a decrease in rumination from Time 1 to Time 2. A very tentative explanation could be that the control writing intervention provided a successful method of distraction, which reduced the tendency of individuals to engage in ruminative processing. A distraction effect could also help explain the unexpected finding that after controlling for baseline levels of depression and autobiographical memory specificity, participants in the control condition showed significantly greater autobiographical memory specificity one month following the intervention compared to participants in the traditional and specific writing conditions. This line of thinking would be consistent with evidence that experimentally

induced distraction has been shown to be effective in reducing overgeneral memory (Watkins et al., 2000).

*“Traditional” Expressive Writing versus “Specific” Expressive Writing*

Although no specific hypotheses were proposed regarding differential effectiveness or mechanisms of action for the traditional and specific expressive writing conditions, the discrepant pattern of results observed between the two conditions merits discussion. Specifically, results showed that both conditions were associated with increased autobiographical memory specificity at the six-month follow-up. This effect was partially mediated by a reduction in avoidance in the traditional expressive writing condition, but not in the specific expressive writing condition. Why did participants in the specific expressive writing intervention not show a reduction in avoidance? Recall that for both conditions, identical instructions asked participants to write about their very deepest thoughts and feelings about any difficult or emotionally disturbing events they had experienced; the specific expressive writing condition contained the following additional instruction: “It is most important that you describe the events you write about in a vivid and detailed way. For example, you might include a precise description of the exact images, thoughts, and emotions that come to mind as you write.” A tentative speculation may be that the additional instructions in the specific expressive writing condition interfered with emotional processing that is necessary to counteract tendencies to avoid distressing material. In fact, Pennebaker and Chung (2007) have suggested that “forcing individuals to write about a particular topic or in a particular way may cause them to focus on the writing itself rather than the topic and the role of their emotions in the overall story” (p.268).

### *Does Reduced Overgeneral Memory Predict Follow-up Depressive Symptoms?*

It was predicted that increased autobiographical memory specificity due to the expressive writing intervention would partially mediate the benefits of the expressive writing intervention on follow-up depressive symptoms. Recall that the primary aim of this hypothesis was to answer important questions regarding the potential of increased autobiographical memory specificity to prevent the development of follow-up depression symptoms. Unfortunately, this hypothesis was not supported for several reasons. First, contrary to expectation, after controlling for baseline depressive symptoms, no significant difference was observed among participants in the expressive and control writing conditions on depressive symptoms at the six-month follow-up. It would have been fruitless, therefore, to examine autobiographical memory as a potential mediator of a nonsignificant effect. Second, regardless of whether or not the intervention had a significant direct effect on Time 3 depressive symptoms, the most stringent test of mediation requires meaningful change in the mediator (i.e., autobiographical memory specificity) to precede meaningful change in the outcome (i.e., depressive symptoms). This criterion was not met, as a significant difference between the expressive and control writing condition was not observed until the six-month follow-up (the final assessment of the study).

Although not the primary focus of the current study, the null finding regarding the effect of the intervention on follow-up depression symptoms merits comment. A possible explanation for this nonsignificant effect concerns the fact the study sample only included participants who were not currently depressed (i.e.,  $BDI \leq 12$ ). Also, participants were not selected for the experience of prior depressive symptomatology. It can be assumed,



therefore, that a sizable percentage of participants had a relatively low risk of developing depression over the course of the study. Clearly, the nature of the study sample reduced the power to detect meaningful change in follow-up depressive symptoms as a result of the expressive writing intervention. Reduced power is further compounded by the fact that the overall effect size for depression outcomes in randomized expressive writing experiments is reportedly small to begin with (Frattaroli, 2006). Future studies could possibly overcome this lack of statistical power by limiting the sample to individuals with a heightened vulnerability to future depression based on the presence of prior depression or on empirically supported cognitive vulnerability factors (e.g., cognitive avoidance, rumination).

#### *Strengths of the Study*

The current study addresses several methodological limitations of the two previous studies that have demonstrated the efficacy of psychological intervention in reducing overgeneral memory (Serrano et al., 2004; Williams et al., 2000). First, the current study employed a randomized controlled design, which rules out third-variable explanations and allows for the strongest causal inferences to be made regarding the effects of the expressive writing intervention on increased autobiographical memory specificity. Furthermore, the inclusion of an active control group increases confidence that differences observed between the experimental and control conditions are not due to experimental artifacts (e.g., demand characteristics, participant expectancies, attention). Additionally, the expressive writing intervention and all study measures were administered online, reducing experimenter bias, and participants were blinded to study hypotheses.

The prospective design of the study, which allowed for two follow-up assessments, provided a significant advantage in detecting meaningful change in study outcomes. For instance, significant change in autobiographical memory specificity was not observed until the six-month follow-up for participants in the expressive writing conditions. Of equal importance is the fact that the inclusion of multiple follow-up points allowed for the most stringent test of avoidance as a mediator of the effect of the traditional expressive writing intervention on increased autobiographical memory specificity. Specifically, it was possible to show that meaningful change in avoidance as a result of the traditional expressive writing intervention occurred before meaningful change in autobiographical memory specificity.

#### *Study Limitations*

Several methodological limitations of the present study should be noted. First, participant attrition over the course of study introduces a potential bias that limits the generalizability of study results. Relative to study completers, study non-completers were more likely to be men and had significantly lower baseline AMT specificity scores, although the size of this effect would be considered small. As detailed in the study methods, two participants did not complete the writing intervention (one from the traditional and one from the specific condition), 13 participants were lost to the one-month follow-up, and an additional 102 participants were lost to the six-month follow-up. The most notable attrition clearly occurred during the one-month and six-month follow-ups. As mentioned previously, this is likely attributed to the fact that participants were required to complete the baseline assessment, the intervention, and the one-month assessment to fulfill departmental course requirements. Alternatively, participation in the

six-month follow-up had no bearing on course credit, although participants did receive ten dollars for study participation. It also remains possible that greater attrition rates among participants with lower autobiographical memory specificity scores at baseline suggests that study non-completers may have found some aspect of the AMT unpleasant, which led them to discontinue the study.

The use of a sample of college students who were not currently depressed (i.e.,  $BDI \leq 12$ ) and who were not actively seeking treatment potentially limits the generalizability of study results. For instance, although recruiting a sample that was not initially depressed provided benefits in examining overgeneral memory without the potential confounds of depression severity, this design feature potentially limits the generalizability of the findings. Given that levels of overgeneral memory are reportedly higher in currently and formerly depressed individuals (e.g., Williams et al, 2007), it is unknown if expressive writing would prove effective in increasing autobiographical memory specificity in these populations. Additionally, results may not generalize to older or younger individuals. Lastly, depression was assessed by self-report. Thus, considerable caution should be used in generalizing study results to individuals with a clinical diagnosis of major depressive disorder.

#### *Conclusions and Future Directions*

In conclusion, the current study offers preliminary evidence that an expressive writing intervention, compared to a control writing condition, is effective in increasing autobiographical memory specificity over a six-month period for initially non-depressed college students. Compared to prior interventions that have demonstrated effectiveness in reducing overgeneral memory, the expressive writing intervention is very brief,

extremely cost-effective, yet still showed the ability to produce positive effects on overgeneral memory. It will be important for future research to replicate these findings and extend the generalizability of these results to additional populations—most importantly to individuals with current and past diagnoses of major depressive disorder. At this point in time, evidence regarding the effectiveness of expressive writing in reducing overgeneral memory should be viewed as preliminary, and much more research needs to be conducted before expressive writing is adopted as a standalone intervention.

Uncovering avoidance as a mechanism of action of the traditional expressive writing on increased autobiographical memory is perhaps the most important contribution of the current study. This finding provides the first known evidence that an experimentally manipulated reduction in cognitive avoidance—a factor theorized to directly influence overgeneral memory—is associated with increased autobiographical memory specificity at follow-up. Avoidance only partially mediated the effect of the intervention on autobiographical memory specificity, suggesting the necessity of further exploration into additional mechanisms through which expressive writing influences overgeneral memory.

On the one hand, the fact that no significant change in depression symptoms was observed among participants in the expressive and control writing conditions over the study period was beneficial in that this finding strengthens the conclusion that observed changes in autobiographical memory specificity were not confounded by similar changes in depressive symptomatology. It is unfortunate, however, that the current study provides no data to address the important question as to whether or not increased autobiographical memory specificity has a protective effect on the development of future depressive

symptoms. Because it is possible that positive downstream effects on depression symptoms would have emerged over a longer follow-up period, future studies are encouraged to use relatively longer follow-up periods combined with multiple opportunities to assess study outcomes. Beyond encouraging longer follow-up periods, strong support that overgeneral memory increases or decreases cognitive vulnerability to depression would come from evidence that levels of overgeneral memory among individuals who were initially not depressed predicts clinically diagnosed episodes of major depressive disorder.

## APPENDICES

Appendix A

**Autobiographical Memory Test Cue Words**

**List A**

Grass  
Guilty  
Happy  
Relieved  
Gigantic  
Hopeless  
Failure  
Absence  
Proud  
Wildlife  
Grave  
Eager  
Glorious  
Bread  
Ugly  
Worse  
Search  
Sunny

**List B**

Pottery  
Grief  
Devoted  
Hopeful  
Ladder  
Rejected  
Helpless  
Occasion  
Amazed  
Moderate  
Blame  
Pleased  
Calm  
Nursery  
Awful  
Mistake  
Shallow  
Bright

**List C**

Expert  
Sad  
Joy  
Smile  
Theatre  
Misery  
Ashamed  
Rhythm  
Faithful  
Rapid  
Weakness  
Lively  
Cheer  
Youngest  
Solemn  
Tired  
Bathe  
Lucky

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