AUTOBIOGRAPHICAL MEMORY AND THE AFFECTIVE IMPACT OF POSITIVE MEMORY RECALL IN DEPRESSIVE DISORDERS

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ORIGINALITY STATEMENT

'I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at UNSW or any other educational institution, except where due acknowledgement is made in the thesis. Any contribution made to the research by others, with whom I have worked at UNSW or elsewhere, is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.'

Signed …………………………………………

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PUBLICATIONS AND PRESENTATIONS

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Peer-reviewed journal articles:

Studies 1 & 2:

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ABSTRACT

This research program examined the role of autobiographical memory in depression and its recurrence. Despite empirical advances in the area, the cognitive processes that contribute to depressive recurrence remain poorly understood. Accordingly, Studies 1 and 2 compared features of cued memories in never-depressed and depression vulnerable (i.e., recovered depressed) individuals following a sad or neutral mood induction. In both studies, negative memories did not differ but interestingly, recovered depressed individuals recalled less vivid positive memories than their never-depressed counterparts, but only in a sad mood. Study 3 extended this line of enquiry to self-defining memories and found that some memory characteristics (i.e., reduced emotional intensity of positive memories) distinguished recovered from never-depressed groups, but only in a sad mood. That these differences emerge even when formerly depressed individuals are in remission suggests that the phenomenological characteristics of personal memories may be an important factor in vulnerability to depression. Building on these findings, the remaining experiments focused explicitly on the affective consequences that follow positive memory recall. Existing research has shown that while healthy individuals experience emotional benefits following the recall of positive memories, depressed and recovered depressed individuals do not. To examine whether this could be due to ruminative processes, Studies 4 and 5 investigated the effect of manipulating ruminative processing mode on the affective impact of recalling positive memories. The findings of Study 4 indicated that for both depressed and formerly depressed participants, concrete processing of a positive memory led to improved mood, while abstract processing did not. Taking a translational approach, Study 6 examined a brief experimenter-delivered processing mode manipulation and found that regardless of the processing mode adopted, recovered but not currently

depressed individuals experienced improved mood after recalling a positive self-defining memory. This illustrates that memory type, depressive status, and processing mode all have implications for the emotional impact of recalling positive memories. In summary, the studies reported in this thesis support the idea that depression is associated with a deficit in the processing of positive material and suggest that explicitly targeting autobiographical memory characteristics and processes may improve existing treatments for depressive disorders.

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CHAPTER 1: General Introduction

Research over the last three decades has identified cognitive factors as being critically involved in the onset of depression and its recurrence. It is now widely accepted that depressive disorders involve deficits in a range of cognitive processes including memory biases, as well as emotion regulation difficulties. Recent work has shown that many of these deficits characterise not only depressive episodes themselves, but they also remain even during the euthymic phase of depression (Ehring, Fischer, Schnulle, Bosterling, & Tuschen-Caffier, 2008; Teasdale & Dent, 1987) suggesting that cognitive factors may be associated with depressive vulnerability and the risk of recurrence. Despite empirical developments in the area, research into the cognitive risk factors contributing to depressive recurrence is lacking. Epidemiological studies have established depression as a lifelong chronic illness, with more than 80% of individuals experiencing repeated episodes (Judd, 1997). Of concern is that with each successive depressive episode experienced, there is increased risk of future recurrence (Solomon et al., 2000). If depressive disorders are to be more effectively treated in the future, there is a need for cognitive vulnerability factors associated with recurrence to be better understood.

This thesis will examine an important aspect of cognition and its role in depressive recurrence - autobiographical memory processes. There are two overall goals of this research program. The first is to examine autobiographical memory processes in individuals with depressive disorders as a way to identify the possible involvement of memory as a cognitive risk factor for depressive recurrence. The second is to consider the role of autobiographical memory processes in the emotion regulation difficulties experienced by depressed and recovered depressed individuals, in order to inform treatment strategies designed specifically to target these impairments.

Outline of Introduction

This introductory chapter will open with a brief overview of the role of autobiographical memory processes in depressive disorders. This discussion will then describe an influential cognitive model of depression: the Differential Activation Hypothesis (Teasdale, 1988), which will provide the theoretical basis for this thesis. A review of the empirical findings in support of this model will follow, with an emphasis on the role of memory. Limitations of existing research in this area will then be identified, followed by an outline of how the current research program will address these limitations.

The second part of this introductory chapter will focus on autobiographical memory processes in the regulation of emotion with a particular emphasis on positive memory recall as a strategy used to improve mood. The contribution of ruminative processes to the difficulty experienced by individuals with depressive disorders in their ability to use positive memories to improve their mood will then be discussed. Literature suggesting that ruminative processes may be involved in this emotion regulation deficit will then be considered. This chapter will conclude with an outline of how the current research program will empirically evaluate whether rumination compromises the capacity of individuals with depressive disorders to use positive memories to improve low mood.

Autobiographical Memory

Autobiographical memories are recollections of personally experienced events from the past. The role of autobiographical memory has been investigated across a range of psychological domains and has been shown to be fundamentally involved in the human experience of the self and the environment (Conway & Pleydell-Pearce,

2000). There is strong evidence suggesting that aspects of autobiographical memory are closely linked to emotional functioning and in particular, to depression. Specifically, research has identified two key disturbances related to memory as critically involved in depressive disorders: (i) the preferential recall of negative compared to positive material, and (ii) the tendency of depressed individuals to recall overgeneral autobiographical memories.

Preferential Recall of Negative Material

Characteristic of depressed individuals is the tendency to preferentially recall negative material relative to positive material. Findings from the depression literature have consistently shown that individuals with depression have a robust preference for recalling negative material (Mathews & MacLeod, 2005; Matt, Vázquez, & Campbell, 1992). In a meta-analytic review, Matt et al. (1992) examined a range of studies that primarily examined the free recall of a range of deliberately learnt word-lists that included both positive and negative words. On average, participants with depression recalled up to 10% more negative than positive words compared to non-depressed control participants, irrespective of whether the material was self-referent in nature. Interestingly, there is some evidence suggesting that the superior recall of negative material extends to autobiographical memory and is related to depression. An early correlational study with depressed individuals found that high levels of depressive symptoms were associated with shorter latencies to recall unpleasant memories, while lower depressive symptoms were related to faster recall of pleasant memories (Lloyd & Lishman, 1975). Moreover, in an experimental study conducted by Clark and Teasdale (1982), a group of depressed participants with diurnal mood variations were more likely to retrieve unhappy memories at the time of day when they were depressed, with the inverse being true for when they were not depressed. Together, these studies suggest

that depression is associated with enhanced memory for negative compared to positive material, and this association extends to personally-relevant, autobiographical memories.

Overgeneral Memory Recall

One of the most notable findings from the depression and memory literature is that depressed individuals experience difficulty retrieving specific autobiographical memories. That is, even when asked to recall specific memories in response to both negative and positive cue words, individuals who are depressed have a tendency to provide a summarised category of similar events or repeated occasions (e.g., Kuyken & Dalgleish, 1995; Williams et al., 2007). This phenomenon is known as overgeneral memory, and may be defined as memory that is either categorical or extended such that the event has occurred more than once or takes place over a period of more than one day (Williams, 1996).

The tendency to recall overgeneral memories has been found to be closely associated with a range of negative psychological outcomes including impaired problem solving ability (Goddard, Dritschel, & Burton, 1996), difficulty in imagining future events (Williams, 1996), and a poorer prognosis in terms of recovery from a depressive episode (Brittlebank, Scott, Williams, & Ferrier, 1993). While some studies have found that memory specificity returns to a high level upon recovery from depression (e.g., Williams, Barnhofer, Crane, & Beck, 2005) there is evidence that recovered depressed individuals recall overgeneral memories even when they are not experiencing a depressive episode (e.g., Mackinger, Pachinger, Leibetseder, & Fartacek, 2000). The finding that overgeneral memory can remain stable under some conditions, even following the resolution of an acute episode, suggests that it could represent a cognitive vulnerability factor. Indeed, more recent studies have found that overgeneral memory

assessed during the euthymic phase of depression is associated with later mood disturbances across depression in response to a range of triggers, including postpartum depression (Mackinger, Loschin, & Leibetseder, 2000), seasonal affective disorder (Dalgleish, Spinks, Yiend, & Kuyken, 2001), and depressed mood following stressful life events (Gibbs & Rude, 2004). Moreover, longitudinal findings suggest that the tendency to recall overgeneral memories is also predictive of depressive status over time (e.g., Hermans, Vandromme, et al., 2008). That overgeneral memory is evident among depressed and recovered depressed individuals, that it is associated with a range of adverse psychological consequences, and that it predicts depression prospectively, suggests that it is both a robust phenomenon and an important trait marker of depressive illness.

Overgeneral memory was initially conceptualised as an emotion regulation strategy, that is, as a mode of memory retrieval that minimises the potential negative emotion experienced as a result of recalling distressing memories (Williams, 1996). This conceptualisation has recently been elaborated upon, with proponents of the CaR-FA-X model (i.e., capture and rumination, functional avoidance, impaired executive control) suggesting that a number of processes, either alone or in combination, account for the tendency to retrieve overgeneral memories that is prevalent among depressed individuals. Specifically, Williams and colleagues (Williams et al., 2007) suggested that three mechanisms underlie overgeneral memory: capture and rumination, functional avoidance and impaired executive control (for recent review, see Sumner, 2012). A comprehensive analysis of this model is beyond the scope of the current thesis, but in short, the capture and rumination mechanism relates to the possibility that overgeneral memory is facilitated by mnemonic information, which activates ruminative processes during memory retrieval. In support, studies have found that experimentally induced

ruminative processing leads to overgeneral memory while non-ruminative thinking does not (e.g., Crane, Barnhofer, Visser, Nightingale, & Williams, 2007; Raes, Watkins, Williams, & Hermans, 2008). The second factor, functional avoidance, is similar to the initial conceptualisation of overgeneral memory as an avoidance mechanism whereby remembering autobiographical events in a general manner has been suggested to result in the reduced affective impact of emotional memories. Consistent with this proposal are findings showing that avoiding specific recall immediately following an aversive experience leads to subsequent reduced emotional distress (e.g., Hermans, de Decker, et al., 2008). Third, the model asserts that impaired executive control limits the ability of an individual to remain focused on retrieving a specific memory. To support this aspect of the model, numerous studies have found that overgeneral memory recall is associated with impaired executive control on a range of outcomes including verbal, spatial and memory measures (e.g., Dalgleish et al., 2007). While evidence from the literature is consistent with the three processes identified in the model, ongoing research in the area is needed to elucidate more fully the mechanisms underlying overgeneral memory recall (Sumner, 2012). Notably, the association between overgeneral memory recall and depression suggests that the *way* in which an individual remembers events from the past is as important as the content of memory. That is, the processes involved in memory recall, as well as the content of the material being recalled, have implications for the course of the disorder. This underscores the need for future research to investigate how such processes are involved in depression.

Cognitive Models of Depression

Depressive disorders have been conceptualised from biological, social and psychological perspectives. While the determinants of depression likely involve a complex interaction of these factors, the current discussion is concerned with the

contribution of psychological factors to depression. Early theories of depression, including Beck's influential cognitive model of depression (Beck, Rush, Shaw, & Emery, 1979) and Seligman's Learned Helplessness theory (Seligman, 1975), were novel in that they proposed that cognitive factors, including memory processes, were involved in the onset and maintenance of the disorder. However, these models do not comprehensively account for depression because they propose that the same factors that precipitate onset are also responsible for recurrence – an assumption that has not been supported by the data (see Lewinsohn, Allen, Seeley, & Gotlib, 1999, for discussion).

The Differential Activation Hypothesis (DAH; Teasdale, 1988) is another cognitive theory of depression that was formulated to account for different factors involved in the onset and recurrence of depression. Moreover, and most relevant to this thesis, the DAH emphasises that memory processes are critically involved in depression recurrence. This model provides the theoretical basis of the current research project.

The Differential Activation Hypothesis

 The central premise of the DAH is that vulnerability to depression is largely determined by the degree to which negative thought patterns are activated when an individual is in a mildly dysphoric state (Teasdale, 1988). Specifically, it is proposed that while in a sad mood, individuals experience increased activation of maladaptive thinking processes (such as memory biases) and negative thought content (such as dysfunctional attitudes).

The DAH posits that during initial experiences of dysphoria, negative patterns of thinking that involve maladaptive cognitions and processes may become activated and associated with low mood. Subsequent experiences of sad mood come to re-activate these negative thinking patterns and a bi-directional associative link between this mood state and negative thinking is formed and progressively strengthens over each

successive episode. In other words, a positive feedback mechanism between low mood and negative thinking is established. It is the relative ease with which this constellation of negative cognitive processes is triggered by mild dysphoria that determines whether an experience of low mood will remain mild and transient, or will escalate into severe and persistent depression. The magnitude of the increase in negative cognition in response to low mood has been termed cognitive reactivity (Lau, Segal, & Williams, 2004), and the degree of this activation has important implications for an individual's level of vulnerability to recurrent depression.

According to the DAH, in the case of individuals with high levels of cognitive reactivity, depressed mood exacerbates negative thinking, which in turn perpetuates sad mood. It is in this way that a reciprocal, cyclic relationship between sad mood and negative thinking patterns causes mild dysphoria to escalate into a severe and persistent depression. By comparison, in non-vulnerable individuals (i.e., individuals who have never experienced depression), this mutually reinforcing relationship between mood and negative thinking patterns is never established and so when sad mood is experienced, it remains mild and transient. According to the model, vulnerable (i.e. formerly depressed) and non-vulnerable (i.e., never-depressed) individuals are indistinguishable when in a euthymic state. However, when in a sad mood, formerly depressed individuals exhibit differences in cognition to their never-depressed counterparts. Further, the ease with which these negative cognitive processes are activated by a sad mood determines whether they will experience recurrent episodes. Therefore, this model essentially proposes that it is the cognitive response of an individual to an experience of a mildly sad mood that is crucial in determining whether a non-pathological dysphoric state will develop into a severe episode of depression (Teasdale, 1988).

Importantly, the DAH emphasises that the original factors that lead to the onset of depression are likely to be different from factors that determine recurrence (Teasdale, 1988). Specifically, it is suggested that while negative life events play a critical role in depressive onset, it is the degree to which negative thinking patterns are activated by a negative shift in mood that is responsible for enduring vulnerability to depression recurrence. Consistent with this suggestion is the finding that while major negative life events typically precipitate initial depressive episodes, the relationship between external life stressors and depression progressively deteriorates over multiple episodes (Kendler, Thornton, & Gardner, 2000). The DAH explains the emergence of subsequent depressive symptoms in the absence of a precipitating event because with each episode experienced, negative cognitive patterns are more likely to be activated due to their history of association with negative mood. This association would likely be stronger as a function of the number of episodes experienced, which therefore explains why even in the absence of a stressful event, an individual may experience recurrent depressive episodes (Segal, Williams, & Teasdale, 2002).

Evidence for the Differential Activation Hypothesis

For the DAH to be empirically supported, both experimental and prospective evidence is needed. Accordingly, the DAH needs to be tested in two stages. First, cross-sectional experiments need to identify whether vulnerable individuals (operationalised as having experienced at least one depressive episode in the past) and never-previously depressed individuals differ in the extent to which maladaptive processes are activated by sad mood. The differential magnitude of the cognitive changes that emerge between these groups as a consequence of sad mood is interpreted as consistent with the model. Then, once the cognitive differences uncovered by sad mood have been identified, the second stage of testing requires prospective designs to determine whether the magnitude

of the change in cognition activated by sad mood predicts depressive recurrence over time. Importantly, there is evidence from both cross-sectional and prospective studies to support the DAH, and these will now be reviewed.

Cognitive Material

A number of studies have tested the DAH by focusing exclusively on the role of cognitive content using the Dysfunctional Attitudes Scale – a measure of dysfunctional cognitions (DAS; Weissman & Beck, 1978). Early indirect evidence for the DAH came from the finding that recovered depressed and never-depressed individuals were indistinguishable in the extent to which they endorsed dysfunctional beliefs when assessed during euthymic mood (Hamilton & Abramson, 1983; Silverman, Silverman, & Eardley, 1984; Simons, Garfield, & Murphy, 1984). More direct support was provided by studies in which dysfunctional attitudes were measured both before and after a sad mood induction. For example, Miranda and Persons (1988) demonstrated that these two groups were indistinguishable at baseline, but that following a sad mood induction, recovered depressed individuals endorsed significantly more dysfunctional attitudes than never-depressed individuals. This finding has since been replicated using different mood induction procedures and naturally occurring mood fluctuations (Miranda, Gross, Persons, & Hahn, 1998; Miranda, Persons, & Buyers, 1990). Together, the findings of these studies demonstrate a residual cognitive deficit that reflects a differential association between sad mood and dysfunctional cognitions in recovered depressed compared with never-depressed individuals.

Cognitive Processes

A number of studies have employed cognitive processes as an index of cognitive reactivity and obtained the same pattern of results. For example, Gemar, Segal, Sagrati, and Kennedy (2001) examined information processing biases using the Implicit

Association Test (an automatic, reactive time task) to compare evaluative biases in recovered and never-depressed individuals. Participants in the two groups were indistinguishable at baseline, but following a sad mood induction, the recovered depressed group displayed a negative self-evaluative bias that was comparable to that of currently depressed individuals (Gemar et al., 2001). Moreover, in a test of attentional processes, Ingram, Bernet, and McLaughlin (1994) used a dichotic listening task to assess level of attention to positive and negative stimuli. Again, participants were indistinguishable at baseline, but following the sad mood induction, recovered depressed individuals demonstrated an attentional bias towards negative, emotionally-laden stimuli relative to the never-depressed group. These studies indicate that cognitive processes represent a valid component of cognitive reactivity, and usefully distinguish recovered from never previously depressed individuals, in a sad mood. Together, these experimental studies have provided important evidence for the predictions made by the DAH about the differential cognitive processing of formerly depressed and never-depressed individuals in sad mood. However, these designs leave untested the model's predictions that the magnitude of the activation of maladaptive cognitive processes in sad mood (i.e., cognitive reactivity) predicts the likelihood of depression recurrence.

Prospective Evidence

Importantly, this prediction has been tested by breakthrough longitudinal studies that have examined whether mood-related cognitive reactivity is a risk factor for subsequent depressive relapse. Specifically, Segal, Gemar, and Williams (1999) found that cognitive reactivity magnitude (i.e., the extent of the increase in negative thinking from neutral mood to sad mood) as measured by the DAS predicted relapse among formerly depressed patients at 30-month follow-up. Moreover, a subsequent study showed that even after successful treatment by pharmacotherapy or cognitive

behavioural therapy (CBT), mood-linked cognitive reactivity remained a valid predictor of relapse at 18-month follow-up, regardless of treatment modality (Segal et al., 2006). These data illustrate that for individuals who have previously experienced a depressive episode, cognitive reactivity is a key risk factor that heightens vulnerability to depressive recurrence. An important implication that follows from these findings is that targeting cognitive reactivity in interventions for depression may have the potential to reduce the likelihood of depression recurrence.

The Role of Memory

While the findings of both the cross-sectional and prospective studies reviewed above offer compelling support for the DAH, much less research has been conducted to identify the involvement of memory in the context of this model, with the exception of a few studies (e.g., Raes, Schoofs, Griffith, & Hermans, in press). This is somewhat surprising given that the model asserts that memory (such as the preferential recall of negative memories in sad mood) plays a key role in the progression from sad mood to depression in formerly depressed individuals. However, the DAH does not specify exactly how memory processes contribute to depression other than to suggest that experiencing sad mood increases the likelihood that individuals with a history of depression will attend to negative information from both external, environmental sources and internal representations stored in memory to inform their experience (Teasdale, 1988). Specifically, Teasdale argues that when an individual is in a sad mood "there will not only be an increased likelihood that unhappy memories will come to mind, but there will also be a negative bias in the way in which inferences and predictions are made using information from the environment and from memory" (p. 253; Teasdale, 1988).

Of those studies that have examined memory, researchers have focused primarily on memory *content* (e.g., accuracy of recall of negative adjectives) rather than memory *processes* (e.g., the processes/mechanisms by which sad mood increases access to negative material), and further, they have not examined memory for autobiographical events. In the first study to investigate memory in the context of the DAH, Teasdale and Dent (1987) used an incidental recall paradigm to test whether word recall was influenced by depressive history (i.e., recovered depressed compared to never-depressed) or mood (i.e., neutral compared to sad). Recovered depressed and never-depressed individuals did not differ in the recall of positive and negative words during neutral mood, but in a sad mood, recovered depressed individuals recalled more negative self-related adjectives than their never-depressed counterparts. This pattern of results has since been replicated in a larger clinical sample (Hedlund & Rude, 1995) and extended to include a formerly dysphoric and never dysphoric sample (Gilboa & Gotlib, 1997). These findings illustrate that, as predicted by the DAH, there is a difference in the content of the memories recalled by vulnerable and non-vulnerable individuals when in a sad mood. While these word-list methods provide a useful way to examine memory in these two groups in a laboratory-based setting, they nonetheless limit the extent to which conclusions can be drawn about the impact of sad mood on autobiographical memory recall.

Limitations of Existing Research

A number of key limitations of research in this area warrant consideration. First, existing studies have failed to include a neutral mood induction condition. More specifically, in the few studies that have compared recovered and never-depressed individuals in terms of their memory in a sad mood, a neutral mood induction condition has been omitted (e.g., Hedlund & Rude, 1995; Teasdale & Dent, 1987). Instead,

researchers have used participants' performance at baseline (i.e., prior to the administration of a sad mood induction) as an index of performance in neutral mood. This pre-induction performance is then typically compared with performance following the sad mood induction in order to test the DAH's predictions about between-group differences in cognitive processing in a neutral mood, relative to a sad mood. Experimentally, this is not optimal because the change in mood from pre- to post-induction could be due to extraneous variables (e.g., the passage of time, fatigue, boredom), rather than the induction itself. To increase the rigor of experimental work that tests this model, a neutral control condition is needed to allow for confidence that pre-post changes are attributable to changes in mood. Accordingly, a neutral control condition will be employed in the experiments reported in this thesis. Second, as mentioned, studies that have examined the role of memory in the context of the DAH have relied exclusively on word-list methodologies. A consequence of this is that it remains unknown whether findings are ecologically valid and generalise to autobiographical memory.

Third, existing studies have relied almost exclusively on a single instrument (the DAS) to measure cognitive reactivity. The use of this instrument is problematic because it is typically administered twice within the same testing session, and its psychometric validity has been brought into question (Van der Does, 2002). Accordingly, new and valid measures of cognitive reactivity such as the Leiden Index of Depression Sensitivity - Revised (LEIDS-R; Van der Does, 2002) have recently been developed. Therefore, multiple measures of cognitive reacitivity will be incorporated into the current program of research to (i) address the limitations associated with the previously used DAS, and (ii) to more fully assess the breadth of the cognitive reactivity construct (to be discussed more comprehensively in Chapter 2).

A fourth and previously raised point is that much of the existing research focuses on the cognitive content aspect of cognitive reactivity with little investigation of cognitive processes. Cognitive reactivity is a multifaceted construct that encompasses both content *and* processes, the latter of which have been largely ignored. As outlined by the DAH, memories are recalled by formerly depressed individuals in a sad mood that are negatively biased in content (Teasdale, 1988). An extension of this notion is that the characteristics of memories which are recalled might also differ. It is known from the intrusive memory literature that phenomenological memory features are associated with depression. While research in this area is somewhat in its infancy, there is evidence that depressed individuals report high levels of vivid, negative intrusive memories that are accompanied by a sense of re-experiencing the event (Patel et al., 2007). This line of enquiry was recently extended in a study conducted with a clinical sample, and distinct intrusive memory features were found to be characteristic not only of those who were currently depressed, but also of those individuals who had experienced depression in the past (Newby & Moulds, 2011). Similar to intrusive memory characteristics, the features of autobiographical memory recalled during sad mood might also be linked to past episodes of depression. The current research program will consider the involvement of memory features in this context.

Fifth, the DAH does not address a possible role of deficits in the recall of positive memories by formerly depressed individuals in sad mood, which may feasibly contribute to depression recurrence. The sole consideration of memories that are negatively valenced is consistent with the existing evidence base which has focused almost exclusively on negative memory biases in depression (Mathews & MacLeod, 2005). While the attention to negative memories makes sense given that depression is associated with an excess in negative cognitive processes, some researchers have argued

that depression might also be associated with a deficit in the processing of positive information (e.g., Joormann & Siemer, 2004; MacLeod & Byrne, 1996; MacLeod, Tata, Kentish, & Jacobsen, 1997). There is emerging evidence for this proposition. In particular, two studies have shown that the ability of dysphoric individuals to vividly imagine future positive events, but not negative events, is impaired relative to healthy controls (Holmes, Lang, Moulds, & Steele, 2008; Stöber, 2000). Furthermore, there is now evidence that a deficit in recalling positive memories from a first-person field perspective is characteristic of both currently (Lemogne et al., 2006), and formerly (Bergouignan et al., 2008), depressed individuals. That is, depressed and recovered individuals have a greater tendency to recall positive memories from an observer vantage perspective than from a field perspective, as compared to never-depressed individuals. Observer perspective recall reduces the positive affect associated with imagining positive material (Holmes, Coughtrey, & Connor, 2008), highlighting the potentially adverse consequences of this form of remembering positive events in depression. Furthermore, these findings are consistent with a myriad of studies that have established that field perspective memories are more affect-laden than observer memories (e.g., Bernsten & Rubin, 2006; Nigro & Neisser, 1983). These converging lines of evidence suggest that the processes involved in the recall of positive memories could be associated with the cognitive profile of depression. Although the DAH does not make predictions about whether recovered and never-depressed individuals differentially recall positive memories in sad mood, the wider literature suggests there is good reason to expect that they may do. Accordingly, using the logic outlined by the DAH as a basis, and drawing upon relevant findings from the wider literature, the current thesis will investigate whether differences exist between formerly depressed and never-depressed individuals by examining the features of their positive memories.

In summary, existing research that has examined memory in the context of the differential activation account of depression is limited in that it: (i) has failed to include a neutral mood induction control condition, (ii) has employed only word-list methods, (iii) has relied exclusively on a single instrument to measure cognitive reactivity, (iv) has ignored a potential role for memory features, and (v) has not tested whether positive memories, in addition to negative memories, might be differentially recalled by recovered and never-depressed individuals in sad mood. This thesis will systematically and experimentally address these limitations in the first phase of this research program (Studies 1, 2, and 3).

Emotion Regulation and Depressive Disorders

It is now widely accepted that individuals who are depressed are impaired in their ability to regulate emotion and to recover from experiences of low mood (Campbell-Sills & Barlow, 2007). The involvement of emotion regulation strategies in depression has recently received increased theoretical attention and garnered empirical support with studies showing that depressed individuals tend to use less adaptive and more dysfunctional strategies to regulate negative affect than their never-depressed counterparts (e.g., Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Garnefski & Kraaij, 2006). For example, Campbell-Sills et al. (2006) found that depressed individuals were more likely than healthy controls to suppress their negative emotions while watching an emotional film clip which served to intensify the emotion. Similarly, Nolen-Hoeksema (2000) demonstrated that rumination in response to negative affect predicts the onset, maintenance and to some extent, the chronicity of depression. Further, there is now preliminary evidence that individuals vulnerable to depression (i.e., formerly depressed individuals) also have difficulty in regulating negative emotion (Ehring et al., 2008). Specifically, Ehring et al. (2008) reported that depression-

vulnerable individuals habitually use more dysfunctional strategies (e.g., catastrophising and rumination) and less functional strategies (e.g., putting things into perspective) than never-depressed controls in the way that they typically respond to low mood. Together, these studies suggest that emotion regulation difficulties may play a key role not only among those experiencing current depression, but also for individuals who have recovered from depression. By extension then, deficits in the capacity to regulate emotion may have implications for depression recurrence. Accordingly, a closer evaluation of the specific mood regulation strategies that depressed and formerly depressed individuals employ in order to reduce or alleviate low mood, and the degree to which these strategies are impaired relative to healthy individuals, is warranted. It is the second goal of the current research program to address this issue and to build upon the first research phase by investigating the role of positive autobiographical memory recall as an emotion regulation strategy.

Using Positive Memories to Improve Mood

The recall of positive memories is an effective method of improving low mood. For example, there is evidence that healthy individuals frequently retrieve positive autobiographical memories as a way to repair negative mood (Parrott & Sabini, 1990; Rusting & DeHart, 2000). In an examination of factors that may influence this process, Joormann and Siemer (2004) induced sad mood and found that while healthy individuals used positive memories to improve mood, dysphoric individuals did not. To test whether this could be due to motivational differences, the authors explicitly instructed participants to recall happy memories and examined the subsequent emotional consequence. Unlike healthy individuals, dysphoric participants did not derive any emotional benefit (i.e., they did not report improvements in mood) following positive memory recall. This finding has since been replicated and extended to a clinical

sample. Joormann, Siemer, and Gotlib (2007) examined the effectiveness of positive memory recall as a mood repair strategy in a sample of depressed, formerly depressed and healthy individuals. Not only did depressed and previously depressed individuals not benefit emotionally (i.e., report improved mood) after recalling happy memories, but participants who were currently depressed reported worse mood following memory recall (Joormann et al., 2007). This suggests that the benefit associated with the recall of positive memories to improve mood depends on depressive status because for currently depressed individuals, the recall of happy memories was to the detriment of their mood; for recovered depressed individuals, positive memory recall did not change mood.

Rumination

These findings raise an important question about the mechanism/s responsible for this effect. Although speculative, one suggestion that has been raised in the literature is that positive memory recall may induce processes that are associated with depression such as rumination (Joormann et al., 2007). From a theoretical perspective, seminal models of ruminative thought propose that focusing on discrepancies between actual and ideal states underlie rumination (Martin & Tesser, 1996). Martin and Tesser (1996) assert that ruminative processing is commonly prompted by problems with goal achievement – a claim that has been substantiated experimentally in work that has illustrated elevated rumination levels when individuals experience difficulty in attaining their goals (Moberly & Watkins, 2010). From this perspective then, positive memory recall would likely draw attention to the discrepancy between an individual's current circumstances (i.e., low mood) to past, happier times. If it is assumed that in general, individuals aim to avoid depressed mood and rather aim to experience positive mood, the recall of a positive memory would emphasise the failure in achieving this goal and in turn, prompt a ruminative response. Indeed, this explanation may account for the

mood repair deficit observed in the study of Joormann et al. (2007), although these researchers did not directly manipulate rumination to evaluate its effect on mood.

Studies that have examined cognitive processes in depression have established a core role for rumination. Considerable evidence has shown that thinking about the causes, meanings and consequences of depressive symptoms (i.e., depressive rumination) maintains and exacerbates low mood. However, not all rumination results in unfavourable outcomes. Watkins and colleagues have suggested that the mode of processing that is adopted while individuals focus on their mood determines whether this process is helpful or not (Watkins, 2004; Watkins & Moulds, 2005; Watkins & Teasdale, 2004). That is, rumination is problematic to the extent that self-focused material is processed at an abstract, general level, as opposed to a more specific, concrete level. To elaborate further, an abstract mode of processing lends itself to the tendency to focus on 'why' questions, while concrete processing is oriented towards moment-to-moment experience. There is accruing evidence that in the context of depression, an abstract processing mode is associated with poor outcomes across domains of functioning, while a concrete processing mode has adaptive functional consequences (see Watkins, Moberly, & Moulds, 2008, for review). For example, in depressed samples, an abstract processing mode has been found to lead to poorer social problem solving ability (Watkins & Moulds, 2005) and to maintain overgeneral memory recall (Watkins & Teasdale, 2004).

Applying this mode of processing distinction to the mood repair deficit observed among depressed and remitted individuals, it may be that these groups have a natural tendency to adopt an abstract mode of processing during low mood which could mitigate the potential emotional benefit of positive memory recall. In contrast, a concrete processing mode may heighten a memory's affective impact via prompting

vivid, specific and detailed sensory memory features. That is, thinking in a more specific and concrete way might enhance the emotionality that can be derived from a positive memory, while thinking in an abstract and general way might reduce the intensity of the memory, ameliorating the downstream effects on mood. This possibility has not yet been experimentally addressed. To this end, the second part of this research program will investigate the role of processing mode in preventing depressed and recovered depressed individuals from using positive autobiographical memories to improve sad mood (Studies 4, 5 and 6).

Aims of the Research Program

There are two aims of the current research program. The first is to overcome the methodological and conceptual limitations of existing studies that have examined memory processes in the context of Teasdale's DAH model, in order to systematically compare the autobiographical memory recall of individuals with and without a history of depression in low mood. The second is to consider the problems experienced by individuals with depressive disorders in recovering from sad mood, and specifically focusing on one emotion regulation strategy - the recall of positive autobiographical memories. Building upon this, it is possible that ruminative processes may contribute to the difficulty experienced by formerly and currently depressed individuals in using positive memory to improve mood. This proposition will be experimentally tested.

Research Phase 1

In the first phase, this research program will address the previously discussed limitations associated with the DAH. First, an experimentally rigorous approach to investigating the differential impact of sad mood on memory performance in recovered as compared to never-depressed individuals will be employed by including a neutral

mood induction condition in the experiments reported in Phase 1. Second, the experiments in this phase will take a broader approach than has been taken in previous work such that they will examine autobiographical memory in the context of the DAH by: (i) including both word-cue and free-recall memory paradigms to investigate memory, (ii) examining whether phenomenological characteristics of memory are differentially recalled by recovered depressed and never-depressed individuals while they are in a sad mood, and (iii) extending the research question to include positive memories in addition to negative memories.

Research Phase 2

Building on Phase 1, the second phase of this thesis will examine the difficulties experienced by depressed and previously depressed individuals in their ability to recover from experiences of sad mood. In particular, impairment in using positive memories to improve sad mood will be investigated. To examine whether ruminative processes might account for this deficit, either a concrete or abstract processing mode will be experimentally induced. The effect of this manipulation on subsequent mood following positive memory recall will indicate whether ruminative processes are involved in this emotion regulation deficit associated with depressive disorders.

Summary

It is the overall goal of this research program to provide insight into the contribution of autobiographical memory processes to depression and its recurrence. As the necessary first step towards meeting this goal, Phase 1 of this thesis will compare the memory processes of formerly depressed and never-depressed individuals under conditions of both sad and neutral mood. In Phase 2, this work will be extended to examine the capacity of positive memory recall as a strategy to regulate sad mood in

depressed and formerly depressed individuals and to improve our understanding of the cognitive processes (e.g., rumination) that potentially undermine its benefits.

Vulnerability to depressive recurrence is not yet well understood. A major challenge in improving treatments for depression is the identification of factors which put recovered individuals at elevated risk of recurrence. Once these factors have been identified, more effective treatments that directly target these variables could be developed. This thesis will provide a much needed empirical investigation of the role of autobiographical memory processes in depression and its recurrence. The results of the experiments reported in this thesis have scope to contribute meaningfully to the existing knowledge base by establishing: (i) whether there are differences in the autobiographical memories of formerly depressed and never-depressed individuals while in a sad mood, and (ii) the mechanisms underlying the deficits experienced by individuals with depressive disorders in their ability to use positive memories to regulate sad mood. Findings from this body of work may suggest novel avenues for explicit targeting of cognitive factors with a view to improve existing treatments for depression.

CHAPTER 2: Characteristics of Autobiographical Memories

As outlined in Chapter 1, the high rate of depressive recurrence suggests that there is a need to investigate cognitive factors that increase vulnerability to future depression, even after the resolution of a depressive episode. As predicted by Teasdale's DAH framework, maladaptive cognitive characteristics (e.g., increased endorsement of dysfunctional attitudes) can be uncovered by formerly depressed individuals while they are in a sad mood. With respect to memory, the DAH similarly asserts that differences in memory processes become apparent between recovered and never-depressed individuals only while they are in a sad mood. Although there is little discussion by the

model of how memory is likely to differ between these two groups, an extension of the ideas proposed by the model is that autobiographical memory features may differ. To examine whether the autobiographical memories recalled by recovered depressed and never-depressed individuals in sad mood differ in terms of their features, Study 1 compared the phenomenological memory features of negative and positive memories of these groups in a sad and neutral mood.

As discussed in Chapter 1, studies that have tested the predictions of the DAH have been hampered by methodological problems; for example, and most critically, the absence of a neutral control condition. In order to improve on previous work and address this issue, pilot testing was conducted in order to identify a suitable piece of neutral music that could be used in the neutral induction condition with the goal of not changing (i.e., not improving or worsening) mood. Accordingly, prior to comparing the features of memories recalled by recovered and never-depressed participants in sad mood, a short pilot study was conducted to compare the suitability of a selected piece of music for this purpose.

Pilot Study

Valid methods to induce a sad and neutral mood in the laboratory needed to be developed because previous studies in the area had generally omitted a neutral mood condition (e.g., Segal et al., 2006). This omission is problematic because without a neutral comparison condition the influence of extraneous factors (i.e., time, fatigue) on the observed pre-post differences cannot be ruled out.

In following the methods adopted in previous studies that have tested the predictions of the DAH, the sad mood induction was the gold-standard piece of music used previously for this purpose – an orchestral piece by Sergei Prokofiev entitled

"Russia Under the Mongolian Yoke" played at half-speed for seven minutes (e.g., Clark & Teasdale, 1985; Segal et al., 2006).

As there is no gold-standard neutral piece of music used in the area, an experimentally-matched neutral piece of music needed to be found for the neutral induction. A review of the mood induction literature (Hesse, Spies, & Hesse, 1994) established that seven pieces of music have been used in experimental studies previously to induce neutral mood. However, all but two were not orchestral. To ensure that the sad and neutral mood inductions were as closely matched as possible, one of the two orchestral pieces would be adopted. Accordingly, as an initial step, a short pilot study was conducted that compared these pieces of music in order to: (i) ensure that the music chosen was truly neutral in effect and (ii) identify which piece of music was superior in inducing neutral mood.

Method

Participants

Participants were ten postgraduate psychology students (eight females; mean age = 25.00; *SD* = 1.41) at The University of New South Wales who did not receive any reimbursement for their participation.

Measures

Mood Rating Scale A ten-point visual analogue rating scale was used to measure sadness and happiness prior to, and following, the seven minute music induction. The rating scale was as follows: "I would like you to rate, on a 0-100 scale how you feel right now where 0 = *I do not feel at all sad/happy* and 100 = *I feel extremely sad/happy*".

Music Pieces. The first orchestral piece was "Chopin Waltzes no. 11 in G-flat and no.23 in F. Minor". The second was "Aerial Boundaries" by Michael Hedges which comprised of a series of guitar chords. Each musical piece was matched for length to the sad music (seven minutes) and delivered to participants through headphones.

Procedure

After providing informed consent, participants were asked to complete the first mood rating scale and were then randomly allocated to listen to either the Chopin or the Hedges piece of music. At the conclusion of the piece participants were instructed to complete the second mood rating scale and were debriefed.

Results

To ensure that there were no pre-existing differences as a function of condition between the groups, an independent samples *t*-test was conducted, with sad and happy mood ratings assessed prior to the induction as the dependent variables. There were no differences in ratings of sadness, $t (8) = .00$, $p > .05$, or happiness, $t (8) = 1.25$, $p > .05$. To determine whether the mood inductions had any effect on mood, a 2 (Condition: Chopin, Hedges) x 2 (Time: pre, post) analysis of variance (ANOVA) with repeated measures on the second factor was carried out, with sad mood ratings as the dependent variable. There was no main effect of time, $F (1, 8) = 1.80$, $p > .05$, no main effect of condition, $F (1, 8) = .01$, $p > .05$, nor was there a time x condition interaction, $F (1, 8) = 1.80$, $p > .05$. This analysis was repeated with happy mood ratings as the dependent variable and the same results were obtained – no main effect of time, $F (1, 8) = 1.95$, $p > .05$, or condition, $F (1, 8) = 1.17$, $p > .05$, and no time x condition interaction, $F (1, 8) = .87$, $p > .05$. As mood was statistically unchanged in both conditions, the means of participants' mood ratings were compared as a way to decide which music piece to use

in subsequent studies (see Table 2.1). As indicated by the means, "Aerial Boundaries" by Michael Hedges resulted in a smaller magnitude of change in mood. Guided by the data, this piece of music was selected as the neutral mood induction piece in subsequent studies.

Table 2.1

Mood Ratings for Pilot Study

	Mood Pre	Mood Post	Mood Change
Chopin - Sad	10 (6.71)	14 (8.66)	4
Chopin - Happy	70 (9.59)	60 (8.40)	10
Hedges - Sad	10 (6.71)	12 (8.66)	2
Hedges - Happy	53 (9.59)	51 (8.40)	2

Note. Values refer to mean (and standard deviation) scores.

Discussion

This small pilot study indicated that neither of the piloted instrumental musical pieces resulted in significant change in either sadness or happiness ratings. Michael Hedges' guitar piece was selected as the neutral mood induction because it resulted in a smaller mood shift of the two. Importantly, the guitar piece was matched in terms of both length and orchestral nature to the sad mood induction (i.e., "Russia Under the Mongolian Yoke" by Sergei Prokofiev).

It has been well-documented that laboratory-based mood induction procedures effectively induce mood in a majority of individuals, although a small proportion of participants do not respond (e.g., Clark, 1983). There has been some suggestion that combining different mood induction procedures may increase the effectiveness of inducing mood states in the laboratory (Hesse et al., 1994). The successful induction of

mood is essential to this project. To increase the likelihood that the intended mood states would be successfully induced, and guided by several reviews on the topic (e.g., Eich, Ng, Macaulay, Percy, & Grebneva, 2007; Hesse et al., 1994), music was combined with the widely used Velten induction procedure (VIP) in the subsequent studies reported in this thesis (Velten, 1968). The VIP consists of asking participants to read through a series of sixty statements and to *"try and feel the mood suggested"* by what they are reading. There are three mood categories – sad, happy and neutral. While there has been controversy surrounding the exact response rate, a comprehensive review of the procedure estimated that between 50-80% of individuals report feeling the moods that were implied by the statements (Clark, 1983). Therefore, the sad and neutral VIPs were used as an adjunct to the musical pieces in order to maximise the likelihood that sad and neutral mood states would be induced as intended.

Study 1 - Characteristics of Negative and Positive Autobiographical Memories

As discussed in Chapter 1, studies that have examined the role of memory in the context of Teasdale's DAH have been limited by a number of factors. In particular, the omission of a neutral induction condition, reliance on a single cognitive reactivity measure, and the exclusive use of word-list methodologies have left unknown the degree to which findings generalise to autobiographical memories, and whether the features of memories are differentially influenced by sad mood according to depressive history. Accordingly, the goal of Study 1 was to improve on existing work in the field by systematically addressing each of the abovementioned limitations. A secondary goal was to take a broader approach to comparing the memory recall of these two groups in sad mood by extending the scope of the investigation to include positive (as well as negative) memories. To date, no study has compared the phenomenological features of

autobiographical memories recalled in sad mood by recovered depressed and never-depressed individuals.

Aims

Study 1 sought to provide a preliminary investigation of the characteristics of autobiographical memories recalled by recovered depressed and never-depressed individuals in sad mood. The question of interest was whether these two groups differ in terms of the phenomenological features of the memories that they recall in a sad mood, but not in a neutral mood.

A number of methodological factors were considered in order to address the goal of improving on existing research in the field. First, as established by the pilot study, an appropriate neutral mood induction condition was included. Second, the study was conducted across two separate testing sessions in order to overcome some of the problems associated with the use of the DAS to measure of cognitive reactivity. The use of the DAS poses the problem of repeated administration, i.e., administration both prior to and following the mood induction as a way to measure a change in dysfunctional attitudes. To address this, an alternative form of the DAS (Version B) was developed, although concerns about the psychometric properties of Version B have been raised (e.g., Power et al., 1994; Van der Does, 2002). Accordingly, participants in this study were tested on consecutive days so that the DAS (Version A) could be administered to each participant twice; first in a neutral mood at the first testing session, then at the second testing session in either neutral or sad mood (i.e., depending on experimental condition). This avoided two possibilities that were both highly problematic: (i) the repeated administration of Version A (pre- and post-induction) in the same session, and (ii) using both Version A and the questionable Version B to compare pre- and post-induction dysfunctional attitudes.

In addition to the DAS, prior to the experiment, the LEIDS-R (Van der Does, 2002) was also administered to more fully assess the breadth of the cognitive reactivity construct, as it measures a range of behaviours and cognitions associated with being in a low mood. Unlike the DAS which is a mood-dependent state measure, the LEIDS-R measures trait cognitive reactivity. Therefore, it does not need to be administered twice to distinguish recovered depressed individuals from never-depressed individuals, nor does it require a mood induction procedure to uncover differences between these groups. The LEIDS-R has strong psychometric properties, suggesting that it is a valid, time-efficient measure of cognitive reactivity (Van der Does, 2002).

To elicit autobiographical memories, the widely used Autobiographical Memory Test (AMT) described by Williams and Broadbent (1986) was employed. In this task, participants are presented with a cue-word and asked to respond to each word by recalling a specific event that is triggered by the cue. To extend the scope of existing research both negative and positive cue words were used to examine memories of each valence, and phenomenological memory features were indexed by asking participants to complete a validated measure outlining the characteristics that accompanied each memory that was recalled (i.e., Memory Experiences Questionnaire, MEQ, Sutin & Robins, 2007).

Hypotheses

In accordance with the DAH, it was expected that recovered depressed and never-depressed individuals would be indistinguishable in terms of the features of the negative memories that they recalled in neutral mood. However, in a sad mood, it was predicted that those with a history of depression would recall autobiographical memories with different characteristics from those recalled by never-depressed individuals (as outlined below). Given that the DAH does not explicitly address the

issue of memory qualities, predictions pertaining to the specific phenomenological memory features were guided by the wider literature.

For negative memories, findings from the intrusive memory literature have shown that intrusive memories experienced by depressed and formerly depressed individuals are accompanied by highly sensory features (e.g., Newby & Moulds, 2011; Patel et al., 2007). Accordingly, it was hypothesised that recovered depressed individuals who were administered the sad mood induction would recall negative memories with a strong affective impact, that is, memories that were characterised by high levels of vividness, sensory detail, emotional intensity and coherence. Consistent with mood-congruent effects (Matt et al., 1992), it was expected that negative memories would be rated as more easily accessible to participants in a sad mood, and on the basis of the DAH, that this effect would be more pronounced in formerly depressed individuals.

Interestingly, the vantage perspective from which memories are recalled was considered to be another potentially important feature to consider. Notably, memories recalled from a first person or "field" perspective contain rich sensory information and are highly emotional while memories recalled from a third person or "observer" perspective tend to be more descriptive and less affect-laden (Nigro & Neisser, 1983). This difference has prompted the suggestion that observer perspective recall may potentially serve a cognitive avoidant function by lessening the emotional impact of the memory (e.g., Williams & Moulds, 2007a). Consistent with this suggestion is evidence that depressed individuals are more likely to retrieve autobiographical memories from an observer perspective (Kuyken & Howell, 2006). Therefore, the vantage perspective from which negative memories are recalled is expected to differ between recovered and never-depressed participants, with recovered depressed individuals expected to recall

more observer-based negative memories than their never-depressed counterparts, but only in a sad mood.

Although the DAH does not make mention of whether recovered and never-depressed individuals are likely to differentially recall positive memories in a sad mood, the wider literature suggests that there is good reason to expect that they do (e.g., Bergouignan et al., 2008). Accordingly, this study sought to test this possibility by comparing the positive memory features of recovered and never-depressed individuals in a sad and neutral mood. In order to generate hypotheses about differences between the positive memories recalled by recovered and never-depressed individuals in sad mood, the broader mood and memory literature was again consulted. Consistent with mood-incongruent effects (e.g., Matt et al., 1992), it was hypothesised that the positive memories recalled by individuals in a sad mood would be rated as less accessible than those in the neutral mood condition. Extending the thesis outlined by the DAH, it was predicted that this effect would be more pronounced for individuals with a history of depression. Furthermore, it was expected that if formerly depressed participants rated the positive memories they recalled in sad mood as less accessible, then these memories might also be characterised by less intense phenomenological features (e.g., decreased vividness, sensory detail, emotional intensity) than those reported by never-depressed individuals following the sad mood induction. Evidence in support of this prediction came from two studies that found that the ability of dysphoric individuals to vividly imagine future positive events is impaired relative to healthy controls (Holmes, Lang, et al., 2008; Stöber, 2000). Although not specific to memory, these findings suggest that depressive disorders may be associated with difficulty in generating positive material associated with intense phenomenological features.

With respect to the vantage perspective from which positive memories were recalled, evidence that a deficit in recalling positive memories from a first-person field perspective is characteristic of both currently (Lemogne et al., 2006) and recovered (Bergouignan et al., 2008) depressed individuals was used to inform predictions. That is, individuals with current or past depression have a tendency to recall positive memories more from an observer perspective than from their own perspective, relative to never-depressed participants. It is noted that this directional prediction is the same as for negative memories, as existing literature suggests that recovered depressed individuals have a propensity to recall more observer-based memories than never-depressed individuals, regardless of the valence of the memory (e.g., Bergouignan et al., 2008; Kuyken & Howell, 2006). Accordingly, it was expected that relative to never-depressed individuals, formerly depressed individuals would tend towards recalling positive autobiographical memories from an observer perspective, following the sad mood induction.

Method

Design

This study had a 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) x 2 (Time: time 1, time 2) design, with repeated measures on the third factor.

Participants

Seventy-eight undergraduates from The University of New South Wales participated in the study in return for course credit. It is noteworthy that recruiting recovered depressed participants primarily from undergraduate populations is common in this research area (e.g., Ehring et al., 2008). Consistent with prevalence rates of

remitted depression in an undergraduate sample, there were a greater number of never-depressed participants (e.g., Kessler et al., 2005). Therefore, to increase the sample size of the recovered depressed group, 13 community volunteers were recruited from a list of participants who had previously taken part in research in the laboratory and had agreed to be contacted to take part in future studies. These participants were reimbursed ($AUD20/hour) for their time. A total of 91 participants took part (59 females, mean age = 21; *SD* = 5.53).

Materials and Measures

Autobiographical Memory Test (AMT). The AMT is widely used in depression research to elicit autobiographical memories. This paradigm was employed to cue memory recall and to examine the features of the memories reported. As it was not the goal of the study to address memory specificity, if participants reported a general memory, they were cued by the experimenter to recall a specific memory until they were able to do so.

The AMT was used exactly as described by Kuyken and Dalgleish (1995). Four words were used to cue memories: two negative *(failure, hopeless)* and two positive *(amazed, proud)* presented in counterbalanced order across participants. Each participant was presented with one positive and one negative cue word at each testing session, and the order of presentation according to word valence was randomized. Cue words were presented on 12.5cm x 7.5cm laminated cards and were printed in black letters, 3.5cm high.

Participants were instructed to retrieve a specific autobiographical memory, defined as an event that happened on a particular occasion or lasted for less than one day. Examples of acceptable and unacceptable responses were given. If participants did not respond within 30 seconds, or if they provided non-specific memories (i.e.,

extended or categoric memories) they were prompted *("Can you think of a specific time? One particular episode?"*). Responses were audio-recorded and transcribed for coding according to criteria outlined by Williams (1992).

Beck Depression Inventory – Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report measure of the presence and severity of depressive symptoms over the previous two weeks. The BDI-II possesses strong psychometric properties, including high internal consistency (α = .92; Beck et al., 1996).

Dysfunctional Attitudes Scale (DAS; Weissman, 1979). The DAS is a 40-item self-report instrument that was designed to measure depression-related attitudes. Participants are instructed to indicate on a seven-point scale the degree to which they agree or disagree with a series of dysfunctional statements (e.g., *"My value as a person depends greatly on what others think of me"*). The DAS has good internal consistency, with alpha values ranging from .89 to .93 (Segal et al., 1999).

Leiden Index of Depression Sensitivity- Revised (LEIDS-R; Van der Does & Williams, 2003). The LEIDS-R is a 34-item self-report measure that indexes cognitive reactivity in response to low mood. Participants are instructed to think about the last time they felt *"somewhat sad"* and to indicate the degree to which a list of statements describe their typical cognitions (e.g., *"When I feel sad I spend more time thinking about what my moods reveal about me as a person"*) and behaviours (e.g., *"When in a low mood, I am more inclined to avoid difficulties or conflicts"*). Individuals indicate the degree to which they agree with each statement on a 5-point scale (where 0 = *not at all* and 4 = *very strongly*). The LEIDS-R is divided into six subscales: Hopelessness, Acceptance/Coping, Aggression, Control/Perfectionism, Harm Avoidance, and Rumination. A higher score on each subscale is indicative of greater cognitive

reactivity. The LEIDS-R has good psychometric qualities (Van der Does, 2002), and correlates with cognitive reactivity as measured using a mood induction procedure (Segal et al., 1999). The LEIDS-R was administered in addition to the DAS in order to establish its validity in measuring cognitive reactivity in this sample.

Memory Experiences Questionnaire (MEQ; Sutin & Robins, 2007). The MEQ is a self-report measure that indexes a range of phenomenological characteristics of autobiographical memory. Specific subscales were selected based on the characteristics of interest. Specifically, the subscales included were vividness (e.g., *"My memory for this event was very vivid"*), coherence (e.g., *"The order of events in the memory is clear"*), accessibility (e.g., *"This memory was easy for me to recall"*), sensory detail (e.g., *"As I remembered the event, I can hear it in my mind"*), emotional intensity (e.g., *"My emotions are very intense concerning this event"*), visual perspective (e.g., *"I see the experience in the memory through my own eyes"*), and valence (e.g., *"The overall tone of the memory is positive"*). Participants indicate on a 5-point scale the way in which they experience their memory (where 1 = *strongly agree*, 3 = *neutral* and 5 = *strongly disagree*). The final subset of the questionnaire included 45 items from the MEQ to measure the memory features of interest, and each subscale included was averaged in order to obtain a score out of five. The subscales possess strong internal consistency, with alpha values ranging from .72 to .97 (Sutin & Robins, 2007).

Mood Rating Scale. Participants completed a single-item visual analogue rating scale (VAS) that assessed their mood state at time 1 to ensure neutral mood, and twice at time 2 (once prior to the mood induction, and again following the mood induction). The ratings at time 2 provided a manipulation check to ensure that the mood induction had the intended effect. The rating scale required participants to *"Rate how are you are feeling right now"* (where 0 = *I do not feel at all sad* and 100 = *I feel extremely sad*).

Mood Induction. As informed by the pilot study, mood was induced by using a combination of music and Velten statements (Velten, 1968). The VIP requires participants to read a series of negative statements (e.g., *"Everything seems utterly futile and empty"*) or neutral statements (e.g., "*The Orient Express travels between Paris and Istanbul"*). The music was delivered through headphones. As mentioned, the sad music was the orchestral piece "Russia Under The Mongolian Yoke" by Sergei Prokofiev, remastered at half-speed which is routinely used to induce sad mood in studies of cognitive reactivity (e.g., Clark & Teasdale, 1985). The neutral music was the instrumental piece "Aerial Boundaries" by Michael Hedges as selected on the basis of the pilot study. The induction lasted for seven minutes and participants were instructed to read the Velten statements aloud while listening to the music. Both musical pieces have been used to induce sad and neutral mood respectively (Clark & Teasdale, 1985; Hesse et al., 1994; Wood, Saltzberg, & Goldsamt, 1990), and music has previously been combined with Velten statements in mood induction procedures (Gillham, Putter, & Kash, 2007).

Structured Clinical Interview for DSM-IV – Mood Module (SCID; First, Spitzer, Gibbons, & Williams, 1996). The SCID-IV is a semi-structured interview that is widely used in clinical research to diagnose DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, American Psychiatric Association, 1994) Axis 1 psychological disorders. The mood module was administered to assess current and previous Major Depressive Episodes (MDEs). The SCID-IV was administered at the end of testing to avoid priming or contaminating the experimental procedures with clinically relevant material.

Responses on the SCID-IV indicated that four participants met criteria for a current MDE. Therefore they were excluded from the study. For inclusion in the

recovered depressed group, participants needed to report symptoms consistent with at least one previous MDE but not have experienced them in past month ($n = 38$). Participants were allocated to the never-depressed group if they denied symptoms consistent with a diagnosis of current or past MDE ($n = 49$). There were 87 participants in the final sample.

Procedure

In the first session, participants read the information sheet and provided informed consent. Demographic information was collected, followed by the administration of the DAS, LEIDS-R, VAS and BDI-II. Participants were then presented with the two AMT cue words (one positive and one negative). Participants completed the MEQ for each memory following recall. Participants were then instructed to return the following day in order to complete the study and receive their credit.

At the second testing session, participants were randomly allocated to an experimental condition, completed a VAS and received either the sad or neutral mood induction. They then completed a second VAS, and the DAS. Participants were then presented with the remaining two AMT cue words (one positive and one negative), and they completed the MEQ for each memory following recall. Finally, the mood module from the SCID-IV was administered to screen for the presence of current or prior MDEs. Participants were then thanked for their time and fully debriefed.

Results

Participant Characteristics

A series of 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) ANOVAs with age and depression symptoms (BDI-II) as the dependent variables were conducted to ensure that the groups did not differ on these variables.

Means and standard deviations are presented in Table 2.2. For age, there was a main effect of condition, $F(1, 85) = 5.71$, $p < .05$, such that participants in the sad condition were older than those in the neutral condition. There was no main effect of history, $F(1, 85) = 1.03$, $p > .05$, but there was a significant history x condition interaction, $F(1, 85) = 4.22$, $p < .05$. Follow-up independent samples t-tests indicated that in the neutral condition, participants did not differ according to depression history, $t(34) = 1.15$, $p > .05$. However, in the sad condition, recovered depressed participants were older, $t(49) = -2.03$, $p < .05$. On account of this difference, age was entered as a covariate in all subsequent analyses. The results were identical with and without age being co-varied. Accordingly, unadjusted means are presented.

For BDI-II, there were no main effects of condition, $F(1, 83) = .27$, $p > .05$, or history, $F(1, 83) = 1.50$, $p > .05$, and no condition x history interaction, $F(1, 83) = .01$, $p > .05$. That is, participants in each condition did not differ in terms of depressive symptoms. Importantly, mean BDI-II score was 9.93, illustrating that across the sample, participants reported minimal depression symptoms.

Mood Ratings

To ensure that there were no pre-existing differences as a function of condition or depressive history at the first testing session, a 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) ANOVA was conducted with time 1 mood ratings as the dependent variable. The groups did not differ as a function of condition, $F(1, 83) = 1.80$, $p > .05$, depressive history, $F(1, 83) = .12$, $p > .05$, and there was no condition x history interaction, $F(1, 83) = 1.20$, $p > .05$. This indicates that groups were comparable in mood at time 1.

To ensure that there were no pre-existing differences as a function of condition or depressive history prior to the mood induction at time 2, a 2 (Condition: sad, neutral)

x 2 (History: never-depressed, recovered depressed) ANOVA was conducted with time 2 pre-induction mood ratings as the dependent variable. The groups did not differ as a function of condition, $F(1, 83) = .09$, $p > .05$, or depressive history, $F(1, 83) = .23$, $p > .05$, and there was no condition x history interaction, $F(1, 83) = 2.12$, $p > .05$. Thus, the groups were comparable in mood prior to the mood induction.

To determine whether the mood inductions had their intended effects, a 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA with repeated measures on the third factor was conducted with sad mood ratings as the dependent variable. There was a main effect of time, $F(1, 83) = 23.88$, $p < .05$, a significant condition x time interaction, $F(1, 83) = 37.40$, $p < .05$, no time x history interaction, $F(1, 83) = .38$, $p > .05$, and no time x condition x history interaction, $F(1, 83) = .78$, $p > .05$. Follow-up paired samples t-tests demonstrated that participants in the sad condition reported increased sad mood from pre- to post-induction, $t(50) = -7.55$, $p < .05$, while in the neutral condition, sad mood ratings did not change, $t(35) = 1.26$, $p > .05$ (see Table 2.2). This indicates that following the mood induction, the sad mood group reported elevated ratings of sad mood, while for participants in the neutral group, mood did not change, confirming that the induction procedures effectively manipulated mood as intended.

Valence

Memory valence was analysed as a manipulation check to ensure that participants' capacity to retrieve negative and positive autobiographical memories did not differ as a function of condition, depressive history or time. First, to ensure that the negative memories were indeed rated as negative, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted, with repeated measures on the third factor and valence as the dependent

variable. Importantly, there were no main effects of time, $F(1, 83) = 1.57$, $p > .05$, or

condition, $F(1, 83) = .54$, $p > .05$, and no interactions of time x condition, $F(1, 83) =$

1.29, $p > .05$, time x history, $F(1, 83) = 2.14$, $p > .05$, or time x condition x history, F

$(1, 83) = .34$, $p > .05$. This indicates that participants did not differ in their ability to

retrieve negative memories when cued to do so, and this was the case irrespective of

depressive history, mood condition and time of recall. To address the valence of

positive memories, a 2 (Condition: neutral, sad) x 2 (History: never-depressed,

recovered depressed) x 2 (Time: pre, post) ANOVA was conducted, with repeated

measures on the third factor and valence as the dependent variable. Similar to results for

the negative memories, there were no main effects of time, $F(1, 83) = 1.57$, $p > .05$, or

condition, $F(1, 83) = .54$, $p > .05$, no interactions of time x condition, $F(1, 83) = 1.29$,

$p > .05$, or time x history, $F(1, 83) = 2.14$, $p > .05$, and no time x condition x history

interaction, $F(1, 83) = .34$, $p > .05$. Thus, both recovered and never-depressed

participants were able to retrieve positively valanced memories, and valence did not

differ as a function of condition, history or time.

Table 2.2

Participant Characteristics and Self-Report Measures

| | Condition | | | |
| | Sad (n = 51) | | Neutral (n = 36) | |
	Never-Depressed (n = 26)	Recovered (n = 25)	Never-Depressed (n = 23)	Recovered (n = 13)
Age	20.31 (1.04)	23.92 (1.06)	19.91 (1.10)	18.69 (1.69)
BDI-II	9.54 (1.25)	11.16 (1.27)	8.70 (1.32)	10.53 (1.76)
Sad 1	17.69 (22.86)	21.40 (21.03)	16.52 (19.91)	13.08 (17.02)
Sad 2 (pre)	12.38 (16.84)	14.60 (23.81)	13.71 (20.42)	8.92 (12.09)
Sad 2 (post)	30.38 (18.86)	34.80 (22.38)	18.04 (23.78)	5.38 (8.77)
DAS 1	123.92 (21.80)	144.04 (29.30)	119.78 (22.92)	134.77 (24.72)
DAS 2	131.85 (26.47)	149.76 (32.80)	118.39 (26.21)	129.00 (27.41)
LEIDS-R	53.19 (17.81)	62.20 (19.25)	54.09 (18.96)	58.36 (11.51)

Note. Values refer to mean (and standard deviation) scores. BDI-II = Beck Depression Inventory II; Sad 1 = Ratings of sad mood at time 1; Sad 2 (pre) = Ratings of sad mood at time 2 pre-induction; Sad 2 (post) = Ratings of sad mood at time 2 post-induction; DAS 1 = Dysfunctional Attitudes Scale at time 1; DAS 2 = Dysfunctional Attitude Scale at time 2; LEIDS-R = Leiden Index of Depression Sensitivity - Revised. Raw (rather than adjusted) means reported.

Cognitive Reactivity

To examine whether dysfunctional attitudes were differentially influenced by the mood induction as a function of depressive history, a 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) x 2 (Time: time 1, time 2) ANOVA was conducted with repeated measures on the third factor and DAS scores as the dependent variable. There was no main effect of time, $F(1, 83) = .71$, $p > .05$, although there was a significant main effect of condition, $F(1, 83) = 4.45$, $p < .05$, and history, $F(1, 83) = 7.94$, $p < .05$, and a significant condition x time interaction, $F(1, 83) = 7.29$, $p < .05$. To examine the nature of this interaction, follow-up paired samples t-tests indicated that in the neutral condition, there was no significant change in DAS scores from time 1 to time 2, $t(35) = 1.13$, $p > .05$. However, in the sad condition, there was a significant increase in the endorsement of dysfunctional attitudes from time 1 to time 2, $t(50) = -2.71$, $p < .05$.

To examine whether the LEIDS-R distinguished formerly and never-depressed individuals, a one-way ANOVA was conducted with LEIDS-R total scores as the dependent variable. There was a trend towards recovered depressed participants scoring more highly, $F(1, 86) = 3.65$, $p = .06$. An inspection of the means for the individual subscales indicated that formerly depressed participants scored more highly than their never-depressed counterparts on some of these subscales (see Figure 2.1). This difference reached significance on the hopelessness and rumination subscales, $F(1, 85) = 12.56$, $p < .05$, and $F(1, 85) = 7.13$, $p < .05$, respectively, while the difference on the aggression subscale approached significance, $F(1, 85) = 3.59$, $p = .06$. The groups did not differ on the acceptance/coping, $F(1, 85) = 1.03$, $p > .05$, control/perfectionism, $F(1, 85) = 0.65$, $p > .05$, or harm avoidance subscales, $F(1, 85) = 0.94$, $p > .05$.
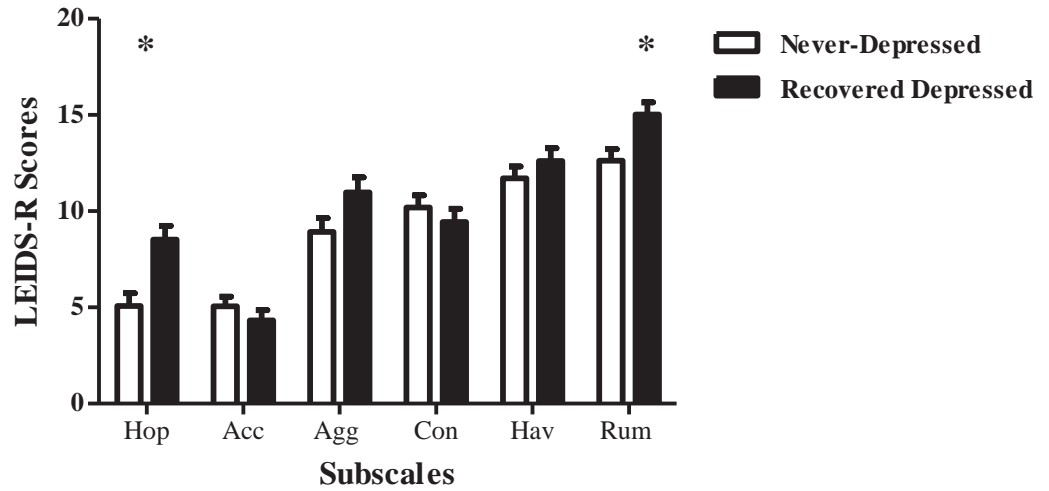
Figure 2.1. LEIDS-R subscale means and standard error. Hop = hopelessness; Acc = acceptance/coping; Agg = aggression; Con = control/perfectionism; Hav = harm avoidance; Rum = rumination. * = significant at α = .05.

Memory Features

To evaluate the qualities of the memories recalled, a series of 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVAs was conducted, with repeated measures on the third factor and the memory quality of interest as the dependent variable. Means and standard deviations for negative and positive autobiographical memories are presented in Tables 2.3 and 2.4, respectively.

Table 2.3

Ratings of Negative Memory Features

	Condition							
	Sad (n = 51)				Neutral (n = 36)			
	Never Depressed (n = 26)		Recovered (n = 25)		Never Depressed (n = 23)		Recovered (n = 13)	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
Vividness	3.77 (.88)	3.49 (.82)	3.88 (1.0)	3.57 (.87)	3.52 (1.15)	3.36 (1.17)	3.72 (.95)	2.92 (.98)
Coherence	4.03 (.69)	3.70 (.64)	4.11 (.73)	3.97 (.72)	4.04 (.73)	4.07 (.71)	4.06 (.71)	3.88 (.69)
Accessibility	3.56 (1.24)	3.27 (1.22)	3.94 (1.16)	3.56 (1.18)	3.78 (1.04)	3.30 (1.23)	3.54 (1.18)	2.85 (1.46)
Sensory Detail	3.25 (.92)	3.09 (.88)	3.58 (.87)	3.22 (1.01)	3.20 (1.01)	3.18 (.84)	3.56 (1.06)	3.02 (.58)
Emotional Intensity	3.14 (1.1)	3.00 (1.04)	3.81 (.95)	3.07 (1.32)	2.86 (1.33)	2.64 (1.22)	3.79 (1.29)	3.15 (1.09)
Vantage Perspective	3.94 (.94)	3.76 (.89)	4.15 (.96)	3.91 (1.07)	4.06 (.85)	3.84 (.93)	4.18 (.81)	3.10 (1.17)

Note. Values refer to mean (and standard deviation) scores. Memory quality ratings presented as out of five, where a higher score reflects a greater level of the variable.

Table 2.4

Ratings of Positive Memory Features

	Condition							
	Sad (n = 51)				Neutral (n = 36)			
	Never Depressed (n = 26)		Recovered (n = 25)		Never Depressed (n = 23)		Recovered (n = 13)	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
Vividness	3.72 (.86)	3.69 (.60)	3.97 (.71)	3.26 (.61)	3.94 (.78)	3.84 (1.12)	3.79 (.84)	4.00 (.93)
Coherence	4.10 (.64)	4.02 (.60)	4.22 (.67)	3.87 (.98)	4.17 (.61)	4.35 (.67)	4.33 (.56)	4.44 (.79)
Accessibility	3.38 (1.08)	3.60 (.87)	3.76 (1.12)	3.38 (1.24)	3.04 (1.39)	3.89(1.02)	3.62 (1.12)	3.81 (.95)
Sensory Detail	3.63 (.84)	3.54 (.78)	3.34 (1.01)	3.02 (1.15)	3.68 (.76)	3.49 (1.07)	3.58 (.97)	3.79 (.66)
Emotional Intensity	2.92 (1.23)	3.19 (.95)	3.09 (.93)	2.85 (1.14)	2.87 (1.35)	3.10 (1.20)	3.18 (1.21)	3.46 (.94)
Vantage Perspective	4.06 (.68)	3.94 (.65)	4.16 (1.02)	3.69 (1.22)	3.96 (.89)	4.16 (.76)	3.87 (1.00)	4.26 (.79)

Note. Values refer to mean (and standard deviation) scores. Memory quality ratings presented as out of five, where a higher score reflects a greater level of the variable.

Vividness

To evaluate the vividness of negative memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and vividness as the dependent variable. There was a main effect of time, $F (1, 83) = 8.15$, $p < .05$, no main effect of condition, $F (1, 83) = .46$, $p > .05$, no time x condition interaction, $F (1, 83) = 1.49$, $p > .05$, no time x history interaction, $F (1, 83) = .40$, $p > .05$, and no time x condition x history interaction, $F (1, 83) = 1.28$, $p > .05$. This indicates that following the mood induction, negative memories became less vivid irrespective of mood induction condition or depressive history.

To examine whether there were any between-group differences in the vividness of positive memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and vividness as the dependent variable. There was no main effect of time, $F (1, 83) = 2.13$, $p > .05$, or condition, $F (1, 83) = 2.00$, $p > .05$, no time x condition interaction, $F (1, 83) = 3.78$, $p > .05$, nor a time x history interaction, $F (1, 83) = .76$, $p > .05$. However, there was a significant time x condition x history interaction, $F (1, 83) = 5.26$, $p < .05$.

To deconstruct this interaction, separate 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) repeated measures ANOVAs were conducted for each condition. In the neutral condition, there was no main effect of time, $F (1, 34) = .08$, $p > .05$, and no time x condition interaction, $F (1, 34) = .70$, $p > .05$. In the sad condition, there was a main effect of time, $F (1, 49) = 8.56$, $p < .05$, and a significant time x history interaction, $F (1, 49) = 7.40$, $p < .05$. To examine this interaction further, separate paired samples t-tests were conducted with pre- and post-induction vividness

ratings as the variables of interest. For never-depressed individuals, there was no change in the vividness of positive memories reported before and after the mood induction, t $(25) = .18$, $p > .05$. However, for formerly depressed participants, positive memories were rated as less vivid following the sad mood induction, $t(24) = 3.43$, $p < .05$ (see Figure 2.2).
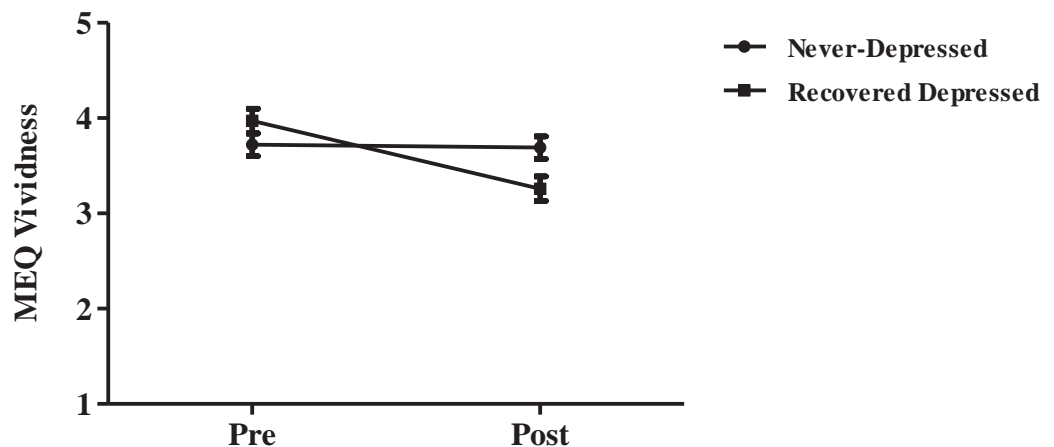
Figure 2.2 Mean and standard error for vividness ratings of positive memories prior to, and following, the sad mood induction.

Coherence

To evaluate the coherence of the negative memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and coherence as the dependent variable. There was no main effect of time, $F(1, 83) = 2.49$, $p > .05$, or condition, $F(1, 83) = .24$, $p > .05$, no time x condition interaction, $F(1, 83) = .65$, $p > .05$, no time x history interaction, $F(1, 83) = .00$, $p > .05$, and no time x condition x history interaction, $F(1, 83) = .95$, $p > .05$. This indicates that the coherence of negative memories was not influenced by mood induction condition or depressive history.

To evaluate the coherence of positive memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and coherence as the dependent variable. There was no main effect of time, $F(1, 83) = .17$, $p > .05$, no time x history interaction, $F(1, 83) = .96$, $p > .05$ and no time x condition x history interaction, $F(1, 83) = 0.40$, $p > .05$. However, there was a main effect of condition, $F(1, 83) = 4.19$, $p < .05$, and a time x condition interaction, $F(1, 83) = 4.47$, $p < .05$. To investigate the nature of this time x condition interaction, follow-up paired samples t-tests were conducted and indicated that in the neutral condition, there was no change in memory coherence from pre- to post-induction, $t(35) = -1.40$, $p > .05$, while in the sad mood condition, there was a trend towards a decrease in coherence following the induction, $t(50) = 1.82$, $p = .07$. That is, participants in the sad mood condition tended to recall less coherent positive memories than participants allocated to the neutral condition.

Accessibility

To test the accessibility of negative memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and accessibility as the dependent variable. There was a main effect of time, $F(1, 83) = 7.29$, $p < .05$, no main effect of condition, $F(1, 83) = 1.06$, $p > .05$, no time x condition interaction, $F(1, 83) = .54$, $p > .05$, no time x history interaction, $F(1, 83) = .20$, $p > .05$, and no time x condition x history interaction, $F(1, 83) = .03$, $p > .05$. This analysis suggests that following the mood induction, negative memories were less accessible for participants, independent of condition and depressive history.

To evaluate the accessibility of positive memories recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post)

ANOVA was conducted with repeated measures on the third factor and accessibility as the dependent variable. There was no main effect of time, $F(1, 83) = 1.89$, $p > .05$, or condition, $F(1, 83) = 0.98$, $p > .05$, no time x condition interaction, $F(1, 83) = 3.64$, $p > .05$, no time x history interaction, $F(1, 83) = 3.88$, $p > .05$, and no time x condition x history interaction, $F(1, 83) = .10$, $p > .05$. This indicates that accessibility of positive memories was not influenced by mood condition or depressive status.

Sensory Detail

To identify the sensory detail with which the negative memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the second factor and sensory detail as the dependent variable. There was no main effect of time, $F(1, 83) = 3.95$, $p > .05$, no main effect of condition, $F(1, 83) = .09$, $p > .05$, no time x condition interaction, $F(1, 83) = .00$, $p > .05$, no time x history interaction, $F(1, 83) = 1.80$, $p > .05$, and no time x condition x history interaction, $F(1, 83) = .37$, $p > .05$. These findings indicate that the sensory detail with which negative memories were recalled was unaffected by mood condition or depressive history.

To examine the sensory detail with which the positive memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the second factor and sensory detail as the dependent variable. There was no main effect of time, $F(1, 83) = .74$, $p > .05$, no main effect of condition, $F(1, 83) = 2.16$, $p > .05$, no time x condition interaction, $F(1, 83) = .86$, $p > .05$, no time x history interaction, $F(1, 83) = 1.55$, $p > .05$, and no time x condition x history interaction, $F(1, 83)$ 1.84, $p >. 05$. These findings indicate that the sensory detail with which positive memories were recalled was not influenced by mood condition or depressive history.

Emotional Intensity

To address the emotional intensity with which negative memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and emotional intensity as the dependent variable. There was no main effect of condition, F (1, 83) = .43, $p > .05$, no time x condition interaction, F (1, 83) = .00, $p > .05$, no time x history interaction, F (1, 83) = 3.67, $p > .05$, and no time x condition x history interaction, F (1, 83) = .12, $p > .05$. There was however, a main effect of time, F (1, 83) = 10.58, $p < .05$, which indicates that negative memories were recalled with reduced emotional intensity following the mood induction.

To evaluate the emotional intensity with which positive memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and emotional intensity as the dependent variable. There was no main effect of time, F (1, 83) = 1.18, $p > .05$, no main effect of condition, F (1, 83) = .40, $p > .05$, no time x condition interaction, F (1, 83) = .94, $p > .05$, no time x history interaction, F (1, 83) = .84, $p > .05$, and no time x condition x history interaction, F (1, 83) = 1.25, $p > .05$. This analysis indicates that the emotional intensity with which positive memories were recalled was comparable between those with and without a depressive history, and did not change as a consequence of the mood induction.

Vantage Perspective

To evaluate the vantage perspective from which negative memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and vantage perspective as the dependent variable. There was a main effect

of time, F (1, 83) = 12.33, p < .05, no main effect of condition, F (1, 83) = .65, p > .05, no time x condition interaction, F (1, 83) = 3.21, p > .05, no time x history interaction, F (1, 83) = 3.55, p > .05, and no time x condition x history interaction, F (1, 83) = 2.68, p > .05. As suggested by the means, there was a tendency for participants in both conditions to shift from a field to an observer perspective in negative memory recall following the mood induction.

To evaluate the vantage perspective from which positive memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA was conducted with repeated measures on the third factor and visual perspective as the dependent variable. There was no main effect of time, F (1, 83) = .00, p > .05, no main effect of condition, F (1, 83) = .42, p > .05, no time x history interaction, F (1, 83) = .90, p > .05, no time x condition x history interaction, F (1, 83) = 1.00, p > .05, but there was a significant time x condition interaction, F (1, 83) = 5.14, p < .05. To examine the nature of this interaction, paired-samples t-tests were conducted and indicated that in the neutral mood condition, there was no change in vantage perspective as a function of the induction, t (35) = -1.56, p > .05. However, for the sad mood condition, there was a trend towards an observer perspective, following the induction, t (35) = 1.83, p = .07. That is, participants in the sad mood condition were more likely to shift towards an observer perspective in their recall of a positive memory after the mood induction.

To summarise, given the theoretical underpinnings of the research question, a three-way interaction needed to be detected to indicate a change in memory feature that depended on condition, history, and time. This effect was not found for memory coherence, accessibility, sensory detail, emotional intensity or vantage perspective for either negative or positive memories. For memory vividness, a difference was not

detected for negative memories. However, analyses indicated a significant three-way interaction for vividness of positive memories, suggesting that relative to never-depressed participants, recovered depressed individuals recalled less vivid positive memories while in a sad mood.

Discussion

The primary goal of Study 1 was to investigate whether autobiographical memory features would be differentially activated in a sad mood for recovered compared to never-depressed individuals. A secondary aim was to include an additional measure of cognitive reactivity and thereby improve on previous studies that have relied on a single instrument to measure this construct. To this end, the LEIDS-R emerged as a cognitive reactivity measure that is sensitive to depressive status. This finding is consistent with previous work in the area that has identified the LEIDS-R as a valid and useful tool with which to differentiate individuals according to depression vulnerability (e.g., Moulds et al., 2008; Van der Does, 2002).

To address the focus on memory characteristics, it was expected that the phenomenological features of memories recalled by never-depressed and recovered depressed individuals would be different when in a sad mood, at least for negative memories. This prediction was not supported. For negative memories, differences according to depressive history and mood condition for vividness, coherence, accessibility, sensory detail, emotional intensity or vantage perspective were not observed. This was contrary to the predictions based on Teasdale's DAH which asserts that formerly depressed and never-depressed individuals differ in terms of their recall of negative memories under conditions of sad mood. That said, and as noted earlier, memory qualities specifically are not explicitly addressed in this model. Based on the

findings of Study 1, a tentative conclusion is that the features of negative memories that are recalled in sad mood do not distinguish formerly and never-depressed individuals.

Less confident predictions were made with respect to the possibility that the features of positive memories recalled in sad mood might differ between recovered and never-depressed individuals because the DAH does not make any mention of positive memories. Accordingly, the investigation of positive memory features in Study 1 took an exploratory approach and was informed by the wider literature. Based on this literature, it was expected that the positive memories recalled by recovered depressed participants in a sad mood would be characterised by less intense phenomenological features. This was not the case for coherence, accessibility, sensory detail, emotional intensity or vantage perspective. However, consistent with predictions, recovered depressed individuals recalled less vivid positive memories than their never-depressed counterparts while in a sad mood.

The finding that positive memories were recalled less vividly by formerly depressed individuals in a low mood is particularly interesting because vividness has been linked to memory intensity and emotionality (Sutin & Robins, 2007). Given a link between vividness and emotion, and based on results of Study 1, recovered depressed individuals may experience positive memories with lower levels of emotion than never-depressed individuals. However, it is important that these results are interpreted cautiously because only a single memory was recalled for each memory condition. That is, as a preliminary investigation, the method used to assess autobiographical memory involved comparisons between a single negative and a single positive memory. Confining participants' responses to such a limited number of autobiographical memories may have restricted the capacity to fully explore how sad mood influences qualities of autobiographical memory. Therefore, before any conclusions can be drawn,

Study 2 was designed to follow-up this finding by examining positive memory features more comprehensively.

Study 2 – A More Comprehensive Analysis of Positive Autobiographical Memory Characteristics

The objective of Study 2 was to replicate the above findings of Study 1 and to examine more rigorously the phenomenological features of autobiographical memories recalled by formerly and never-depressed individuals. To do this, a number of procedural changes were made. First, instead of comparing only a single memory from pre- to post-induction, participants were instructed to recall six autobiographical memories (i.e., three prior to the induction, three following the induction). This change was designed to increase the breadth of the information gathered about autobiographical memory features using the same methodology.

In measuring memory quality, the amount of time that participants spent evaluating each memory was reduced in order to minimise the likelihood that the effects of the mood induction would dissipate before the conclusion of the study. This was achieved in two ways. First, the reverse-scored items of the MEQ used to assess memory qualities were removed, thereby halving the amount of time participants spent evaluating each memory feature. Second, the number of MEQ subscales administered following each memory was also reduced to three. That is, in Study 2, only those features of autobiographical memories that the findings of Study 1 (together with existing research) indicated as important were indexed; namely, vividness, accessibility and vantage perspective. Vividness was examined in order to replicate the findings of Study 1. Accessibility was investigated on the basis that the accessibility of positive memories is influenced by mood (Matt et al., 1992). Vantage perspective was included on the basis of evidence suggesting that it is an important feature in autobiographical

memory that varies according to depressive history (e.g., Bergouignan et al., 2008; Lemogne et al., 2006). Although results from the first study did not indicate that accessibility or vantage perspective differed between recovered and never-depressed individuals in a sad mood, given the limited nature of the initial investigation, it was decided that there was merit in conducting a more comprehensive follow-up, even if to confirm that these features do not in fact differ between the two groups.

Another modification made in Study 2 was to use only a sad mood induction condition. The rationale for including a neutral condition in Study 1 was to improve on past studies by including a theoretically meaningful control group that has typically been omitted in past cognitive reactivity experiments. Although there was no theoretical reason to expect differences from pre- to post-induction in the neutral condition, the inclusion of this condition was critical in order to properly test the DAH. Therefore, given that the neutral induction group successfully served the purpose of providing a control condition with which to compare memory recall of participants in the sad mood condition, the neutral condition was omitted in Study 2.

Also, for practical reasons the LEIDS-R was used to measure cognitive reactivity instead of the DAS. There were two reasons for this decision. First, in Study 1 the DAS was not as reliably sensitive to depressive history; second, employment of the LEIDS-R rather than the DAS meant that the study did not have to be conducted on two separate occasions.

The final change made for Study 2 was the exclusive focus on positive memories. This decision was made for three reasons. First, to replicate the key finding from Study 1 of reduced vividness of positive memory recall by recovered participants following the sad mood induction; second, because emerging literature has suggested an important role for positive autobiographical memory in depressive disorders; and third, due to the

potential clinical implications of understanding the role of positive memories in depression. To elaborate, a deficit in recalling vivid positive autobiographical memories in formerly depressed individuals is potentially very important from a clinical perspective because previous research has established that the recall of positive autobiographical memories is a powerful emotion regulation strategy. For example, as described in Chapter 1, Joormann and Siemer (2004) found that healthy individuals in a low mood use the recall of positive autobiographical memories to improve their mood. Interestingly, recovered depressed individuals do not derive this benefit from recalling positive memories (Joormann et al., 2007). Such findings lead to speculation that impairments in the vividness of positive autobiographical memories might dampen memory-related affect. By comparison, healthy individuals are able to draw on memory-related affect and use it to manage and alleviate their low mood. If impaired vividness of positive memories is a reliable phenomenon among individuals who have been depressed in the past, there may be clinical benefit in targeting this deficit as way to promote the benefits of recalling positive autobiographical memories in a sad mood.

Hypotheses

On the basis of findings in Study 1, it was predicted that formerly depressed individuals would recall less vivid positive autobiographical memories following a sad mood induction, while for never-depressed individuals there would be no difference. In accord with the mood-congruent recall literature (Matt et al., 1992), it was also expected that positive memories would be less accessible following a sad mood induction. An extension of the ideas proposed by the DAH would be that this difficulty could be more pronounced for individuals with a history of depression. Finally, as in Study 1, it was predicted that formerly depressed individuals would tend towards recalling positive

autobiographical memories from an observer perspective (Bergouignan et al., 2008) when in sad mood.

Method

Design

This study employed a 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) design, with repeated measures on the second factor.

Participants

Thirty-nine undergraduates from The University of New South Wales participated in this study in return for course credit. As per the recruitment strategy employed in Study 1, to increase the sample size of recovered participants, 14 community volunteers who had participated in previous studies in the laboratory and consented to participate in future research also took part. These participants were reimbursed ($AUD20/hour) for their time. The inclusion criteria were identical to those used in Study 1. Three participants were excluded on the basis that they were experiencing a current MDE, and in the remaining sample there were 23 recovered depressed and 27 never-depressed participants. The final sample consisted of 50 participants (35 females, mean age = 21.81; $SD = 6.37$).

Materials and Measures

Autobiographical Memory Test. The AMT was used exactly as described in Study 1, but with four additional positive cue words (*pleased, hopeful, relieved, happy),* in addition to the two positive cue words used in Study 1 *(amazed, proud).* Cue words were counterbalanced across participants.

Measures. The following measures were used exactly as described in Study 1;
BDI-II, LEIDS-R, MEQ (vividness, accessibility, vantage perspective subscales), VAS,
Mood Induction, SCID-IV.

Procedure

The study was conducted in a single testing session that lasted approximately 45
minutes. Participants read the information sheet and provided informed consent.
Demographic information regarding age and gender was recorded. Following this, the
LEIDS-R, BDI-II, and VAS were administered. Participants then completed the
baseline memory exercise and provided three positive autobiographical memories. After
recalling each memory, participants completed the MEQ for each memory that they
described. They were then administered the sad mood induction, followed by the second
VAS. Cue words from the AMT were then presented, followed by the MEQ for each
memory. Finally, the mood module from the SCID-IV was administered to screen for
the presence of current or prior MDE. Participants were thanked for their time and fully
debriefed.

<div align="center">

Results

</div>

Participant Characteristics

A series of one-way ANOVAs were carried out to compare the never-depressed
and recovered depressed groups on age and BDI-II scores. Means and standard
deviations are presented in Table 2.5. The groups did not differ in terms of age, F (1,
48) = .34, p > .05, or BDI-II scores, F (1, 48) = 2.42, p > .05[1]. Importantly, the mean
BDI-II score was 9.60, which indicates that across the sample, participants reported

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[1] Given that F > 2, analyses were conducted with BDI-II included as a covariate. The pattern of results
was identical with and without depression symptoms being covaried. Accordingly, unadjusted means are
presented.

minimal depressive symptoms, and had comparable levels of depression symptoms to the sample in Study 1.

Table 2.5

Participant Characteristics and Self-Report Measures

	Never-Depressed (*n* = 27)	Recovered Depressed (*n* = 23)
Age	21.81 (6.37)	22.70 (3.81)
BDI-II	7.89 (5.61)	11.61 (10.84)
Sad (pre)	13.70 (20.03)	23.70 (26.03)
Sad (post)	38.15 (23.70)	49.13 (27.78)
LEIDS-R	44.63 (14.03)	62.26 (14.28)

Note. Values refer to mean (and standard deviation) scores. BDI-II = Beck Depression Inventory II; Sad (pre) = Ratings of sad mood at prior to the mood induction; Sad (post) = Ratings of sad mood following the mood induction; LEIDS-R = Leiden Index of Depression Sensitivity - Revised.

Mood Induction

To ensure that there were no pre-existing differences between the depressive history groups prior to the mood induction, a *t*-test was conducted on baseline ratings of sad mood. The groups did not differ, $t(48) = -1.67$, $p > .05$. To determine whether the mood induction had the intended effect, a 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVA with repeated measures on the second factor was conducted with sad mood ratings as the dependent variable. There was no main effect of history, $F(1, 48) = 2.8$, $p > .05$, no history x time interaction, $F(1, 48) = .03$, $p > .05$, but there was a main effect of time, $F(1, 48) = 70.93$, $p < .05$. That is, mood substantially worsened for participants following the induction, irrespective of depressive history, indicating that the procedure effectively induced sad mood.

Cognitive Reactivity

A one-way ANOVA with LEIDS-R scores as the dependent variable demonstrated that recovered depressed participants scored significantly higher than never-depressed individuals, $F (1, 48) = 19.30$, $p < .05$. In terms of the subscales, as per Study 1, recovered depressed individuals scored more highly on hopelessness and rumination, $F (1,48) = 29.17$, $p < .05$, and $F (1, 48) = 17.64$, $p < .05$, respectively. In addition, recovered depressed participants also scored more highly on the acceptance/coping and harm avoidance subscales than did never-depressed individuals, $F (1,48) = 5.01$, $p < .05$, and $F (1, 48) = 10.78$ $p < .05$. The groups did not differ on the control/perfectionism and aggression subscales, $F (1, 48) = 2.57$, $p > .05$, and $F (1, 48) = 2.01$ $p > .05$, although the means were in the expected direction (i.e., recovered participants scored more highly).

Memory Features

The six positive autobiographical memories were divided into pre- and post-induction categories. To evaluate memory qualities, a series of 2 (History: never-depressed, recovered depressed) x 2 (Time: pre, post) ANOVAs were conducted, with repeated measures on the second factor and the memory quality of interest as the dependent variable. Means and standard deviations are presented in Table 2.6.

Table 2.6

Ratings of Positive Memory Features

	Never-Depressed ($n = 27$)		Recovered Depressed ($n = 23$)	
	Pre	*Post*	*Pre*	*Post*
Vividness	4.10 (.62)	4.17 (.60)	3.98 (.64)	3.35 (.60)
Accessibility	3.83 (.82)	3.86 (.56)	3.61 (.68)	3.71 (.85)
Vantage Perspective	3.95 (.76)	3.94 (.63)	3.81 (.78)	3.65 (.81)

Note. Values refer to mean (and standard deviation) scores. Ratings presented as out of five, where a higher score reflects a greater level of the variable.

Vividness

To examine whether there were any between-group differences in memory vividness, a 2 (History: never-depressed, recovered depressed x 2 (Time: pre, post) ANOVA was conducted, with repeated measures on the second factor and vividness as the dependent variable. There was no main effect of time, $F(1, 47) = 2.71$, $p > .05$, or history, $F(1, 47) = 2.72$, $p > .05$, but there was a significant time x history interaction, $F(1, 47) = 4.27$, $p < .05$[2]. To deconstruct this interaction, an independent samples *t*-test was first conducted on vividness ratings prior to the induction to ensure that there were no pre-existing differences. The groups did not differ in memory vividness at baseline, $t(48) = .68$, $p > .05$. Follow-up paired samples *t*-tests were then conducted with baseline and post-induction memory vividness as a function of depressive history. For never-depressed individuals, there was no change in vividness from pre- to post-induction, $t(26) = -.74$, $p > .05$. However, for recovered depressed participants, positive memories recalled following the sad mood induction were rated as less vivid after the mood induction, $t(22) = 3.60$, $p < .05$ (see Figure 2.3).

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[2] With BDI-II included as a covariate, the critical interaction was obtained, $F(2, 50) = 3.55$, $p < .05$.
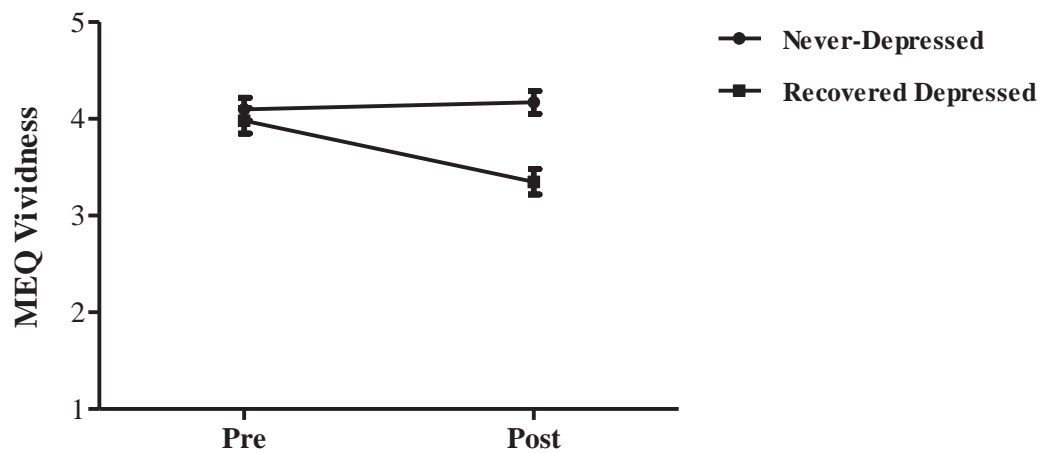
Figure 2.3 Mean and standard error for vividness ratings of positive memories prior to, and following, the sad mood induction.

Accessibility

To investigate possible between-group differences according to positive memory accessibility, a 2 (History: never-depressed, recovered depressed x 2 (Time: pre, post) ANOVA was conducted, with repeated measures on the second factor and accessibility as the dependent variable. There was no main effect of time, $F (1, 47) = .49, p > .05$, no main effect of history, $F (1, 8) = .53, p > .05$, and no time x history interaction, $F (1, 47) = .13, p > .05$. This analysis indicates that the accessibility of positive memories both prior to, and following, the sad mood induction was not influenced by depressive history or mood.

Vantage Perspective

To examine whether vantage perspective was influenced by depressive history or mood, a 2 (History: never-depressed, recovered depressed x 2 (Time: pre, post) ANOVA was conducted, with repeated measures on the second factor and vantage

perspective as the dependent variable. There was no main effect of time, $F(1, 47) = .11$, $p > .05$, no main effect of depressive history, $F(1, 47) = .87$, $p > .05$, and no time x history interaction, $F(1, 47) = .46$, $p > .05$. These analyses indicate that positive memories were recalled from the same vantage perspective independent of depressive history and mood.

Discussion

The goal of Study 2 was to replicate findings of Study 1 using an experimental protocol that allowed for a more comprehensive analysis of positive autobiographical memories. Consistent with Study 1, in a sad mood, participants who had recovered from depression recalled less vivid positive autobiographical memories than those who had never been depressed. This finding is consistent with the DAH in the sense that formerly and never-depressed individuals exhibited a different way of remembering in sad mood, but it provides an exciting extension of this account by showing that this difference is present for positive memories. Contrary to hypotheses (but consistent with Study 1), the accessibility and vantage perspective of positive memories did not differ according to depressive history. In accordance with mood-congruency effects, positive autobiographical memories were expected to be more difficult to recall in low mood, particularly for individuals with a history of depression. For vantage perspective, it was expected that individuals with a depressive history would tend towards an observer perspective in sad mood. Neither of these predictions was supported.

A notably difference between the current study and Study 1 was the omission of a neutral comparison condition. While Study 1 established no differences in memory qualities as a result of the neutral induction, the possibility that this was not the case in the current study cannot be ruled out, and represents a limitation.

An additional aim of Study 2 was to further investigate the utility of the LEIDS-R as a measure of cognitive reactivity. The finding that the LEIDS-R reliably distinguished recovered depressed and never-previously depressed individuals replicates what has been previously reported (e.g., Moulds et al., 2008; Van der Does, 2002). This suggests that as a trait measure of cognitive reactivity, the LEIDS-R is both a practical and valid instrument and as such can be used in research of this nature as an alternative to the DAS, because it has the advantage of not requiring multiple administration or a mood induction procedure.

General Discussion

Two studies were conducted to compare the characteristics of the autobiographical memories recalled by recovered depressed individuals and never-depressed controls in sad mood. In Study 1, the memory qualities of both negative and positive autobiographical memories were investigated. Interestingly, formerly depressed individuals recalled less vivid positive memories than their never-depressed counterparts, but only in a sad mood. This finding was replicated in Study 2. These results illustrate that recovered depressed individuals recalled less vivid positive autobiographical memories than never-depressed controls, and is consistent with the broad premise of the DAH: in sad mood, individuals with a history of depression exhibit differential patterns of cognitive functioning from those who have never been depressed before.

Interestingly, in Study 1 there was no evidence of differences in the features of negative memories recalled in sad mood as a function of depression history. This result was surprising because it is inconsistent with research showing that depressive disorders are characterised by biases in the recall of negative information (e.g., Singer & Salovey, 1988). For example, a substantial body of evidence has shown that depressed

individuals have increased accessibility to negative, mood-congruent memories (Matt et al., 1992). There is also evidence that those with depression experience negative intrusive memories as highly vivid and are very distressing (Newby & Moulds, 2011; Patel et al., 2007). One possible reason for the absence of the expected differences for negative memories is the fact that the recovered depressed participants in this sample were relatively non-chronic; that is, they had experienced (on average) less than three previous depressive episodes. As outlined by Teasdale's theoretical account of depression, negative cognitive processes become increasingly severe and more easily activated by sad mood as the chronicity and frequency of past depressive episodes increases. Accordingly, it is possible that differences in negative memories may have emerged had participants' depression history been more longstanding. Studies that examine individuals who differ in the extent of their depressive history are needed to determine whether chronicity influences the effect of sad mood on negative memories.

Alternatively, it is also possible that the absence of support for predictions about negative memory features could well have been due to methodological factors. In Study 1, a single negative memory recalled in a sad and neutral mood was compared to a single negative memory recalled after the mood induction. By limiting participants' responses in this way, it is plausible that the breadth of this investigation was restricted. To this end, the results may have been an artefact of the cue words selected, and this represents a key limitation of this study. Moreover, it should be noted that some participants recalled negative but relatively benign events (e.g., missing a bus) while others recalled more serious, life-changing negative events (e.g., the death of a family member). This high degree of variability in the content of the memories recalled may have confounded the analysis and reduced the likelihood of detecting systematic differences in negative memory features. A relatively straightforward way to overcome

this difficulty would be to examine memories that contain similar content. For example, instructing all participants to recall self-defining memories, which are by definition personally-important memories, would reduce the possibility of a disparity in memory content between participants. Accordingly, Study 3 will investigate whether recovered and never-depressed individuals differ in the recall of self-defining memories in sad mood.

The key finding was that remitted depressed individuals recalled less vivid positive memories in a sad mood. This finding is consistent with evidence that dysphoric individuals have an impaired ability to imagine future positive events (Holmes, Lang, et al., 2008; Stöber, 2000), and extends this work by showing that this deficit is also apparent in the vividness of positive autobiographical memories. In contrast, other characteristics of positive memories (e.g., coherence, accessibility, emotional intensity, sensory detail, vantage perspective) did not differ between recovered and never-depressed individuals. The finding that vividness but not other features of memory differed as a function of depressive history was puzzling, as it was expected that memory characteristics such as emotional intensity and accessibility would be highly correlated with vividness. This inconsistency warrants some consideration.

One possible explanation implicates the methodology as a potential factor that was responsible for ratings of vividness to have emerged as the only differentiating variable. Specifically, the memory procedure involved instructing participants to retrieve a memory and make immediate ratings of memory features. As such, participants were not given much time in which to reflect on the features of their memories. It is possible that memory vividness is a relatively salient feature that lends itself to be rated without significant reflection. In comparison, more complex features

such as vantage perspective or emotionality could require more time to be processed and evaluated. That is, the sequence with which memory characteristics are rated may have implications for participants' reports of their features (to be discussed further in the General Discussion).

Another methodological issue that could account for the findings is the task used to assess memory. Although widely used, the AMT is in many respects a prescriptive test in that participants are cued to recall particular memories. Without prompts, different kinds of memories might be recalled which lend themselves to including different content and characteristics. Indeed, the AMT does not control for the content or nature of memories recalled. It seems highly likely that the perceived importance of a memory, as well as its subjective meaning, will be inextricably linked to the way in which the memory is remembered, that is, to memory features (e.g., emotional intensity). To investigate this possibility, experiments that employ less prescriptive procedures to elicit meaningful autobiographical memories and assess memory content and features are needed. Whether impaired vividness of positive memories extends to all kinds of autobiographical memory (e.g., self-defining memories, intrusive memories) is yet to be examined. Indeed, in the next chapter (i.e., Study 3), this issue will be addressed directly with the investigation of self-defining autobiographical memories.

The finding that vividness was the sole feature that distinguished the positive memories recalled by recovered and never-depressed groups in low mood supports the notion that depression may be associated with deficits in the processing of positive material (MacLeod & Moore, 2000). Clinically, targeting such deficits may be useful because of the possible affective impact of recalling less vivid positive memories. Specifically, in light of findings from the intrusive memory literature that have established that negative intrusive memory vividness is related to intrusion-related

distress and negative affect (e.g., Newby & Moulds, 2011; Williams & Moulds, 2007a), although speculative, this link between vividness and emotionality may also apply for positive memories: that is, that less vivid positive memories may be less emotion-eliciting, which could have downstream consequences on mood. This possibility will need to be investigated in the future.

From a theoretical perspective, the current study provides evidence in partial support of the DAH. While features of negative memories did not distinguish individuals according to their history of depression, the vividness of their positive autobiographical memories did. This finding is consistent with predictions made by the model and therefore contributes support for this account of depression and its recurrence.

To summarise, the two experiments reported in this chapter were designed to determine whether there were any differences in the features of the autobiographical memories recalled by recovered depressed and never-depressed individuals in sad mood. The results of Study 1 revealed that there were no differences in the features of negative memories, but that the positive memories recalled by recovered depressed participants were rated as less vivid, but only while in a sad mood. This finding was replicated in Study 2. Due to the large variability in the content of the memories elicited by the AMT, it remains unknown whether memories of highly personally-relevant events are recalled with different features by formerly and never-depressed participants in a sad mood. Therefore, the goal of Study 3 was to address this issue by examining whether formerly and never-depressed participants differ in terms of the features of the self-defining memories they recall in sad mood.

CHAPTER 3: Self-Defining Memories

Study 3 – Characteristics of Self-Defining Memories

As discussed in Chapter 1, the role of autobiographical memory in the context of depressive disorders is of interest from theoretical and applied perspectives. According to Teasdale's cognitive theory of depression, memory disturbances in the context of sad mood may persist beyond the resolution of a depressive episode and elevate the risk for recurrence (Teasdale, 1988). Clinically, this model of depression has informed the development of relapse prevention approaches for depressive disorders, and has contributed to the growing recognition that comprehensive interventions need to address not only symptom reduction during the acute phase of a depressive episode, but they also need to target residual cognitive deficits if recurrence rates are to be reduced (Segal et al., 2006).

With respect to the role of memory, as mentioned, Teasdale's model predicts that recovered depressed individuals will exhibit a bias for recalling negative material compared to never-depressed individuals, but only when they are in a sad mood (Teasdale, 1988). Evidence supports this proposition, with recovered depressed individuals showing preferential recall of negative self-related adjectives, compared to healthy controls, but only in a sad mood (Hedlund & Rude, 1995; Teasdale & Dent, 1987). Understandably, studies designed to test the DAH's predictions about the role of memory have focused exclusively on negative memories, which is to be expected given that the model makes clear predictions about the role of negative memories but does not make mention of how positive memory processes may be involved. The findings of Studies 1 and 2 showed that recovered depressed and never-previously depressed individuals recall cued positive memories that differ in characteristics to those of never-depressed individuals, but only while in a sad mood. This finding represents an

extension to the DAH in two ways: first, by providing empirical evidence of differences in the characteristics of memories recalled in sad mood as a function of depressive history; second, by demonstrating that these between-group differences are for positive memories, and not negative memories, as proposed by the model.

While the methodologies of Studies 1 and 2 contained improvements on the procedures of previous research in this area that has largely relied on word-list methods (e.g., Teasdale & Dent, 1987), these experiments were nonetheless somewhat restricted by the use of a word-cue paradigm, which provides clear instruction and prompts to elicit memory. Word-cue techniques have provided an important and useful platform from which to examine autobiographical memory, but their highly prescriptive nature does not allow for any control over the type of memory that participants recall in terms of its personal significance. Indeed, there has been some discussion in the literature of the limitations of cueing tasks because they index memory without directly eliciting personally meaningful material (Jansari & Parkin, 1996; Rybash & Monaghan, 1999).

Of relevance to the current research program is that there is good reason to expect that the importance assigned to autobiographical memories would be linked to their characteristics (i.e., vividness, emotional intensity, sensory detail). For example, a number of studies from the intrusive memory literature have established an association between memory features and emotionality. Specifically, one study found that intrusion-related distress was associated with a here-and-now quality or a sense of reliving the event (Williams & Moulds, 2007b), while two others have reported that distressing intrusive memories are extremely sensory and involve high levels of vividness (Birrer, Michael, & Munsch, 2007; Newby & Moulds, 2011). Drawing on these findings, it seems likely that personally relevant autobiographical memories would also possess distinct characteristics. In fact, it might even be the case that in order for

fair comparisons between memories to be made, they should be matched according to the importance of the material contained in the memory. That is, a comparison of memories that are characterised by substantial variability in the degree to which they are personally relevant to the individual could potentially mask reliable differences in memory features. This explanation could account for failure to detect the expected between-group differences in negative memory features in Study 1. Therefore, the goal of Study 3 was to examine the characteristics of memories recalled in sad mood that were inherently important to the individuals recalling them.

In order to examine personally relevant autobiographical memories, self-defining memories – which are, by definition, personal and important – were elicited. Self-defining memories involve recollections of highly significant personal experiences that are central to one's identity and are defined as being important, intense and reflective of key concerns about oneself and one's life (Blagov & Singer, 2004; Singer & Moffitt, 1991-1992; Singer & Salovey, 1988). Singer and Moffit (1991-1992) designed a self-defining memory task that has been widely used in cognitive memory domains, as well as in clinical research contexts (e.g., Sutherland & Bryant, 2005). This memory elicitation procedure involves prompting participants to recall five self-defining memories, and is thus well suited to the objective of examining the characteristics of personally relevant memories.

In addition to the focus on self-defining memories in Study 3, the methods of Studies 1 and 2 were improved upon in the following ways: (i) by utilising a different mood induction procedure, (ii) by adopting a between-subject design, and (iii) by not anchoring memory recall to a particular valence. To address the first change, a film-clip induction rather than the combined music and Velten statements was used because the material contained in the sad condition Velten statements contained self-relevant

material (e.g., *"I've doubted that I'm a worthwhile person"*). A potential problem with

presenting self-referent material as part of the experimental manipulations is that there

may be considerable conceptual overlap between the negative self-statements and

depressogenic cognitions held by some individuals, and this in turn could influence the

nature and/or content of the memory that participants recalled subsequent to the

manipulation. The use of a film-clip would reduce the possibility of potential

contamination or priming effects. Further, using a different mood induction procedure

to that employed in Studies 1 and 2 would provide information as to the generalisability

of the previously obtained results – namely, that recovered and never-depressed

individuals recall memories with different characteristics, but only in a sad mood. As in

Study 1, a neutral mood induction condition was included to ensure that any differences

observed could be attributed to the sad mood induction, making this a more rigorous

design than that employed in previous studies in which baseline task performance (i.e.,

performance prior to the administration of a sad mood induction) is used as the neutral

mood comparison condition (e.g., Segal et al., 2006).

The second modification made in Study 3 was to employ a between-subject

design. Given that the memories being elicited were of personal importance, it was

expected that the memories described first would be of greatest significance. That is, the

temporal sequence with which self-defining memories are recalled will presumably be

graded according to importance (i.e., those of most relevance would be reported initially

in this task). In the case of a pre-post study design, it seemed highly probable (and

problematic) that the memories reported at the two time points would not be comparable

in terms of importance. Therefore, Study 3 was designed in such a way that participants

reported self-defining memories only once during the procedure (i.e., following the

mood induction), and the analyses were limited to between-group comparisons.

The final change to the methodology was to allow participants to recall self-defining memories without imposing parameters on memory valence (i.e., without specific instructions to recall positive or negative memories). Given that self-defining memories can be negative or positive, comparing the valence of the memories recalled by the recovered and never-depressed groups without prompting allows for an extended test of the DAH. Thus, the design of this study allowed for an investigation of whether these two groups differ in terms the valence of self-defining memories that they recall in a sad mood. Such a design has the potential to offer insight into the kinds of self-defining memories that recovered depressed individuals recall when they feel sad. Accordingly, this question provided another aim of the study - to compare the valence of self-defining memories recalled by recovered depressed and never-depressed individuals in a sad and neutral mood.

Aims

It was the overall aim of Study 3 to extend the current research program by investigating whether there were any differences in the characteristics of the personally significant memories recalled by recovered and never-depressed participants in a sad compared to neutral mood. Guided by the findings of Studies 1 and 2, and by the wider literature (e.g., Birrer et al., 2007; Newby & Moulds, 2011), vividness, sensory detail and emotional intensity were assessed. Vividness was included to examine whether the key finding of Studies 1 and 2 (i.e., reduced vividness for positive memory by recovered depressed individuals in sad mood) would be replicated for self-defining memories. Given that Studies 1 and 2 did not uncover differences in vantage perspective or accessibility, two different features which may be related to vividness - sensory detail and emotional intensity - were examined. An additional question of interest was to

investigate whether these two groups differed in terms of the valence of the self-defining memories that they retrieved in a sad compared to a neutral mood.

Hypotheses

In line with Teasdale's theoretical framework, it was expected that the recovered and never-depressed participants in the neutral condition would recall self-defining memories with comparable features. It was also expected that in a neutral mood, these groups would report comparable proportions of negative and positive memories. However, under conditions of sad mood, it was hypothesised that independent of depressive history, there would be a mood-congruent effect such that participants would recall a greater proportion of negative self-defining memories than those in the neutral condition, consistent with findings from the social psychology literature (Singer & Salovey, 1993). Extending the logic of the DAH, it was also predicted that this mood-congruent effect may be more pronounced among individuals with a history of depression, compared to those who had never been depressed before (i.e., that in the sad condition, recovered participants would recall significantly more negative memories than never-depressed participants).

For negative memory features, based on predictions derived from Teasdale's model, it was expected that individuals would recall negative memories with different phenomenological features to individuals who had never experienced depression before, but only in a sad mood. Specifically, self-defining negative memories were predicted to possess more intense phenomenological features – that is, greater levels of vividness, emotional intensity, and sensory detail than control participants (although it is noted that the findings of Study 1 would generate the alternative prediction of no between-group memory differences).

For positive memories, again, no differences in valence or characteristics were expected in the neutral condition. However, based on the results of Studies 1 and 2, it was predicted that recovered depressed individuals would recall positive memories with less intense characteristics (i.e., lower levels of vividness, emotionally intensity, and sensory detail) than their never-depressed counterparts, while in a sad mood.

Method

Design

A 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) between-subjects design was employed.

Participants

Ninety undergraduate students (68 females, mean age = 19.70; *SD* = 4.43) from The University of New South Wales participated in return for course credit. Following the initial recruitment phase, there was a need to increase the sample of recovered depressed participants in order to make cell numbers comparable. Therefore, suitable individuals in the undergraduate sample were recruited by specifying that a history of depression was a necessary criterion to participate in the study inclusion, which was verified by administration of the SCID-IV. This method of recruiting formerly depressed individuals among university students has successfully been used previously (e.g., Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010).

Materials and Measures

Previously Used Measures. The BDI-II and LEIDS-R were used exactly as described in Chapter 2.

Mood Rating Scale. The mood rating scale was used as described in Chapter 2,

except participants responded on a 10-point scale (rather than the previously used 100-

point scale).

Mood Induction. Mood was induced using 10-minute film clips. In the sad mood

condition, a scene from the movie "Dead Poets Society" depicting a suicide was shown,

which has previously been used for this purpose (e.g., Joormann et al., 2007).

Participants were instructed to imagine how they might feel if they were in the situation

shown and were encouraged to allow themselves to be affected by the film. In the

neutral condition, participants watched a do-it-yourself home improvement style clip

providing instructions on how to lay down wooden floating floors. The video was

selected especially for use in this study, and pilot data ($n = 5$) indicated that it did not

change mood. Clips of this kind have been successfully used to induce a neutral mood

(e.g., Josephson, Singer, & Salovey, 1996).

Self-Defining Memory Task. The self-defining memory task was based on the

procedure outlined by Blagov and Singer (2004). Participants were informed that a self-

defining memory was a memory of an event that was important to them and had some

relation to who they were as a person. They were told that it was the kind of memory

that they would tell someone if they wanted that person to understand them on a

fundamental level. Finally, participants were told that a self-defining memory could be

either positive or negative or both in terms of how it makes them feel. However, the

self-defining memory had to be important to them and to have helped them to

understand how they have come to be the person that they are. If participants provided a

general memory, they were prompted to recall a specific memory (i.e., something that

happened on a particular day, at a particular time).

In keeping with the task protocol developed by Blagov and Singer (2004), participants were asked to recall five self-defining memories. However, some studies that have examined multiple memories after a mood induction procedure have found that systematic differences emerge when the first memory is examined alone rather than comparing *all* post-induction memories (Parrott & Sabini, 1990). This has been attributed to two factors: (i) the possibility that the effect of the mood induction may deteriorate over the course of the study, and (ii) the possibility of carry-over, cumulative effects of recalling a self-defining memory in one valence that could in turn influence the nature and/or the emotional impact of the subsequent memory/memories recalled. Accordingly, in addition to examining all five memories, groups were compared on dimensions of interest for the first memory recalled only. Such an analysis enabled confidence that at this time point, the effects of the mood induction were optimal and no cumulative carry-over effects (e.g., no influence of recalling an emotional memory on the nature or valence of subsequent memories recalled) were possible.

Self-Defining Memory Questionnaire (SDMQ). Studies of self-defining memory use this standardised questionnaire that requires participants to rate their memories on the basic emotions of happiness, sadness, anger, fear, surprise, shame, disgust, guilt, interest, contempt, pride and embarrassment (Blagov & Singer, 2004). Accordingly, this instrument was administered and participants rated the basic emotions that they experienced for each self-defining memory recalled.

Memory Experiences Questionnaire (MEQ; Sutin & Robins, 2007). As in Study 1 and 2, the MEQ was administered to index the memory characteristics of interest: vividness, sensory detail and emotional intensity. To avoid administering an excessively long questionnaire after each memory was recalled, a single item from each subscale was administered to assess the corresponding memory feature. In addition, rather than

using the 5-point scale of the original MEQ, the wording of the items were adapted so that participants could respond using the same scale as they had done to rate basic emotions on the SDMQ. Specifically, participants were instructed to indicate the extent to which each characteristic was a feature of their memory (i.e., *"How vivid is your memory?"* and *"Does this memory evoke powerful emotions?"*) where 0 = *not at all* and 6 = *extremely*.

SCID-IV – Mood Module (First et al., 1996). As previously described, the SCID-IV is a clinical interview used to diagnose DSM-IV Axis 1 psychological disorders. The mood module was administered at the beginning of the experimental session to assess for the presence of current and previous MDEs, with the same inclusion criteria as those adopted in the Studies 1 and 2. Of the 90 individuals interviewed, six were excluded because their responses indicated that they were currently experiencing a MDE, 35 met criteria for a past MDE, and 49 had never experienced depression before. The final sample consisted of 84 participants.

Procedure

Participants were tested individually in a one-hour session. The experiment was introduced as a study investigating mood, memory and imagination. Participants provided informed consent and then completed the questionnaire package that included demographic information, BDI-II, LEIDS-R, and a baseline mood rating. They were then randomly assigned to either the neutral or sad mood induction and watched the corresponding film clip. Immediately after the mood induction, participants were given the second mood rating scale (to check that mood had been manipulated as intended) and were instructed to describe the main theme of the movie (to ensure that they had attended to the clip as instructed). Participants were then asked to recall five self-

defining memories, and completed the SDMQ and MEQ following each memory. Participants were thanked for their time and fully debriefed.

Results

Participant Characteristics

Demographic information and sample characteristics are presented in Table 3.1. A series of 2 (Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) ANOVAs with age and depression symptoms (BDI-II) as the dependent variables were conducted to ensure that the groups did not differ on these variables. For age, there were no main effects of condition, F (1, 80) = 1.32, $p > .05$, or history, F (1, 80) = .31, $p > .05$, and no group x condition interaction, F (1, 80) = .01, $p > .05$, illustrating that age was comparable across groups.

For BDI-II, there was a main effect of condition, F (1, 80) = 6.96, $p < .05$, and a main effect of history, F (1, 80) = 7.36, $p < .05$, but no condition x history interaction, F (1, 80) = 1.56, $p > .05$. Follow-up independent samples t-tests indicated that collapsed across history, participants allocated to the sad induction condition reported higher levels of depressive symptoms, t (82) = 2.76, $p < .05$. Collapsed across condition, there was a trend towards individuals with a history of depression reporting higher levels of depressive symptoms, t (82) = -1.93, $p = .057$. Given these differences at baseline, symptoms of depression (i.e., BDI-II scores) were entered as a covariate for all subsequent analyses.

To examine whether cognitive reactivity distinguished recovered depressed from never-depressed participants, a one-way ANOVA was conducted with LEIDS-R scores as the dependent variable. There was no difference between the two groups, F (1, 82) = 1.66, $p > .05$, or any of the subscales (acceptance/coping, F (1, 82) = .27, $p > .05$;

aggression, F (1, 82) = 1.76, p > .05; control perfectionism, F (1, 82) = .09, p > .05; risk

aversion, F (1, 82) = .04, p > .05; rumination, F (1, 82) = .85, p > .05), with the

exception of hopelessness, F (1, 82) = 8.50, p < .05.

Mood Ratings

To ensure that there were no differences in baseline mood as a function of

condition or depressive history, a 2 (Condition: sad, neutral) x 2 (History: never-

depressed, recovered depressed) analysis of covariance (ANCOVA) was conducted with

BDI-II scores entered as a covariate and baseline sad mood ratings as the dependent

variable. The groups did not differ as a function of condition, F (1, 79) = 2.26, p > .05,

or depressive history, F (1, 79) = .15, p > .05, and there was no condition x history

interaction, F (1, 79) =.20, p > .05. This indicates that mood was comparable between

the groups at baseline.

To determine whether the mood inductions had the intended effects, a 2

(Condition: sad, neutral) x 2 (History: never-depressed, recovered depressed) x 2 (Time:

pre, post) mixed-model ANCOVA with repeated measures on the third factor was

conducted, with sad mood ratings as the dependent variable and BDI-II scores included

as a covariate. There was a main effect of time, F (1, 79) = 39.89, p < .05, a significant

condition x time interaction, F (1, 79) = 49.30, p < .05, but no time x history

interaction, F (1, 79) = .20, p > .05, and no time x condition x history interaction, F (1,

79) = .54, p > .05. Follow-up paired samples t-tests demonstrated that participants in the

sad condition reported increased sad mood from pre- to post-induction, t (44) = -6.42, p

< .05, while in the neutral condition, sad mood ratings did not change, t (38) = 1.02, p >

.05. This confirms that the respective mood induction procedures effectively

manipulated mood as intended, and furthermore, that the manipulations were equally

effective for all participants, irrespective of depression history.

Table 3.1

Participant Characteristics and Self-Report Measures

	Condition				
	Sad (n = 45)			Neutral (n = 39)	
	Never-Depressed (n = 27)	Recovered (n = 18)		Never-Depressed (n = 22)	Recovered (n = 17)
Age	18.89 (.86)	19.56 (1.05)		20.13 (.95)	20.59 (1.08)
BDI-II	10.26 (1.78)	18.39 (2.18)		7.41 (1.98)	10.41 (2.24)
LEIDS-R	84.56 (3.45)	93.89 (4.26)		84.05 (3.48)	84.82 (4.38)
Sad (pre)	2.85 (.34)	3.83 (.41)		1.91 (.37)	2.53 (.33)
Sad (post)	5.74 (.33)	5.50 (.40)		1.77 (.36)	2.24 (.41)

Note. Values refer to mean (and standard deviation) scores. BDI-II = Beck Depression Inventory II; LEIDS-R = Leiden Index of Depression Sensitivity – Revised; Sad (pre) = Ratings of sad mood before the induction; Sad (post) = Ratings of sad mood following the induction.

Memory Specificity and Valence

The five self-defining memories were coded according to specificity and valence. Memory specificity was assessed in order to ensure that any between-group differences that emerged could not be attributed to differences in specificity. Memories were defined as specific if they occurred at a particular place and time, and lasted for less than one day (Williams & Broadbent, 1986). The proportion of specific memories reported by the sample was high (95%) and analyses showed there were no differences in proportion of specific memories recalled between the groups according to condition, $F (1, 79) = .07, p > .05$, or depressive history, $F (1, 79) = .60, p > .05$, with no interaction, $F (1, 79) = .34, p > .05$.

Valence was coded categorically as either positive (e.g., *when they announced that I had been voted school captain – I felt like it was such an achievement and I could even hear my parents cheering as I went up on stage*) or negative (e.g., *watching my grandmother take her last breath*). The number of negative and positive memories recalled was summed for each participant, out of the total five memories recalled. There were no instances of memories in which the valence was ambiguous or neutral. Overall, 48% of the total memories recalled were negative and 52% were positive, with no between-group differences $(ps > .05)$[3].

As outlined in the Method section, one methodological consideration was the possibility that the mood induction may have dissipated over time or been contaminated by the valence of the preceding memory, potentially masking any memory differences when all five memories were collapsed and examined together. To this end, an additional analysis was conducted, in which only the valence of the first memory

[3] To obtain an estimate of inter-rater reliability, an independent rater with extensive experience with memory rating guidelines re-rated 10% of the memories. For specificity, there was perfect agreement between the two assessors. For valence, the estimate of inter-rater reliability was .91.

recalled was the dependent variable. Such an analysis enabled confidence that at this time point, the effects of the mood induction were optimal and no carry-over effects influenced the data. Indeed, other researchers have taken this approach by examining memories recalled immediately after the delivery of a mood induction, at the time that the effects of the induction are at their strongest (Parrott & Sabini, 1990). Consistent with the results of the analyses conducted with all five memories, a high proportion of the first memories reported were specific (96%) and there were no differences in specificity; i.e., no main effect of condition, F (1, 79) = .12, p > .05, or depressive history, F (1, 79) = 1.20, p > .05, and no interaction, F (1, 79) = .92, p > .05. For valence, 51% of the first memories recalled were negative, and thus the remaining 49% were positive, again with no between-group differences (ps > .05).

These results indicate that for the first memory, as well as on average across all five memories recalled, memory specificity and valence were not influenced by mood (i.e., condition) or depressive history.

Memory Features

Memory features were analysed separately for each valence category. Consistent with the approach taken in Studies 1 and 2, it was not the aim of the study to compare memories between valence (i.e., compare positive and negative memories). Also, from a theoretical standpoint, and in view of the findings of the first two experiments, memory features were expected to differ based on valence. Therefore, separate analyses were conducted for negative and positive memories, with the memory quality of interest as the dependent variable. To do this, memories were first divided into valence categories, and then an average for each participant on the memory dimension of interest was calculated. In the case that participants recalled five memories that were all negative (n

= 6) or all positive (*n* = 4), they were omitted from the analysis for the valence for which they did not recall any memories.

Two analyses of memory features were conducted: the first included all five memories recalled by each participant, and the second limited the analysis to the first memory recalled by each participant. For means and standard deviations, see Tables 3.2 and 3.3 for negative memories, and Tables 3.4 and 3.5 for positive memories.

Vividness

To evaluate whether the groups differed in terms of negative memory vividness, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) ANCOVA was conducted with memory vividness as the dependent variable, controlling for BDI-II scores. There was no main effect of condition, $F (1, 73) = .14$, $p > .05$, or history, $F (1, 73) = 2.46$, $p > .05$, and no condition x history interaction, $F (1, 73) =.40$, $p > .05$. Another ANCOVA was conducted for positive memories, with vividness as the feature of interest. There were no main effects of condition, $F (1, 75) = .60$, $p > .05$, or history, $F (1, 75) = .03$, $p > .05$, and no condition x history interaction, $F (1, 75) = .01$, $p > .05$. Taken together, these results indicate that participants recalled both negative and positive self-defining memories with comparable levels of vividness, independent of mood (i.e., condition) or depressive history.

These analyses were repeated with the first memory only as the dependent variable. For negative memory vividness, there was no main effect of condition, $F (1, 39) = .59$, $p > .05$, or history, $F (1, 39) = .13$, $p > .05$, but there was a significant condition x history interaction, $F (1, 39) = 4.64$, $p < .05$. Follow-up *t*-tests showed that for individuals in the neutral condition, there were no differences in ratings of the vividness of negative memories between recovered depressed and never-depressed individuals, $t (15) = .38$, $p > .05$. However, in the sad mood condition participants with

a history of depression recalled more vivid negative memories compared to their never-depressed counterparts, $t(24) = -3.02$, $p < .05$. For positive memory vividness, there were no main effects of condition, $F(1, 37) = .05$, $p > .05$, or history, $F(1, 37) = .24$, $p > .05$, and no condition x history interaction, $F(1, 37) = .08$, $p > .05$. This indicates that participants recalled positive self-defining memories with comparable levels of vividness, regardless of mood (i.e., condition) or depressive history.

Sensory Detail

To evaluate whether the groups differed in terms of the sensory detail of their negative self-defining memories, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) ANCOVA was conducted with sensory detail as the dependent variable, controlling for BDI-II scores. There was no main effect of condition, $F(1, 73) = .00$, $p > .05$, or history, $F(1, 73) = 3.57$, $p > .05$, and no condition x history interaction, $F(1, 73) = .00$, $p > .05$. For the sensory detail of positive self-defining memories, there was no main effect of condition, $F(1, 75) = 2.36$, $p > .05$, or history, $F(1, 75) = .00$, $p > .05$, but there was a condition x history interaction, $F(1, 75) = 4.86$, $p < .05$. Follow-up independent samples t-tests indicated that for the never-depressed participants there was no difference in sensory detail of self-defining positive memories in the sad compared to the neutral condition, $t(46) = .53$, $p > .05$. However, for recovered depressed participants, memories recalled in the neutral condition contained more sensory detail for positive self-defining memories than those recalled in a sad mood, $t(30) = -2.32$, $p < .05$.

Table 3.2

Negative Self-Defining Memory Feature Ratings for All Five Memories

	Condition			
	Sad		Neutral	
	Never-Depressed (*n* = 25)	Recovered Depressed (*n* = 18)	Never-Depressed (*n* = 19)	Recovered Depressed (*n* = 16)
Vividness	4.26 (1.49)	4.96 (0.78)	4.39 (1.07)	4.60 (1.13)
Sensory Detail	3.01 (1.49)	3.86 (1.21)	2.97 (1.39)	3.67 (1.51)
Emotional Intensity	4.45 (1.01)	4.60 (1.32)	4.15 (1.32)	4.25 (1.41)

Note. Values refer to mean (and standard deviation) scores. Ratings presented out of six, where a higher score reflects a great variable level.

Table 3.3

Negative Self-Defining Memory Feature Ratings for First Memory Recalled

	Condition			
	Sad		Neutral	
	Never-Depressed (*n* = 14)	Recovered Depressed (*n* = 12)	Never-Depressed (*n* = 9)	Recovered Depressed (*n* = 8)
Vividness	4.43 (1.28)	5.66 (0.65)	5.33 (0.86)	5.12 (1.35)
Sensory Detail	3.35 (1.73)	4.00 (1.41)	3.33 (1.58)	3.36 (1.50)
Emotional Intensity	4.57 (1.22)	4.50 (1.38)	4.77 (1.39)	4.75 (1.83)

Note. Values refer to mean (and standard deviation) scores. Ratings presented out of six, where a higher score reflects a great variable level.

Table 3.4

Positive Self-Defining Memory Feature Ratings for All Five Memories

	Condition			
	Sad		Neutral	
	Never-Depressed (*n* = 26)	Recovered Depressed (*n* = 15)	Never-Depressed (*n* = 22)	Recovered Depressed (*n* = 17)
Vividness	4.18 (1.59)	4.39 (0.71)	4.23 (1.19)	4.33 (1.51)
Sensory Detail	3.59 (1.18)	3.14 (1.26)	3.34 (1.47)	4.05 (0.94)
Emotional Intensity	4.02 (0.94)	3.61 (0.89)	4.26 (1.22)	4.38 (0.94)

Note. Values refer to mean (and standard deviation) scores. Ratings presented out of six, where a higher score reflects a great variable level.

Table 3.5

Positive Self-Defining Memory Feature Ratings for First Memory Recalled

	Condition			
	Sad		Neutral	
	Never-Depressed (*n* = 13)	Recovered Depressed (*n* = 6)	Never-Depressed (*n* = 13)	Recovered Depressed (*n* = 9)
Vividness	4.38 (1.66)	4.33 (1.36)	3.92 (1.65)	4.11 (1.76)
Sensory Detail	2.84 (1.21)	4.16 (0.41)	2.46 (1.71)	4.00 (1.09)
Emotional Intensity	4.46 (1.19)	3.00 (1.67)	4.00 (0.19)	4.55 (1.33)

Note. Values refer to mean (and standard deviation) scores. Ratings presented out of six, where a higher score reflects a great variable level.

This indicates that mood condition did not influence sensory detail of positive self-defining memories for never-depressed individuals, but recovered depressed participants recalled memories with less sensory detail when they were in a sad mood, compared to recovered depressed individuals in a neutral mood state.

These analyses were repeated with the first-recalled negative and first-recalled positive memories. For negative memories, there was no main effect of condition, F (1, 39) = .16, p > .05, or history, F (1, 39) = .90, p > .05, nor was there a condition x history interaction, F (1, 39) = .13, p > .05. These results suggest comparable levels of sensory detail between groups; that is, there was no influence of mood condition or history. For positive memories, there was no main effect of condition, F (1, 37) = .37, p > .05, nor a condition x history interaction, F (1, 37) = .06, p > .05. However, there was an unexpected main effect of depressive history such that those who had recovered from depression reported positive self-defining memories with more sensory detail than those without a history of depression, F (1, 37) = 10.05, p < .05.

Emotional Intensity

To investigate the emotional intensity with which negative self-defining memories were recalled, a 2 (Condition: neutral, sad) x 2 (History: never-depressed, recovered depressed) ANCOVA with emotional intensity as the dependent variable and BDI-II scores as the covariate, was conducted. There was no main effect of condition, F (1, 73) = 3.22, p > .05, or history, F (1, 73) = .83, p > .05, and no condition x history interaction, F (1, 73) = .09, p > .05.

For positive memories, the ANCOVA indicated no main effect of history, F (1, 75) = .06, p > .05, and no condition x history interaction, F (1, 75) = .27, p > .05. There was however, a significant main effect of condition, F (1, 75) = 4.15, p > .05, such that collapsed across history, participants allocated to the neutral condition recalled more

emotionally intense self-defining positive memories than those in the sad mood condition.

Again, the first memories recalled were examined on the dimension of emotional intensity. For negative memories, there was no main effect of condition, $F(1, 39) = .26$, $p > .05$, or history, $F(1, 39) = .01$, $p > .05$, nor a condition x history interaction, $F(1, 39) = .97$, $p > .05$, indicating comparable levels of emotional intensity of negative memories independent of mood (i.e., condition) or depressive history.

For positive memories, there was no main effect of condition, $F(1, 37) = 1.80$, $p > .05$, and no main effect of history, $F(1, 37) = 1.27$, $p > .05$. There was however, a condition x history interaction, $F(1, 37) = 6.30$, $p < .05$. Follow-up t-tests revealed that for individuals in the neutral condition, there were no differences between recovered depressed and never-depressed individuals in ratings of emotional intensity of positive memories, $t(20) = -1.16$, $p > .05$. However, for participants allocated to the sad mood condition, those with a history of depression recalled less emotionally intense positive self-defining memories compared to their never-depressed counterparts, $t(17) = 2.18$, $p < .05$.

To summarise, given the theoretical underpinnings of the research question addressed in this study, an interaction needed to be detected in order to indicate a difference in memory characteristics that depended on condition and history. When all five self-defining memories were examined, this effect was not detected for any of the memory features assessed. However, when the analysis was limited to the first memory recalled, the negative memories recalled by recovered depressed individuals were rated as more vivid relative to the negative memories recalled by their never-depressed counterparts, but this difference was only evident in the sad mood condition. Similarly, for positive memories, there was an absence of the critical interaction for any of the

memory features recalled when all five memories were examined together. However, when the first memory recalled alone was examined, the positive self-defining memories recalled by recovered depressed participants were rated as less emotionally intense than those recalled by their never-depressed participants. Again, this difference only emerged in the sad mood condition.

Discussion

Five self-defining memories were elicited following a neutral or sad mood induction, and the memories recalled by formerly depressed and never-previously depressed individuals were compared. The first goal of Study 3 was to compare the phenomenological characteristics of the self-defining memories recalled by recovered and never-depressed individuals in a sad and neutral mood. The second goal was to compare the valence of the memories recalled by the two groups in sad and neutral mood.

When all five self-defining memories were examined, formerly depressed and never-depressed individuals recalled negative memories with comparable levels of vividness, sensory detail and emotional intensity than their never-depressed counterparts, irrespective of condition. Similarly, the characteristics of the positive memories recalled by recovered and never-depressed individuals in a neutral mood did not differ. Interestingly, recovered depressed individuals recalled positive memories in the sad condition with less sensory detail than recovered depressed participants in the neutral condition. This is consistent with the hypothesis that sad mood may uncover specific differences between formerly depressed and never-depressed individuals. This finding is also consistent with the results of Studies 1 and 2, which suggest that a sad mood may result in positive autobiographical memories being recalled by formerly depressed individuals with less intense memory characteristics.

The other notable finding was that in the sad condition, positive memories were not as emotionally intense as those in the neutral condition, but did not differ according to depressive status. This is puzzling because emotional intensity is likely to be related to memory vividness and sensory detail. Further, this result is inconsistent with the findings of Studies 1 and 2 which showed that recovered depressed individuals recalled less vivid positive memories in sad mood. Nonetheless, the implication that follows from the results of Study 3 is that being in a sad mood might limit the accessibility of highly emotionally-charged positive material, irrespective of an individual's depression history. Interestingly, research from the imagery literature is consistent with this interpretation; for example, the finding that dysphoria is associated with the impaired ability to imagine future positive events (Holmes, Lang, et al., 2008; Stöber, 2000) which suggests that simply being in a sad mood might reduce an individual's ability to bring to mind intensely positive memories from the past regardless of depressive history.

To address the possibility that the effects of the mood induction may not have remained across all five of the memories recalled, the characteristics of the first memory recalled following the mood induction were compared. There was also a conceptual reason for this analytic approach; that is, that there may have been carry-over, cumulative effects of recalling a self-defining memory in one valence that could in turn influence the nature and/or the emotional impact of the subsequent memory recalled. For example, if participants recalled a positive self-defining memory first, this may very well have had the effect of improving their sad mood (e.g., Josephson et al., 1996), which may then have prompted the recall of additional, perhaps thematically related, positive memories subsequently in the experimental task. The literature is mixed in regard to delineating the conditions under which mood-congruent and incongruent

effects are likely to emerge (Matt et al., 1992). However, there is agreement that mood does affect memory recall, and therefore the possibility that memory recall had an impact on subsequently reported memories cannot be ruled out. Indeed, the possibility of an additional and possibly cumulative emotional impact of recalling memories themselves (i.e., beyond the intended effects of the mood inductions) has clear relevance for interpretations about the relative effects of the sad and neutral mood inductions. Therefore, the first memory recalled immediately following the mood induction recalled was examined alone as a way to ensure that participants were in the intended mood state and that mood had not been further influenced by emotional memory recall. It needs to be noted that this approach necessarily resulted in the disadvantage that a much smaller number of memories were included in the analysis. As a result, insufficient power may have limited the capacity to detect an effect. Thus, the findings need to be interpreted cautiously.

For negative memories, while there were no differences in memory features between groups in the neutral condition, formerly depressed individuals recalled more vivid negative memories than their never-depressed counterparts in the sad mood condition. This finding is consistent with predictions derived from the DAH (Teasdale, 1988). The higher ratings of vividness of negative memories by recovered individuals suggest that there could be something unique about this feature. Indeed, findings from the intrusive memory domain have established that memory vividness is associated with negative affect and intrusion-related distress (Newby & Moulds, 2011). As a caveat, it needs to be noted that self-defining memories by definition are intense and vivid in nature (Singer & Salovey, 1993). This raises the possibility that increased vividness could be confounded by the memory elicitation task. However, if this were the case, no differences as a result of depressive history or mood should have been observed.

Although speculative, given that several studies have found that self-defining memories are central to an individual's sense of self (e.g., Maccallum & Bryant, 2008; Singer & Salovey, 1988), it is plausible that formerly depressed individuals might view their negative memories as more closely linked to who they are as a person, and that this may be distressing. This explanation could potentially account for the finding that these memories were rated as more vivid by recovered depressed individuals. Of course, this suggestion awaits empirical investigation in order to establish first, whether negative self-defining memories are more distressing to individuals with a depressive history, and second, how this relates to memory vividness.

For positive memories, an unexpected finding was that collapsed across mood condition, recovered depressed individuals recalled memories that contained more sensory detail than never-depressed individuals. One possibility to explain this is that perhaps those with a history of depression were more motivated to recall their positive self-defining memories in detail as a way to garner their maximal emotional benefit. However, if this were the case, it would be likely that an interaction (rather than a main effect of group) would have emerged such that participants in a sad mood would be more motivated than those in a neutral mood to improve their mood via the recall of a detailed positive memory. The reason underlying this finding remains unclear and suggests that the relationship between depressive history and positive memory features will need to be investigated in future research.

Consistent with predictions, in the sad mood condition only, recovered depressed individuals recalled less emotionally intense positive memories than those who had never been depressed. This suggests that sad mood may impede the ability of formerly depressed individuals to recall important, positive events as intensely as those who have never been depressed before. One possible explanation for this result is that

formerly depressed individuals might tend towards an anhedonic response to positive

material while in a sad mood. This interpretation is consistent with an extension of the

logic of Teasdale's model, and is in line with a substantial literature showing that

currently depressed individuals show reduced reactivity to positive material (for review,

see Bylsma, Morris, & Rottenberg, 2008). It is possible that recovered depressed

individuals are impaired in their ability to recall emotionally intense positive memories

because they simply do not experience these memories in the same way. It follows then

that the reduced affective impact of positive memory recall on mood in this group may

be expected, which is exactly what studies in the area have found (e.g., Joormann et al.,

2007). While this possibility awaits empirical examination, this result suggests that

reduced reactivity to positive material may be a potential mediator of the emotional

effects of positive memory recall on mood.

An additional aim of Study 3 was to investigate whether the valence of self-

defining memories recalled would be influenced by mood or depressive history. The

finding that individuals in the sad mood condition did not differ from those in a neutral

condition in terms of the proportion of negative and positive memories recalled was

contrary to the prediction of a mood-congruent effect. Further, this finding was

observed in both series of analyses (i.e., those that examined all five memories and

those that examined first-recalled memories). Although some studies have found

evidence of mood-congruent memory recall in laboratory settings (e.g., Singer &

Salovey, 1993), several comprehensive reviews of the literature indicate that the

evidence for the phenomenon is mixed and inconsistent (Blaney, 1986; Matt et al.,

1992). If the effect does exist, it is likely to be small in magnitude (Matt et al., 1992).

The inconsistencies in the mood and memory literature, and the small effect sizes that

have been reported, may in part account for the absence of a difference in the proportion

of negative and positive memories recalled by participants in the current study. In terms of depressive history, it was hypothesised that having a history of depression might amplify the expected mood-congruent biases. However, in the absence of any effects of mood-congruent recall, it follows that depressive history could not influence the relative proportion of negative compared to positive memories recalled.

There are a few possible factors that could account for why recovered and never-depressed participants did not recall a different proportion of negative compared to positive memories while in a sad mood. First, as already discussed, it is possible that the mood induction was not sustained throughout the self-defining memory task. As is the case in mood manipulation research, induction procedures are designed such that they are relatively transient in nature. Inherent to the task, then, is the possibility that induced mood could subsequently dissipate over the course of the experimental procedure (e.g., Knight, Maines, & Robinson, 2002). Indeed, this may have been a possibility in the current study, in which participants were asked to elaborate on and evaluate each memory before proceeding to the next. This also raises the possibility of contamination; i.e., that the valence and material contained in one memory may have influenced the next memory. Following the protocol previously used by researchers to overcome this problem (Parrott & Sabini, 1990), the first memory that participants recalled was examined separately, when presumably the effects of the mood induction were optimal. While the pattern of results did not change statistically, an examination of the means suggests that formerly depressed participants were twice as likely to recall a negative memory (28%) than a positive one (14%) for their first self-defining memory, but only in the sad mood condition. Reduced power very likely prevented this difference from reaching statistical significance. Of course, the absence of a significant difference limits the conclusions that can be drawn from the data, but the means nonetheless suggest that

having a history of depression could elevate the likelihood that self-defining memories recalled in a sad mood will be negative. If this were the case, it would accord with predictions made by Teasdale's model and be suggestive of a mood-congruent tendency among individuals with a history of depression. Alternatively, it is possible that after participants initially recalled one (or more) negative self-defining memories, they intentionally retrieved a positive memory as a way to improve their mood. The recall of positive memories is an effective way to improve mood (e.g., Joormann & Siemer, 2004), and at least one study has found that many individuals intentionally recruit positive memories after having recalled a negative memory as a way to make themselves feel better (Josephson et al., 1996). Anecdotal evidence (i.e., comments made by some participants during the debriefing) suggests this strategy was indeed adopted by at least some of the individuals who took part in this study.

One methodological issue that warrants consideration is that the self-defining memory task was employed in order to overcome some of the problems associated with the word-cue paradigm. While the self-defining memory task successfully elicited personally-important memories, the task may have caused participants to recall memories that were high on the dimensions of interest. In this way, the phenomenological features of the memories recalled could have been an artefact of the task. It is possible that the groups were so close to ceiling in their feature ratings that there may not have been enough variability to detect any differences. To address this issue, future studies should use a range of memory elicitation procedures to examine memory content and features, such as the idiographic memory task (Rottenberg, Joormann, Brozovich, & Gotlib, 2005) and script-driven imagery procedures (Dunn, 2010).

From a clinical perspective, the results of Study 3 suggest that the features of the self-defining memories recalled by recovered depressed individuals in a sad mood are important to consider. Given that the possibility of mood contamination as a result of carry-over effects associated with recalling multiple memories of different valences, the results drawn from the first memory recalled are likely to be the most valid. Accordingly, the finding that individuals who had recovered from depression recalled more vivid negative memories and less emotionally intense positive memories after a sad mood induction raises the possibility that particular memory features have adverse downstream effects on mood. That is, if mild experiences of low mood activate memories that possess specific features which serve to increase the intensity of negative memories, or dampen the intensity of positive memories, it is likely that problematic affective consequences would follow.

In sum, Study 3 examined whether there were differences in the valence and phenomenological features of the personally important memories recalled by recovered depressed and never-depressed individuals in a sad and neutral mood. When all five memories were examined together, the valence and characteristics of the self-defining memories did not differ as a function of both mood condition and depressive history. When the first memory was examined alone, recovered depressed participants recalled more vivid negative memories and less emotionally intense positive memories, but only while they were in a sad mood. This suggests that having experienced depression in the past has implications for the way in which personally-significant memories are recalled, which depends on current mood.

It is important to note that Studies 1, 2 and 3 yielded inconsistent patterns of between-group memory differences in sad mood, possibly due to methodological factors. Although the findings prompt tentative conclusions about differences in the

features of memories recalled in sad as compared to a neutral mood by recovered and never-depressed individuals, replication is needed before definitive conclusions can be drawn. However, based on the findings of the first three studies of this thesis, and by extrapolating from the intrusive memory and mood repair literature, it is expected that the process/es by which personally important memories are recalled would have implications for emotion and the ability to regulate emotion. One process likely to be involved is rumination – a type of repetitive thinking known to maintain depressive pathology (e.g., Nolen-Hoeksema, 2000). The possible involvement of ruminative thinking in the effects of autobiographical memory recall on emotion will be experimentally addressed in the next three studies.

CHAPTER 4: Positive Memory Recall and the Consequences of Manipulating Processing Mode for Mood

General Introduction

Depressive disorders are characterised by difficulties in regulating emotion. As discussed in Chapter 1, Teasdale's DAH (Teasdale, 1988) suggests that individuals who experience depression differ from their never-depressed counterparts in their ability to regulate and recover from sad mood. This difference is proposed to be responsible for the escalation of sad mood into an episode of depression. That is, the way in which an individual responds to their sad moods has profound implications for whether they will recover from it, or whether a toxic cycle of negative thinking and low mood will become established, eventually leading to clinical depression. Further, the model asserts that individuals who are vulnerable to depression are more likely to respond to negative affect in a maladaptive way.

As briefly discussed in Chapter 1, there is a growing evidence base showing that depressed individuals (Campbell-Sills et al., 2006) as well as individuals who have recovered from an episode of depression (Ehring et al., 2010) tend to use less adaptive and more maladaptive strategies to regulate their emotions than individuals who have never been depressed. Moreover, a recent study found that the use of maladaptive responses to sad mood distinguished depressed and recovered depressed individuals from their never-depressed counterparts (Kovacs, Rottenberg, & George, 2009). In a critical extension of this finding, the use of dysfunctional emotion regulation strategies was found not only to relate to depressive symptoms, but also to predict the recurrence of depressive episodes over a one year follow-up period (Kovacs et al., 2009). These longitudinal findings provide compelling evidence that a maladaptive response to sad mood in depressed and recovered depressed individuals may be a cognitive risk factor for recurrence. Accordingly, there has been some suggestion in the literature that ineffective responses to sad mood may represent a trait-like feature among individuals with depression, rather than being symptomatic of an acute depressive episode (Joormann et al., 2007; Kovacs et al., 2009).

In light of these findings, it is clear that if depression is to be more effectively treated and possibly even prevented in some cases, research into specific ways of responding to sad mood that may facilitate or impede recovery is needed. Experimental studies are necessary as an initial first step in providing a platform to investigate the effectiveness of strategies designed to attenuate sad mood, with a view to eventually incorporate these strategies into existing psychological therapies. To date, three types of emotion regulation strategies have been empirically examined in the context of depression: distraction, rumination and positive memory recall. The contribution of

rumination and positive memory recall to emotion regulation have both been subject to recent empirical evaluation and warrant further consideration.

It is widely accepted that rumination is a core cognitive process associated with depression and involves repetitive thinking about the causes, meanings and consequences of depressive symptoms and their correlates (Nolen-Hoeksema, 1991). Rumination has been implicated in the onset, maintenance, exacerbation and course of depression (for review, see Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Despite substantial evidence attesting to the detrimental effects of rumination, there has been some suggestion that it is not rumination per se that has adverse consequences for sad mood, but rather it is the mode of processing adopted during rumination that determines whether the outcome will be negative (Watkins, 2008). As outlined in Chapter 1 of this thesis, there is now evidence suggesting that focusing on material in an abstract or general way (i.e., characterised by "why" questions) leads to unfavourable outcomes, while processing information in a more concrete way (i.e., focusing on moment-to moment experiences) leads to more adaptive outcomes. For example, relative to a concrete processing mode, inducing an abstract mode of processing is associated with greater overgeneral memory recall (Watkins & Teasdale, 2004), the activation of global negative self-judgments (Rimes & Watkins, 2005) and poorer social problem solving ability (Watkins & Moulds, 2005). These studies illustrate that responding to sad mood with a ruminative response in and of itself is not problematic. Rather, it is the mode of processing which is adopted during rumination that determines the consequence.

The recall of positive autobiographical memories has also been investigated as a mood regulation strategy. As mentioned, while for healthy individuals positive memories improve mood, for dysphoric, recovered depressed and currently depressed individuals they do not (Joormann & Siemer, 2004; Joormann et al., 2007; Josephson et

al., 1996). Notably, for individuals who have previously been depressed, mood is unchanged by positive memory recall. Of even greater concern is the finding that for depressed individuals, mood actually worsens after recalling a positive memory. The mechanism/s responsible for this effect remain unknown, although there has been speculation that positive memory recall may induce maladaptive ruminative processes, which prevent the emotional impact of this positive material on mood (Joormann et al., 2007). There is theoretical reason to expect that this might be the case, with seminal models of ruminative thought suggesting that discrepancies between ideal and actual states underlie rumination (Martin & Tesser, 1996). Specifically, it has been suggested that ruminative processing is prompted by difficulties in goal achievement - a claim that has been substantiated experimentally in work that has illustrated elevated rumination levels when individuals do not attain their goals (Moberly & Watkins, 2010). From this perspective then, positive memory recall would likely draw attention to the discrepancy between an individual's current low mood to past, happier times. If it is assumed that in general, individuals aim to experience positive mood, the recall of a positive memory during low mood would draw attention to the failure in achieving this goal and in turn prompt a ruminative response. This explanation may very well account for the finding depressed and recovered depressed individuals did not experience emotional benefits following positive memory recall in the Joormann et al. (2007) study.

The above-reviewed evidence suggests that distinct functional outcomes follow rumination depending on the mode of processing adopted, which is consistent with the possibility that a ruminative mechanism is responsible for preventing positive memories from improving mood in depression. Accordingly, the studies reported in this chapter were designed to empirically address this issue. Specifically, the goal of Studies 4 and 5 was to investigate whether the mode of processing adopted during the recall of a

positive memory influences the memory's affective impact. It could be the case that depressed and recovered depressed individuals have a natural propensity to process their positive memories in an abstract way while they are in a sad mood, which may reduce their emotional impact. In contrast, adopting a concrete processing mode may be more adaptive by prompting vivid and detailed processing of positive memory, which may have beneficial emotional effects for mood.

Research from the social cognition literature provides good reason to expect that processing mode may very well be responsible for moderating the effects of positive memory recall on mood. A potentially useful framework with which to account for the differential emotional consequences that follow from making mental simulation-based comparisons is the Reflection and Evaluation Model proposed by Markman and McMullen (2003). According to this model, the operation of two distinct psychological modes of thinking (evaluation and reflection) determine whether the emotional consequence of making a mental comparison will be that of assimilation (i.e., towards the target) or affective contrast (i.e., away from the target). The 'evaluation' mode is characterised by using the focus of the comparison as a reference point from which to evaluate one's present standing. Conversely, the 'reflection' mode is experiential in nature and involves vividly imagining information about the target being compared to, and incorporating this information into a view of oneself. Importantly, the evaluation mode leads to an affective contrast effect while the reflection mode results in affective assimilation. Interestingly, these 'evaluation' and 'reflection' modes are conceptually similar to 'abstract' and 'concrete' processing modes, respectively. This parallel provides a basis for explaining why each mode produces distinct emotional consequences following positive memory recall. That is, the evaluative or abstract mode involves focusing on the positive memory as a reference point from which to compare

the individual's actual low mood state. It is in this way that thinking in an evaluative, abstract, and ruminative mode could reduce the direct, sensory and concrete details of the memory being processed. Instead, focusing on the discrepancy between the actual low mood and past happy times (as outlined by the model) would maintain or intensify low mood. On the other hand, the reflection or concrete mode involves generating vivid mental details and reliving the memory more directly, thereby improving mood.

Another line of research from the imagery literature provides additional support for the idea that distinct affective consequences follow according to the way in which emotional material is processed. For example, in a study that examined the effects of visual imagery on mood, healthy volunteers who imagined positive events experienced improved mood, while those who processed these same positive events verbally did not (Holmes, Lang, & Shah, 2009). That is, imagining positive events had greater emotional benefits than thinking about the meanings of those same events (Holmes et al., 2009). Similarly, a study with depressed individuals designed to train a positive interpretation bias found that those who engaged with the training material in an imaged-based way were successful in deriving emotional benefit from the training, while those who processed the material verbally were not (Blackwell & Holmes, 2010). One possible account of these findings is to consider the overlap between generating imagery and adopting a concrete processing mode. Imagery has perceptual correspondence to direct sensory experience (Kosslyn, Ganis, & Thompson, 2001) which is not dissimilar to a moment-by-moment, concrete mode of processing (e.g., Watkins, 2004). In contrast, thinking about something verbally and focusing on its meaning could be akin to an abstract processing mode (Holmes et al., 2009). While these imagery studies did not address memory directly, they nonetheless illustrate that the way that positive material is processed has important implications for the affective consequences that follow.

To summarise, the findings of research from several domains is consistent with the suggestion that the difficulty experienced by depressed and recovered depressed individuals in regulating their sad mood by recalling positive memories could be due to the adoption of an abstract, ruminative processing mode during memory recall. However, this hypothesis has not yet been tested. It was the goal of Studies 4 and 5 to address this empirically. Guided by findings from the social cognition, rumination and imagery literatures, it was expected that an abstract mode of processing would lead to unchanged or worsened mood in depressed and recovered depressed individuals, while a concrete mode would facilitate mood improvement. To examine the generalisability of the effect, one study was conducted in which processing mode was manipulated immediately after positive memory recall (Study 4), while in the other (Study 5), processing mode was manipulated before memory recall.

Study 4 – Effects of Manipulating Processing Mode After Positive Memory Recall on Mood

Aims

The aim of Study 4 was to investigate whether adopting an abstract processing mode is a mechanism that contributes to the absence of mood improvement following positive memory recall in depressed and recovered depressed individuals. Depressed and formerly depressed individuals comprised the sample in this study because the mood regulation deficits evident in previous studies are specific to these two groups (Joormann et al., 2007). It was therefore not necessary to include a never-depressed control group to meaningfully address the research question. That is, a healthy control group was not needed in order to examine processing mode as a possible mechanism

contributing to the difficulty in using positive memory to improve mood by recovered and depressed participants.

Hypotheses

Based on findings from the rumination and imagery literatures, it was hypothesised that inducing an abstract, ruminative mode of processing would hinder mood improvement, while participants who engaged in a concrete mode of processing would report improved mood after recalling a positive memory. Given the absence of research that has specifically examined the impact of processing mode during memory recall on subsequent mood, there was no clear hypothesis about whether the depressed group would differ from the recovered depressed group in their emotional response to positive memory recall. Specifically, it was predicted that following the recall of happy memories: (i) a concrete processing mode would lead to an improvement in mood and (ii) an abstract processing mode would lead to the maintenance or exacerbation of low mood.

Method

Design

A 2 (Diagnostic Group: currently depressed, recovered depressed) x 2 (Condition: abstract, concrete) design was employed.

Participants

Sixty-eight participants were recruited from the community through advertisements in newspapers and online in the careers section of these newspapers. Potential participants were contacted via telephone to be screened for suitability. Participants were required to be over the age of 18, fluent in English, and needed to

report experiencing at least a two week period of low mood or anhedonia at some stage in their lives in order to be invited into the laboratory for a more comprehensive interview. To determine depression status and history, participants were administered the Mood Module of the SCID-IV. The final sample consisted of 68 individuals and all participants were reimbursed ($AUD20/hour) for taking part in the study.

Materials and Measures

Previously Used Measures. The BDI-II and LEIDS-R were used exactly as described in Chapter 2.

Ruminative Response Scale (RRS) of the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991). The RRS is a 22-item self-report measure which indexes the tendency to ruminate in response to sad mood. A measure of ruminative thinking was included to ensure that the results could not be attributed to a difference in trait-rumination. The RRS includes items that are self-focused, symptom-focused and focused on the possible causes and consequences of associated with mood. The RRS has strong psychometric properties (Nolen-Hoeksema & Morrow, 1991).

Mood Induction. Mood was induced in recovered depressed participants using a 10-minute video clip. Replicating Joormann et al. (2007), a clip from "Dead Poets Society" showing a suicide scene was used and participants were instructed to imagine how they might feel if they were in the situation shown in the film. Again, replicating Joormann et al. (2007), depressed individuals were not administered the sad mood induction for ethical reasons and also because they were already (by definition) in a state of low mood. Therefore, a neutral clip that depicted a nature scene that has been used previously was selected (Joormann et al., 2007). As discussed below, these inductions produced comparable mood ratings for the recovered and currently depressed groups.

Mood Rating Scale. Participants completed a mood rating scale on three occasions during the study: prior to (time 1) and following (time 2) the mood induction, and after the memory processing induction (time 3). Participants were instructed to rate on a 9-point Likert scale how they were feeling at the time, where 1 = *not at all* and 9 = *very* on dimensions of 'sad', 'bad', and 'happy', with extra items such as 'distracted' and 'excited' interspersed throughout in order to mask the study's focus on mood. Following the methods used by Joormann and colleagues (2007), sad mood ratings alone, as well as an aggregate mood score that combined sad, bad, and reverse-scored happy items provided the dependent variables of interest. The internal consistency of the aggregated scale was very good for each of the three time points (α = .89, .81, and .80, for times 1, 2, 3, respectively).

In order to examine the effectiveness of positive memories in improving mood, participants' mood needed to be manipulated successfully by the film-clip. Accordingly, it was stipulated a-priori that following the mood induction, participants needed to have post-induction sad mood ratings of at least 3 out of 9, where 1 = *not at all* and 9 = *very*[4]. Accordingly, eight depressed participants were excluded from the analysis and the final sample consisted of 60 participants (31 recovered and 29 currently depressed).

Autobiographical Memory Recall Task. Replicating the study by Joormann et al. (2007), participants were instructed to think back to their high school years and recall a single specific positive event that had occurred during that time. Once they had retrieved a memory of an event that made them feel happy at the time that it had

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[4] This was decided for a number of reasons. First, the question of interest was to examine the utility of positive autobiographical memory as a strategy to improve sad mood. Therefore, it was necessary that participants actually be in a sad mood state, and a rating of 1 or 2 suggested otherwise. Second, anecdotal evidence from currently depressed individuals suggested that many of them actually enjoyed the film-clip that depicted nature scenes, and reported that it had a calming effect on their mood. Notably, only participants from the currently depressed group reported sad mood scores of 1 or 2 on the sad mood rating scale, and for each individual who did so, their rating reflected an improvement in mood as a result of the mood induction.

occurred, they were instructed to describe the memory in a few sentences. Participants

then rated on a 9-point scale the valence and vividness of their memory. A 9-point scale

(rather than the previously used 5-point scale) was used to assess memory features for

two reasons: first, so that the scale would be consistent with the mood ratings that

participants were required to report immediately before rating memory features, and

second, because it offers the additional benefit of being a more sensitive measure than

the previously used 5-point scale employed by the MEQ.

Processing Induction. The memory processing induction was adapted from the

procedure used by Watkins, Moberly, and Moulds (2008) to train concrete and abstract

processing modes. In both conditions, participants were instructed to read through a list

of ten items at their own pace for five minutes (for details, see Appendix A). In the

abstract condition, participants were prompted to think about their memory and consider

the *"causes, meanings and consequences of what happened"*, while in the concrete

condition they were asked to *"play the scene over in your head like you are replaying a*

movie of how the event unfolded". A manipulation check item was included following

the completion of the task (see Appendix B).

SCID-IV – Mood Module (First et al., 1996). The SCID-IV was to determine the

presence of past and current MDE. Of the 68 individuals interviewed using the SCID-

IV, 37 met criteria for current MDE, while 31 met criteria for a past MDE. Participants

were included in the current MDE group if they met DSM-IV criteria for a current

depressive episode. For inclusion in the recovered MDE group, participants needed to

have met DSM-IV criteria for a past major depressive episode with their most recent

MDE ending at least one month prior to the assessment. To obtain an estimate of inter-

rater reliability, the mood module was re-administered to 15% of participants in a

separate interview that was conducted within two weeks of the initial interview by a

fully qualified Clinical Psychologist. The estimate of inter-rater reliability was .76. The two assessors recorded a discrepant diagnosis for one of the participants who received a diagnosis of recovered MDD on initial interview, and current MDD on second interview. Notably, these diagnoses were consistent with the participants' self-reported increase in depressive symptoms on the BDI-II. It appears that this individual had relapsed into an MDE within the two weeks of delay between the two interviews. After removing this participant from the inter-rater reliability analysis, there was complete agreement between the two interviewers in diagnostic assessments.

Procedure

Participants were informed that this was a study examining the relationship between imagination, mood and memory, and how they relate to individual thinking styles. The study was framed in a similar way to Joormann et al. (2007) 's study, such that the experimenter took care to disguise the study's focus on mood. After providing informed consent, participants were administered the mood module of the SCID-IV. They then completed the questionnaire package that included demographic information, the baseline mood rating scale, LEIDS-R, RRS and BDI-II. Next, participants were told that they would be performing an imagination exercise which involved watching the relevant film-clip and to imagine how they might feel if they were in that situation. They then completed the second mood rating scale with items interspersed with questions about the film content. Participants were then told they would be doing the memory task, which required them to recall and describe one positive autobiographical memory from their high school years, and make ratings of memory valence and vividness. They were then randomly allocated to either the abstract or concrete condition and instructed to complete the 'thinking styles' component of the study which required them to work through the relevant memory processing induction. The

importance of remaining focused on their memory and following the prompts was emphasised. Participants then completed the final mood rating scale and manipulation checks, and were then thanked for their time and fully debriefed.

Results

Participant Characteristics

Demographic information and sample characteristics are presented in Table 4.1. The recovered and currently depressed participants did not differ in terms of age, cognitive reactivity or trait rumination. However, as expected, the currently depressed group reported more depressive symptoms than the remitted group, $t(58) = 6.79$, $p < .05$.

Table 4.1

Participant Characteristics and Self-Report Measures

	Currently depressed $n = 29$	Recovered depressed $n = 31$
Gender (% female)	52.0	67.0
Age	32.78 (2.48)	34.59 (2.86)
Marital Status (% single)	76.0	75.0
Educational History (% completed school)	86.0	97.0
Employment Status (% unemployed)	48.0	52.0
Ethnicity (% of sample)		
Caucasian	62.0	65.0
Asian	21.0	16.0
Other	17.0	19.0
LEIDS-R	97.38 (2.90)	90.29 (2.49)
RRS	59.80 (2.18)	54.53 (2.11)
BDI-II	29.90 (1.86)	14.06 (1.43)
Number of previous episodes	5.62 (1.28)	3.94 (0.56)
Current Antidepressant Treatment (%)	35.0	19.0
Current Psychological Treatment (%)	28.0	29.0

Note. Values refer to mean (and standard deviation) scores unless stated as a percentage. LEIDS-R = Leiden Index of Depression Sensitivity – Revised; RRS = Rumination Response Scale; BDI-II = Beck Depression Inventory-II.

Baseline Mood

Means and standard deviation for sad and happy mood ratings are presented in Table 4.2. There were no between-condition differences at baseline, such that those assigned to the concrete/abstract processing mode conditions reported comparable levels of sadness, $t (58) = .58$, $p > .05$, and happiness, $t (58) = .00$, $p > .05$. However, there was a between-group difference in mood ratings at baseline such that depressed participants reported more sadness, $t (58) = 5.23$, $p < .05$, and less happiness, $t (58) =$

5.77, $p < .05$, than recovered depressed participants. Importantly, the groups did not differ following the mood induction in sadness, $t (58) = -1.87$, $p > .05$, or happiness, $t (58) = -.41$, $p > .05$.

Mood Induction

To determine whether the mood induction had the intended effect, a 2 (Diagnostic Group: currently depressed, formerly depressed) x 2 (Condition: abstract, concrete) x 2 (Time: baseline, post-induction) mixed-model ANOVA with repeated measures on the third factor was conducted with sad mood ratings as the dependent variable. There was no main effect of condition, $F (1, 56) = 1.06$, $p > .05$, no time x condition interaction, $F (1, 56) =.18$, $p > .05$, and no time x diagnostic group x task interaction, $F (1, 56) =.00$, $p > .05$. However, there was a main effect of time, $F (1, 56) = 4.70$, $p < .05$, a main effect of diagnostic group, $F (1, 56) = 6.15$, $p < .05$, and a time x diagnostic group interaction, $F (1, 56) = 29.93$, $p < .05$. To deconstruct the time x group interaction, follow-up paired samples t-tests were conducted and showed that participants who had recovered from depression reported increased sad mood in response to the sad mood induction, $t (30) = -5.38$, $p < .05$, while those who were currently depressed exhibited a minor improvement in mood in response to the neutral mood induction, $t (28) = 3.42$, $p < .05$. This indicates that following the mood induction, the sad mood group reported elevated ratings of sad mood as intended, while for depressed participants, mood improved (See Figure 4.1). As this improvement in mood was not expected, an independent samples t-test between the diagnostic groups following the induction procedure was conducted in order to check whether the mood ratings differed; importantly, they did not, $t (58) = -1.86$, $p > .05$. Therefore, despite the mood improvement reported by currently depressed individuals in response to the

neutral mood induction, this group remained sufficiently sad so as to be comparable in

mood to recovered depressed individuals following the sad mood induction.
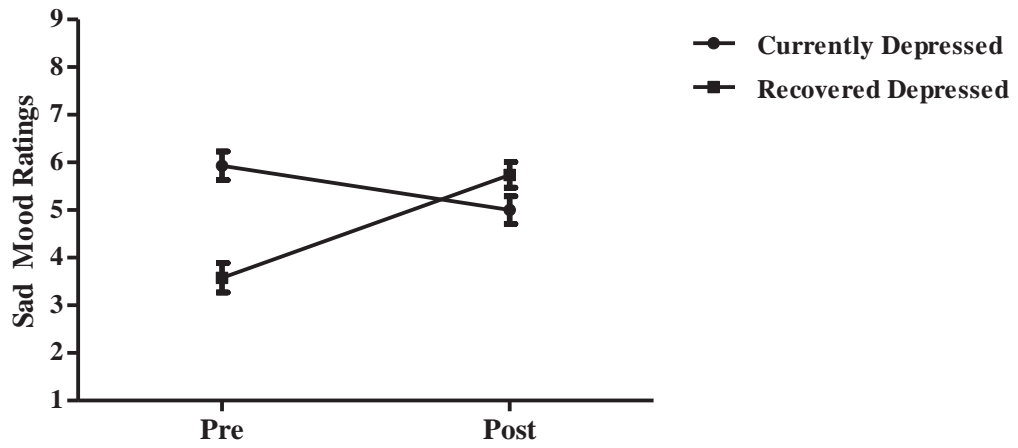
Figure 4.1 Mean and standard error for sad mood ratings prior to, and following, the film clip mood induction.

Table 4.2

Mood Ratings and Positive Memory Characteristics

	Depressed (n = 29)		Recovered (n = 31)	
	Abstract (n = 15)	Concrete (n = 14)	Abstract (n = 15)	Concrete (n = 16)
Sad Mood Ratings				
Time 1	5.86 (1.77)	6.00 (1.47)	3.68 (1.92)	3.31 (1.82)
Time 2	5.06 (1.91)	4.93 (1.14)	4.93 (1.15)	5.38 (1.26)
Time 3	5.66 (2.19)	3.42 (1.65)	4.26 (1.98)	2.43 (0.96)
Happy Mood Ratings				
Time 1	2.66 (1.40)	2.14 (0.86)	5.13 (1.60)	5.29 (1.86)
Time 2	3.33 (2.19)	3.64 (1.95)	3.33 (1.67)	4.00 (1.55)
Time 3	3.00 (1.65)	4.57 (1.95)	5.13 (1.77)	6.00 (1.67)
Memory Quality				
Valence	7.86 (1.46)	8.35 (1.15)	8.40 (0.74)	8.37 (0.62)
Vividness	7.20 (1.74)	7.71 (1.54)	7.53 (1.19)	7.00 (1.75)

Note. Values refer to mean (and standard deviation) scores. Time 1 = Mood at baseline; Time 2 = Mood after the mood induction film clip; Time 3 = Mood after the memory processing task.

Memory Characteristics

To ensure that the groups were matched in terms of the positive memories they recalled, self-reported ratings of positivity and vividness were compared (see Table 4.2 for descriptive information). The average rated positivity of the autobiographical memories was high and there were no differences in positive ratings between diagnostic groups, $F(1, 56) = 1.06$, $p > .05$, or conditions, $F(1, 56) = .75$, $p > .05$, and there was no diagnostic group x condition interaction, $F(1, 56) = .92$, $p > .05$. Memories that were recalled were also highly vivid, and there were no differences in vividness ratings between diagnostic groups, $F(1, 56) = .22$, $p > .05$, conditions, $F(1, 56) = .00$, $p > .05$, and no group x condition interaction, $F(1, 56) = 1.66$, $p > .05$. To evaluate memory specificity, memories were defined as specific if they contained events that occurred at a particular place and time, and lasted for less than one day (Williams & Broadbent, 1986). All memories were rated by one rater (AW-S)[5]. The proportion of specific memories reported by the sample was high (87%) and there were no differences in specificity between the depressed and recovered depressed groups, $F(1, 56) = .01$, $p > .05$, nor between the abstract or concrete conditions, $F(1, 56) = .00$, $p > .05$, and there was no interaction, $F(1, 56) = 2.57$, $p > .05$. Together, these analyses show that the memories recalled by remitted and depressed participants did not differ in valence, vividness or specificity.

Mode of Processing

To ensure that the processing mode manipulation had the intended effect, a 2 (Diagnostic Group: currently depressed, recovered depressed) x 2 (Condition: abstract,

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[5] To obtain an estimate of inter-rater reliability, an additional independent rater with extensive experience with memory specificity guidelines re-rated 50% of the memories. There was perfect agreement between the two assessors.

concrete) ANOVA with ratings of abstract/concrete thinking as the dependent variable

was conducted. There was no main effect of diagnostic group, F (1, 56) = 0.39, $p > .05$,

and no group x condition interaction, F (1, 56) = 1.37, $p > .05$, but importantly, there

was a main effect of condition, F (1, 56) = 14.18, $p < .05$. As intended, and regardless

of depressive status, participants who were allocated to the abstract processing task

reported thinking in a more abstract and less concrete way ($M = 6.73$, $SE = 0.34$) than

those allocated to the concrete processing condition ($M = 4.92$, $SE = 0.34$).

To examine the effect of processing mode on mood, a 2 (Diagnostic Group:

currently depressed, recovered depressed) x 2 (Condition: abstract, concrete) x 2 (Time:

after mood induction, after processing task) mixed-model ANOVA was conducted with

repeated measures on the third factor and sad mood ratings as the dependent variable.

There was a main effect of time, F (1, 56) = 31.31, $p < .05$, and condition, F (1, 56) =

13.16, $p < .05$, but no main effect of diagnostic group, F (1, 56) = .41, $p > .05$. The

analysis also yielded a time x group interaction, F (1, 56) = 14.66, $p < .05$, and a time x

condition interaction, F (1, 56) = 9.68, $p < .05$, but no group x condition interaction, F

(1, 56) = .02, $p > .05$, nor a time x group x condition interaction, F (1, 56) = 1.02, $p >$

.05. To deconstruct the time x diagnostic group interaction, follow-up paired samples t-

tests were conducted. Results indicated that when mode of processing was collapsed

across groups, currently depressed individuals did not show a change in sad mood

ratings following the processing induction, t (28) = .97, $p > .05$, while for formerly

depressed individuals, mood improved, t (30) = 6.99, $p < .05$. To deconstruct the time x

condition interaction, follow-up paired samples t-tests showed that, as predicted,

individuals instructed to focus on the concrete, sensory aspects of their positive

memories showed an improvement in mood as a result of the task, t (29) = 7.39, $p < .05$,

while for those instructed to process their positive memories abstractly, mood did not

change, t (29) = 1.33, p > .05 (See Figure 4.2). In keeping with the analytic approach

taken by Joormann et al. (2007), an analysis was conducted using an aggregate of sad,

bad and reverse-scored happy items. The same pattern of results was obtained, including

the critical time x condition interaction, F (1, 56) = 9.55, p < .05. Follow-up t-tests

supported the same interpretation as for sad mood ratings alone – that individuals who

processed their positive memories in a concrete way experienced improved mood, t (29)

= 3.03, p < .05, while for those in the abstract processing condition mood did not

change, t (29) = .27, p > .05. In summary, individuals who were instructed to focus on

the concrete, sensory aspects of their positive autobiographical memories benefitted

emotionally irrespective of depressive status, while the abstract processing of positive

memories did not improve mood.
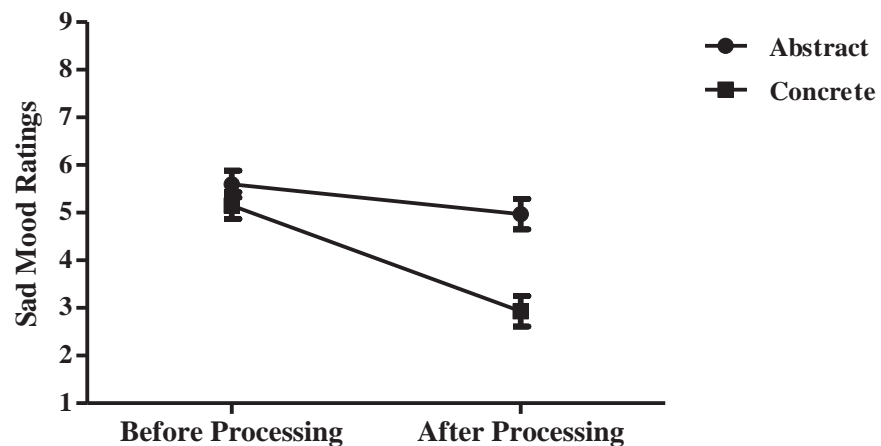
Figure 4.2 Mean and standard error for sad mood ratings prior to, and following, the memory processing mode task.

Discussion

It was predicted that: (i) a concrete processing mode would result in an

improvement in mood following positive memory recall, and (ii) an abstract processing

mode would maintain or exacerbate low mood. The results of Study 4 support both of

these hypotheses. Abstract processing of positive memories was shown to be

maladaptive in that it did not facilitate recovery from low mood. Conversely, concrete

processing enabled depressed and recovered depressed individuals to derive emotional benefit from the recall of happy memories - an effect observed among healthy volunteers in previous work (e.g., Joormann et al., 2007). That is, the processing mode inductions that either improved (concrete) or maintained (abstract) low mood had the same consequences for mood, regardless of whether participants were depressed or had recovered from depression.

The finding that an abstract processing mode may hinder mood improvement fits with the considerable literature highlighting the adverse consequences of abstract rumination (e.g., Watkins & Moulds, 2005). The results reported in Study 4 represent a unique extension of knowledge in this area by identifying that abstract processing may be involved in preventing depressed and formerly depressed individuals from effectively using positive memory recall to improve mood. This evidence that an abstract processing mode exacerbates (or at the very least maintains) low mood supports the notion that a ruminative cycle of thought is a likely candidate for preventing mood improvement among individuals who experience depression.

The findings of Study 4 represent the first demonstration that distinct affective consequences follow as a result of manipulating processing mode during positive memory recall. As the initial finding of this nature, it was the goal of the next study to examine the circumstances under which this effect could be produced. That is, in an attempt to test the robustness and generalisability of the effects of manipulating processing mode on mood, Study 5 examined whether processing mode could be induced before (rather than after) positive memory recall, and still produce similar effects on mood. This is also of interest from a treatment perspective because if adopting a concrete processing mode is found to enable those with depressive disorders to gain benefits from the recall of positive memories, this would suggest that a concrete

processing mode training procedure could serve a protective function against later mood deterioration.

Study 5 - Effects of Manipulating Processing Mode Prior to Positive Memory Recall on Mood

Study 4 illustrated that inducing a concrete processing mode following positive memory recall reduced sad mood in depressed and recovered depressed individuals, while an abstract processing mode maintained it. The objective of Study 5 was to examine whether inducing a specific processing mode prior to positive memory recall would have distinct consequences for sad mood. Clinically, if inducing a concrete processing mode can enable individuals who usually do not derive emotional benefits from positive memory recall (i.e., recovered and depressed individuals) to do so, this could protect against the sad mood that typically follows positive memory recall. This proposal aligns with the idea of a "cognitive vaccine" put forward by Holmes and colleagues (e.g., Holmes et al., 2009); that is, inducing a process that enhances an individual's resistance against a subsequent emotional challenge. The possibility of inducing a concrete processing mode to inoculate vulnerable individuals against subsequent negative emotional outcomes is promising in that it suggests that processing mode may be a useful treatment target.

Of relevance is that a processing mode training procedure was recently developed and found to have demonstrable effects on a subsequent task (Watkins et al., 2008). This training procedure involved instructing participants to attend to thirty scenarios (half positive, half negative), spending one minute on each. The scenarios that were presented to participants in the abstract and concrete conditions were identical. An example of a positive scenario was: *"You go for a job interview. You are well prepared and able to answer the questions competently. The interview panel is*

friendly and encouraging, and you leave feeling very confident that you had performed well enough to secure the position." While participants in both conditions received the same scenarios, the instructions that were provided in the two conditions were specific to the processing mode to be induced (i.e., either abstract or concrete). To elaborate, participants were oriented to focus on *"why it happened, and to analyse the causes, meanings, and implications"* in the abstract condition, while in the concrete condition they were asked to focus on *"how it happened, and to imagine a movie of how this event unfolded"* (See Appendix C for full scenario descriptions and instructions). In three experiments, participants who were trained in the concrete processing mode were less emotionally reactive to a subsequent failure experience than those who were trained in a ruminative, abstract processing mode (Watkins et al., 2008). That is, participants who focused on the series of scenarios while adopting an abstract processing mode showed greater reactivity to a subsequent stressor than participants who focused on these same scenarios but adopted a concrete processing mode. The finding of these experiments illustrate that processing mode has a causal effect on subsequent emotional responding.

The aim of Study 5 was to examine whether this training procedure could be used to manipulate processing mode and produce the same outcome as in Study 4; i.e., that an abstract processing mode would prevent mood improvement following positive memory recall, while a concrete processing mode would facilitate it. This is an important research question; if the findings are consistent with those yielded by Study 4, this would suggest that prior training may enhance an individual's ability to recover from subsequent shifts in mood. Not only would such an outcome be theoretically informative, it would also be potentially clinically valuable because the procedure is a relatively low-resource way to train individuals with depression to use positive

memories to improve mood. To elaborate, processing mode training procedures can be administered by computer (e.g., Watkins, Baeyens, & Read, 2009) and would therefore offer a straightforward, cost-effective way of manipulating processing mode in a clinical context. In light of the growing recognition of the effectiveness of Cognitive Bias Modification procedures (CBM; to be discussed further in the General Discussion), the current processing mode training has marked similarities to these computer-based procedures. At the very least, this kind of intervention warrants experimental attention in order to identify whether these procedures might have utility in assisting depressed individuals to regulate their sad mood.

An important change that was made for Study 5 was that never-depressed and recovered depressed samples were examined (rather than a depressed and a recovered depressed sample, as used in Study 4). This decision was made primarily for practical reasons, but also because from a theoretical perspective, differences in the effect of processing mode on mood between the recovered depressed and depressed participants in Study 4 were not detected. Therefore, it was reasoned that a recovered depressed group would serve as the clinical group against which to compare a more easily recruited never-depressed sample. Of course, this has implications for the clinical and theoretical conclusions that can be drawn from Study 5, but the inclusion of recovered and never-depressed groups nonetheless allows for the research question of interest (i.e., whether the processing mode inductions result in different emotional consequences of positive memory recall) to be tested.

Hypotheses

Based on findings from the literature showing that healthy individuals report improved mood following the recall of positive memories (e.g., Josephson et al., 1996), it was hypothesised that never-depressed participants in both the concrete and abstract

conditions would report improved mood after positive memory recall. However, based on the findings of Study 4, it was expected that recovered depressed participants who were allocated to the concrete processing mode training would experience an improvement in mood after recalling a positive memory, while those in the abstract training condition would not report any mood change.

Method

Design

A 2 (Condition: abstract, concrete) x 2 (History: never-depressed, recovered depressed) between-subjects design was used.

Participants

Sixty-nine undergraduates from The University of New South Wales participated in return for course credit. Following the initial recruitment phase, the sample of recovered depressed participants needed to be increased. Therefore, suitable individuals were identified by specifying that a history of depression as necessary for study inclusion, which was verified by administration of the SCID-IV. This method of recruiting formerly depressed individuals from an undergraduate sample has successfully been used previously both in the literature (e.g., Ehring et al., 2010) and in this thesis (e.g., Studies 1, 2, 3). Responses to the SCID-IV indicated that six participants met criteria for a current MDE, and these participants were excluded. The final sample therefore consisted of 60 participants (47 females, mean age = 19.40; SD = 2.46).

Materials and Measures

Previously Used Measures. The BDI-II and LEIDS-R were used exactly as described in Chapter 2. The RRS, Mood Rating Scale and sad mood induction were used exactly as described in Study 4.

Processing Mode Induction. The inductions used by Watkins et al. (2008) were adapted to induce either a concrete or abstract processing mode. Fifteen positive and fifteen negative scenarios that were each approximately three sentences in length were presented to participants via a computer screen in a counterbalanced order. The scenarios were identical to those used in the original procedure, except for minor modifications in order to make the scenarios appropriate to an Australian undergraduate sample (See Appendix D). All participants read through the 30 scenarios, and were instructed to spend one minute concentrating on each. In the abstract processing mode condition, participants were instructed to *"think about why it happened, and to analyse the causes, meanings, and implications of this event"*. In the concrete condition, participants were asked to *"focus on how it happened, and to imagine in your mind as vividly and concretely as possible a `movie' of how this event unfolded"*. This procedure has been shown to successfully induce distinct processing modes. The same manipulation check as used in Study 4 (See Appendix B) was included following the completion of the task to ensure that the processing mode induction had the intended effects.

Autobiographical Memory Recall Task. Participants were instructed to bring to mind a specific, positive memory that had occurred during their high school years and that had made them extremely happy at the time that it occurred. They were then asked to provide a written description of the memory in a few sentences and to spend three minutes focusing on their happy memory. This is the same memory task as that used in

Study 4, with two minor changes: (i) instructions were delivered via computer, and (ii) participants wrote down the content of their memories rather than describing them verbally.

SCID-IV – Mood Module (First et al., 1996). The mood module was administered to assess for the presence of current and/or previous MDEs. Six participants were excluded on the basis that they met criteria for a MDE at the time of testing. As in previous studies reported in this thesis, participants were included in the recovered depressed group if they had experienced a previous MDE but not within the most recent month prior to assessment ($n = 23$). For inclusion in the never-depressed group, participants needed to deny symptoms consistent with a diagnosis of a past or current MDE ($n = 40$).

Procedure

Participants were tested individually and the experiment was introduced as a study that was investigating mood, memory and imagination. Informed consent was provided and then participants completed the questionnaire package that included demographic information, LEIDS-R, RRS, BDI-II, and a baseline mood rating. They were then randomly allocated to either the concrete or the abstract processing mode training, which lasted for 30 minutes, followed by the manipulation check. Participants then watched the sad film clip, and then rated their mood. Finally, participants were asked to complete the positive memory recall task and to complete another mood rating scale. They were than thanked for their time and fully debriefed. The procedure took approximately one hour.

Results

Participant Characteristics

Demographic information and sample characteristics are presented in Table 5.1. The never-depressed and recovered depressed participants did not differ in terms of age or trait rumination. However, the recovered group reported more depressive symptoms, $t(61) = -2.06$, $p < .05$, and greater levels of cognitive reactivity, $t(61) = -2.17$, $p < .05$. Depressive symptoms and cognitive reactivity were included as a covariate in all subsequent analyses.

Table 4.3

Participant Characteristics and Self-Report Measures

	Never-Depressed $n = 40$	Recovered depressed $n = 23$
Gender (% female)	67.5	87.0
Age	19.27 (1.99)	19.91 (3.09)
LEIDS-R	85.52 (16.55)	94.43 (13.84)
RRS	51.35 (14.55)	54.52 (10.79)
BDI-II	8.5 (6.34)	12.34 (8.37)
Number of previous episodes	0	2.73 (1.98)
Current Psychological or Drug Treatment (%)	0	34

Note. Values refer to mean (and standard deviation) scores unless stated as a percentage. LEIDS-R = Leiden Index of Depression Sensitivity – Revised; RRS = Rumination Response Scale; BDI-II = Beck Depression Inventory-II.

Manipulation Checks

To ensure that the processing mode manipulation successfully induced distinct processing modes, a 2 (History: never-depressed, recovered depressed) x 2 (Condition: abstract, concrete) ANCOVA was conducted with ratings of abstract/concrete thinking as the dependent variable, controlling for BDI-II scores and LEIDS-R scores. There was

no main effect of history, $F(1, 57) = .26$, $p > .05$, no main effect of condition, $F(1, 57)$ $= 2.40$, $p > .05$, and no history x condition interaction, $F(1, 57) = 1.68$, $p > .05$. This indicates that contrary to predictions, individuals allocated to the abstract condition rated their thinking in the mid-range between concrete and abstract ($M = 4.50$, $SE = 0.32$), and that these ratings of abstractness did not differ from those reported by participants who were allocated to the concrete condition ($M = 4.03$, $SE = 0.42$)[6]. That is, regardless of condition and depressive history, participants allocated to the two experimental conditions did not differ in the extent to which they rated their thinking as abstract following the training procedure[7]. Therefore, in Study 5, processing mode training did not have the intended effect of inducing either a concrete or abstract processing mode. Accordingly, the conditions cannot be meaningfully compared, and the hypothesised differences as a function of processing mode cannot be examined. Thus, no further statistical analyses were carried out.

Discussion

The failure of the processing mode training to induce either an abstract or concrete mode as intended precludes the validity of discussing the effect of processing mode training on the affective impact of subsequently recalling a positive memory. That is, as distinct processing modes were not induced as intended, a conceptual consideration of the results can be presented. Therefore, the discussion that follows is limited to a consideration of possible factors that may have contributed to the unsuccessful processing mode training procedure.

It is likely that methodological differences between the study from which the induction was taken (i.e., Watkins et al., 2008) and the protocol employed in Study 5

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[6] A high score indicates an abstract processing mode.
[7] To test whether this manipulation was effective in the recovered depressed group, an additional analysis was conducted, but indicated an identical result, $F(1, 21) = 2.72$, $p > .05$.

accounts for why the processing mode training was not successful. There are two main differences that may have been responsible for the failure to induce distinct processing modes. The first is that the sample examined in Study 5 was made up entirely of undergraduates. It is possible that the younger participants in this study (mean age = 19.40) did not relate to the content of some of the scenarios (e.g., mortgage repayments, home renovations, work promotions). Perhaps the scenarios were more relevant to the community sample studied by Watkins et al. (2008), for whom the stimuli had been developed (mean age = 25.93). Furthermore, there may have been subtle cultural differences that may have made the stimuli less relevant to an Australian sample, as compared to the British sample examined in Watkins et al.'s study (as an example, one scenario centered around some evening pottery classes describing winning a prize for making a vase).

A second factor that may account for the discrepancy in training effectiveness is that the experimenter was not in the room with participants during the procedure. This departs from the procedure of all other studies presented in this thesis. This leaves unknown whether participants complied with the instructions to attend to the scenarios presented and whether they engaged in the training procedure as intended. If participants did not follow instructions to focus on the scenarios in the selected processing mode, this could account for the ineffectiveness of the induction. In the future, researchers should pilot test this training procedure to ensure cultural relevance of the items, and also ensure that the experimenter is present during the training as a way to increase the likelihood of adherence to instructions.

General Discussion

Two studies were conducted to investigate processing mode as a factor involved in the regulation of mood in individuals with depressive disorders. Specifically, Study 4

investigated the affective impact of manipulating processing mode following positive memory recall. For depressed and previously depressed individuals, recalling a positive memory and focusing on it in an abstract way did not change mood, while processing the same material in a concrete way improved mood. The goal of Study 5 was to examine whether training an abstract or concrete processing mode prior to memory recall would yield comparable effects on emotion. As the training procedure was not successful in inducing distinct modes of processing, no meaningful comparisons could be made between participants in the two conditions, and thus no conceptual considerations can be presented. Therefore, the remainder of this discussion will focus on the findings of Study 4.

Study 4 was the first (known) study that has explicitly examined the effect of processing mode on the emotional impact of positive memory recall in the context of depression. That said, Study 4 was a partial replication of the study conducted by Joormann et al. (2007), and parallels between the two studies warrant discussion. Consistent with the Joormann et al. (2007) results, the findings of Study 4 indicate that depressed and recovered depressed individuals did not experience improved mood after they had recalled a positive memory. The key difference between these studies is that in Study 4, this was only the case when participants recalled happy memories in a ruminative, abstract way. Although Joormann and colleagues did not include a processing mode manipulation, the consistency between the pattern of findings reported here for depressed and recovered depressed participants in the abstract condition, and Joormann's results for the clinical groups could reflect a natural propensity for depressed and recovered individuals to adopt a ruminative processing mode while in a low mood. Alternatively, the inverse could be true, such that adopting a concrete

processing mode may be necessary to enable positive memories to improve mood – something that depressed and formerly depressed individuals may not do spontaneously.

One important difference between the findings of the two studies was that Joormann et al. (2007) found that formerly depressed individuals reported unchanged mood following the memory recall task, but that depressed individuals showed a worsening of mood. In contrast, results from the current study did not indicate a difference in mood following memory recall as a function of depressive status. Instead, statistical analyses suggested that depressed and recovered depressed individuals reported comparable affective responses following positive memory recall (within each of the processing mode conditions). There are a number of likely reasons for this difference. First, the sample size of Study 4 was smaller than that employed by Joormann et al. (2007). Decreased power may have reduced the ability to detect a difference between these groups - a difference that may have been expected in the abstract processing mode condition. Although not statistically significant, an examination of means for the recovered and depressed groups within the abstract processing condition suggests that the depressed participants reported worse mood following the abstract processing induction than formerly depressed individuals (see Table 4.2). Second, the recovered depressed participants in Study 4 were more chronic than the recovered sample in the previous study (Joormann et al., 2007) in that they: (i) had experienced a greater number of depressive episodes and (ii) had higher levels of current symptoms (although not in a clinical range). Unlike the approach taken by Joormann and colleagues (Joormann et al., 2007), in Study 4 participants were not excluded based on the presence of sub-threshold residual symptoms because these symptoms are common in recovered groups and furthermore, have been found to predict recurrence (Judd et al., 2000). Therefore, given the orientation of this thesis on

depression and its recurrence, individuals with sub-threshold symptoms were included in an effort to maximise the generalisability of the findings.

In regard to concrete processing, the results of Study 4 indicated that a concrete processing mode enabled positive memory recall to have a reparative effect on mood for recovered depressed participants, and improved mood for depressed individuals. Previous findings have shown that distraction is effective in alleviating the deficit in mood regulation experienced by this sample (Joormann et al., 2007). It is conceivable that a concrete processing mode could (to a degree) function in a similar way to distraction in the sense that in both inductions the individual is instructed to focus *away* from the discrepancy between their current state and themselves at a previous, happier time. In this respect, processing a memory in a concrete way may serve the same function as distraction insomuch as participants are doing something that prevents them from making comparisons between their previous and current selves – the ruminative process that is proposed to contribute to the difficulty in improving mood using a positive memory. Alternatively, concrete processing could be emotionally beneficial because of the aforementioned features that it shares with imagery. Pairing highly sensory imagery with an emotionally-laden, personally relevant memory may have given participants the greatest chance possible of being able to capitalise on the mood reparative effects associated with positive memory recall among healthy individuals. Whether concrete processing is helpful due to features shared with imagery, or because it induces a processing mode antithetical to rumination, or indeed whether it is a combination of the two, will need to be clarified and empirically addressed in future research.

The results of Study 4 are also consistent with evidence from the imagery literature which suggests that focusing on the sensory aspects of positive material is

more emotionally powerful than verbal representations of the same events (Holmes et al., 2009). Interestingly, the potency of mental imagery for eliciting emotion has been well-documented and applies to both positive and negative material such that imagery elicits a stronger affective response than the verbal processing of the same material, irrespective of valence (for review, see Holmes & Mathews, 2010). If, as proposed previously, concrete processing is akin to mental imagery, and abstract is akin to verbal processing, the findings may have important consequences for the processing of material according to valence. In terms of positive memory, as the data reported here suggest, it would be clinically advantageous for depressed and formerly depressed individuals to adopt a concrete processing mode during positive memory recall as a way to derive emotional benefits. However, in the case of negative memory, it might be expected that a concrete processing mode may produce stronger emotional effects, which would result in an amplification of negative emotion in the short term, but more successful emotional processing in the long term. In any case, it is likely that flexibility in the application of processing mode as determined by contextual factors and the valence of material being processed will be important variables to consider in order to produce clinically beneficial outcomes (see Watkins, 2008).

The involvement of abstract, ruminative processing in maintaining low mood raises interesting questions about the role of rumination in relation to positive material. To date, research has almost exclusively focused on rumination in response to negative mood states, with a notable exception being the work by Johnson and colleagues. This group has argued that positive rumination, or the way in which an individual responds to positive affective states, could be of fundamental importance to understanding both depression and mania (Feldman, Joormann, & Johnson, 2008; Johnson, McKenzie, & McMurrich, 2008). Of relevance to the current discussion is the possibility that

rumination about positive autobiographical memories could reduce the emotional impact of the memory itself. For example, if an individual responds to a positive memory by thinking in a way that reduces the intensity or duration of the positive effects of the memory (a process labelled 'dampening' by Feldman et al., 2008) this would help explain the impairment in ability to use a positive memory as a way to improve mood. Accordingly, rumination in response to positive material warrants consideration because of its potential involvement in the regulation of emotion. This will be addressed more comprehensively in the General Discussion of this thesis.

The findings reported in this chapter suggest some important ways that existing therapeutic techniques used to treat depression could be improved. First, capitalising on treatments that promote concrete processing would appear to be particularly advantageous. One study recently found that training individuals to think more concretely about emotional events resulted in a reduction in depressive symptoms and rumination (Watkins & Moberly, 2009). Second, the utility of reducing rumination and increasing concreteness could be relevant not only for the treatment of in-episode depression, but also prophylactically as a way to reduce relapse. For example, in a case series, rumination-focused CBT that targeted residual depression symptoms by explicitly addressing ruminative processes was found to be very effective, with high response and remission rates (Watkins et al., 2007). Also in the context of relapse prevention, mindfulness-based cognitive behavioural therapy treatments essentially encourage individuals to switch from ruminative, abstract ways of thinking and take a more concrete approach by attending to the present moment and experiencing the world in a moment-by-moment manner (Segal, Williams, & Teasdale, 2002; Teasdale, 1999). The promising outcomes from interventions that seek to reduce rumination and train

concreteness underscores the involvement of processing mode in depressive disorders as well the importance of ongoing research in this area.

The current study is not without a number of limitations that deserve mention. First, a healthy comparison group was not included in Study 4. This decision was made because of the focus of this research to investigate the mechanism underlying the mood regulation deficit experienced by depressed and recovered individuals. The inclusion of a control group would clarify the degree to which the effects of the processing mode manipulation generalise to healthy individuals. Notably, the experiment described in the next chapter includes an additional never-depressed control group.

Second, a no-instruction control group was not included in Study 4 or 5. This means that the only conclusions about the relative differences between an abstract and concrete processing mode can be drawn. Specifically, it could be the case that depressed or recovered depressed individuals have a natural tendency to ruminate and process information in an abstract way, which may have confounded the manipulations administered. Further, the possibility that mood may have interacted with the manipulations cannot be ruled out. Therefore, for the effects of the processing mode manipulations to be unequivocally clear, future studies will need to include a no-instruction control group (to be discussed further in the General Discussion).

Third, previous work has suggested that vantage perspective is an important factor involved in the emotional impact of positive material (Holmes, Coughtrey, et al., 2008). While care was taken in this study to ensure that groups were matched on important memory characteristics, in order to replicate the methodology of Joormann et al. (2007), no instructions as to the vantage perspective from which to recall the memory were given to participants. This issue will be addressed by Study 6. Finally, the ineffective processing mode training procedure employed in Study 5 prevents any

comment about the influence of processing mode on the affective impact of a subsequently recalled positive memory. Future studies will need to ensure the effectiveness of this training procedure in order to examine this issue.

Study 4 represents the first experimental investigation of the role of an abstract mode of processing as a possible mechanism underlying the difficulty experienced by depressed and formerly depressed individuals in their ability to use positive memories as a mood regulation strategy. An abstract processing mode resulted in unchanged mood while a concrete mode of processing enabled positive memory recall to improve mood. These results suggest that there may be clinical benefit in directly targeting processing mode as a novel way to enable depressed and recovered depressed participants to garner emotional benefits following positive memory recall. Accordingly, the final study reported in this thesis (Study 6) will take a translational approach to test whether a processing mode manipulation delivered by the experimenter (and therefore more akin to what would occur in a clinical context) might amplify the affective benefits associated with adopting a concrete processing mode following the recall of a positive self-defining memory.

CHAPTER 5: Processing Mode and Self-Defining Memories

Study 6 – An Evaluation of the Effectiveness of Recalling Positive Self-Defining Memories on Improving Mood: The Impact of Processing Mode

Investigations of the influence of processing mode during positive memory recall have suggested that there may be utility in developing strategies designed to assist individuals who experience depressive disorders to recall their positive memories in a concrete way. The findings of Study 4 support the proposal that the concrete processing of positive memories has the capacity to enable depressed and previously depressed individuals to capitalise on the affective benefits of this material. The final study

described in this thesis builds on the previous experimental findings with a view to provide a base from which strategies may be developed to be used as adjuncts to standard treatments for depression. Adopting a translational approach in this way aligns with the need for promising experimental outcomes to be translated into useful therapeutic strategies - an issue that has been raised by leading researchers in the field (Clark, 2004).

The overall goal of this thesis was to examine the role of autobiographical memory processes in depression and its recurrence. As emphasised by Teasdale's DAH, the ability to recover adaptively from sad mood is critical in determining whether sad mood will remain benign and transient, or whether it will escalate into a depressive episode. Therefore, intervening at the temporal point of mild dysphoria is critical if clinical interventions are to reduce the likelihood that sad mood will develop into a depressive episode. The findings of Study 4 suggested a channel through which this might be achieved – specifically, by manipulating processing mode during positive memory recall.

Training recovered depressed individuals to respond to sad mood by recalling a positive memory and focusing on it in a concrete way may facilitate recovery from sad mood. It was therefore the aim of Study 6 to examine the utility of adopting a concrete processing mode during positive memory recall to improve mood. Pertinently, rather than using a self-administered processing mode manipulation as adopted in Study 4, Study 6 employed an experimenter-delivered manipulation, that was more akin to what would occur in a clinical context. The rationale underlying this design was that this method of delivery may augment the benefits of positive memory recall, and if so, would suggest that this procedure may be a useful adjunct to existing talking therapies for depression.

While the methodology employed in Study 4 provided the basis for the design of this study, several changes were made to allow for the current study to examine processing mode as a clinically-relevant treatment target, together with some methodological improvements. First, as mentioned, the induction was delivered by the experimenter. Second, to potentially enhance the emotional impact of positive memories, the memory task involved the recall of a self-defining memory. As found in Study 3, self-defining positive memories were characterised by high levels of emotional intensity. Therefore, to harness this emotionality for the purpose of mood improvement, a self-defining memory was used as a way to amplify the emotional benefit of positive memory recall. Related to this point, additional instructions were provided to participants about the vantage perspective from which positive memories should be recalled. According to existing research, recalling memories from a field or first person perspective may enhance the emotionality of the memory (Holmes, Coughtrey, et al., 2008). Therefore, with the aim of maximising the affective impact of the memory, participants were explicitly instructed to recall their positive memories from a field perspective. Finally, three sample groups were included in this study: never-depressed, recovered depressed and currently depressed participants. The inclusion of a never-depressed group improves on Study 4 by allowing for an investigation of the extent to which processing mode influences the impact of positive memory recall in healthy individuals. The decision to include a depressed and a recovered depressed group (rather than simply a recovered group, as in Study 5) was made because both of these sample groups benefitted from concrete-based positive memory recall (as found in Study 4). If the current study is to provide a basis for the development of more effective treatment strategies that specifically address processing mode, it is necessary to assess whether both sample groups respond to the manipulation in the same way. Without

including both groups, there would be no way to ascertain whether differences in effectiveness or outcome exist as a function of depressive status.

Aims and Hypotheses

The aim of Study 6 was to examine the effectiveness of an experimenter-delivered processing mode manipulation to improve sad mood following the recall of a positive self-defining memory. Informed by existing work illustrating that healthy individuals derive affective benefits from positive memory recall (e.g., Joormann & Siemer, 2004), it was hypothesised that irrespective of processing mode condition, never-depressed participants would report improved mood following positive memory recall. Based on the findings of Study 4, it was predicted that both depressed and recovered depressed participants allocated to the concrete processing mode condition would report improved mood following positive memory recall. Conversely, it was expected that these two clinical groups would not benefit (i.e., would not report any mood change) following positive memory recall in the abstract processing condition.

Method

Design

A 2 (Condition: abstract, concrete) x 3 (Diagnostic Group: never-depressed, recovered depressed, currently depressed) x 2 (Time: pre, post) design was employed, with repeated measures on the third factor.

Participants

Individuals were recruited from the community through online advertisements and in the volunteer and careers sections of local newspapers. Potential participants were briefly screened over the telephone and if they were over the age of 18 and spoke English fluently, they were invited into the laboratory to participate in the study. To

determine depression status and history, participants were administered the Mood Module of the SCID-IV (First et al., 1996). Participants were reimbursed ($AUD20/hour) for their time. Eighty participants took part in this study (50 females, mean age = 28.31; SD = 11.31).

Materials and Measures

Previously Used Measures. The BDI-II and LEIDS-R were used exactly as described in Chapter 2. The RRS was used exactly as described in Chapter 4.

Self-Defining Memory Test. The self-defining memory task was based on the procedure designed by Blagov and Singer (2004) and adapted for use in this study. Participants were told that a self-defining memory was a memory of an event that was important to them and had some relation to who they were as a person. They were told that it was the kind of memory that they would tell someone if they wanted that person to understand them on a fundamental level. Participants were told that their self-defining memory could be something that happened a long time ago or recently, but that it needed to be specific such that it was a memory of an event that occurred on a particular day at a particular time. Participants were asked to recall a single, positive self-defining memory, which was defined as an event that made them both happy at the time that it occurred, and happy in the present, when they think back to it. Once participants had a positive self-defining memory in mind, they were asked to describe it to the experimenter in a few sentences from their own perspective, that is, as they saw the event through their own eyes. All responses were audiotaped for transcribing and coding. Once participants had reported a positive self-defining memory, they were asked to rate on a 9-point scale the extent to which the memory was positive, vivid, and viewed from a first-person field perspective, where 1 = not at all and 9 = very/completely.

Mood Rating Scale. Participants completed a mood rating scale exactly as described in Study 4 on three occasions during the study: prior to the mood induction (i.e., baseline), again following the mood induction (i.e., post-induction), and finally, following the processing mode task (i.e., post memory-task). As in Study 4, participants evaluated their memory on dimensions of 'sad', 'bad' and 'happy', with additional adjectives dispersed throughout to help disguise the study's focus on mood. There were two dependent variables of interest – sad mood ratings alone, and an aggregate of sad, bad and reverse-scored happy ratings. The internal consistency of the aggregated scale was acceptable (α = .88, .78, and .87 for each of the respective time points – baseline, post-induction, and post-memory task).

Mood Induction. Sad mood was induced in never-depressed and recovered depressed participants using a 10-minute video clip. Replicating methods used previously in research of this nature (e.g., Joormann et al., 2007; Study 4), a clip from "Dead Poets Society" depicting a suicide was shown. Participants were instructed to imagine how they might feel if they were in the situation from the film. For ethical reasons, participants who were currently experiencing depression were not administered the sad mood induction on the basis that they were already in a naturally occurring state of low mood. Instead, the neutral clip that was used in Study 3 which provided a do-it-yourself home maintenance instruction was shown to this group. Importantly, as discussed below, these inductions led to comparable mood ratings following the induction for each of the three groups.

SCID-IV – Mood Module (First et al., 1996). The SCID-IV was administered to determine the presence of current and previous MDEs. For inter-rater reliability purposes, 10% of these interviews were audio-recorded and re-rated by an independent Clinical Psychologist blind to group membership. There was perfect agreement between

the two assessors. For inclusion in the depressed group, participants needed to indicate symptoms that were consistent with a current depressive episode ($n = 26$). For inclusion in the recovered depressed group, participants needed to report symptoms that were consistent with at least one previous MDE. Further, the MDE must not have been experienced in the previous month ($n = 29$). Two participants were excluded from this group on the basis that they had experienced depressive symptoms in the previous month, but did not reach criteria for a current MDE. Participants were allocated to the never-depressed group if they denied symptoms that were consistent with a diagnosis of current or past MDE ($n = 25$). There were 80 participants in the final sample.

Processing Induction. The memory processing induction was adapted for the current study from the procedure used in Study 4, which was originally adapted from Watkins et al. (2008). However, it differed from the induction used in Study 4 in that it was experimenter-guided rather than self-guided. Participants were encouraged to close their eyes during the procedure which was framed as a memory exercise. Prompts for the abstract and concrete conditions were matched as closely as possible in terms of length and the use of emotive language. However, participants were asked to focus on their memory either in a general, abstract way or in a concrete, image-based way. Broadly, participants in the abstract condition were asked to think about the causes, meanings and consequences surrounding the event they recalled while those in the concrete condition were instructed to focus on the specific details of the memory and to view the event as though they were watching a movie of what happened (see Appendix E for specific instructions and items). This procedure lasted for four minutes and the manipulation check items from Studies 4 and 5 were administered following the completion of the task to ensure that participants engaged in the intended processing mode.

Procedure

Participants were informed that the study was designed to examine the relationship between imagination and memory, and how they relate to individual thinking styles. As with previous work (i.e., Study 4), this experiment was framed with care taken to disguise the focus of the study on mood. After providing informed consent, participants were administered the SCID-IV (mood module). They then completed the questionnaire package that included demographic information, the baseline mood rating scale, LEIDS-R, RRS and BDI-II. Next, participants were told they would be doing an imagination exercise which involved watching the relevant film-clip and imagining how they might feel if they were in that situation. They then completed the second mood rating scale on which items were interspersed with questions about the film content. Participants were told they would then be doing the memory task, which required them to recall and describe one positive self-defining memory. They then rated their memory in terms of valence, vividness, and vantage perspective. Following this, participants were randomly allocated to either the abstract or concrete condition and instructed to close their eyes and attend to particular aspects of their memory, as guided by the experimenter. They were instructed not to say anything during the memory exercise, but to remain focused on their memory and to think about the answers to the questions that they were asked. The importance of remaining focused on the memory and following the prompts was emphasised. Participants then completed the final mood rating scale and manipulation checks, were than thanked for their time and fully debriefed.

Results

Participant Characteristics

Demographic information and sample characteristics are presented in Table 5.1. A series of one-way ANOVAs indicated that groups were comparable in terms of age, but that the depressed, recovered depressed and never-depressed groups differed according to cognitive reactivity, $F (1, 77) = 35.92$, $p < .05$, trait rumination, $F (1, 77) = 25.82$, depressive symptoms, $F (1, 77) = 71.55$, $p < .05$, and depression chronicity, $F (1, 53) = 8.30$, $p < .05$. Post-hoc Tukey pairwise comparisons indicated that depressed individuals had higher levels of cognitive reactivity (as measured by the LEIDS-R) than either recovered or never-depressed groups (ps $< .05$), and that the recovered depressed group was more reactive than the never-depressed group ($p < .05$). Similarly, the depressed group reported greater levels of trait rumination than either of the other two groups (ps $< .05$), and the recovered depressed group indicated greater rumination than never-depressed individuals ($p < .05$). In terms of depressive symptomatology, the depressed group reported more symptoms than either the recovered or never-depressed group (ps $< .05$), and the recovered group reported more symptoms than the never-depressed group ($p < .05$). Finally, the currently depressed group was more chronic than the recovered depressed group in terms of their depressive history, reporting a greater number of past episodes, $F (1, 54) = 8.30$, $p < .05$.

Baseline Mood

In keeping with the analytic approach taken in Study 4, an aggregate of baseline sad, bad and reverse-scored happy ratings was calculated. There were two mood dependent variables – sad mood ratings, and a general negative affect score (the aggregate). To evaluate whether there were group differences at baseline, an ANOVA was carried out on sad mood and the aggregate mood rating. The statistics indicated

group differences both for sad mood, F (1, 77) = 39.93, $p < .05$, and for the aggregate, F (1, 77) = 45.06, $p < .05$. Tukey post-hoc comparisons indicated that the depressed group reported higher levels of sadness and negative affect than both the recovered depressed group ($p < .05$) and the never-depressed group ($p < .05$). Notably, the recovered and never-depressed groups did not differ on either mood dimension (ps $< .05$). This indicates that, as expected, participants who were depressed reported greater levels of sadness and negative affect at the start of the experiment compared to participants who had recovered from depression, and those who had never been depressed before.

Table 5.1

Participant Characteristics and Self-Report Measures

	Currently depressed	Recovered depressed	Never-depressed
	n = 26	*n* = 29	*n* = 25
Gender (% female)	50.0	72.0	64.0
Age	28.46 (10.73)	28.44 (10.68)	28.00 (12.95)
Marital Status (% single)	76.9	72.4	76.0
Educational History (% completed school)	92.0	90.0	96.0
Employment Status (% unemployed)	65.0	48.0	68.0
Ethnicity (% of sample)			
Caucasian	60.0	54.0	72.0
Asian	23.0	11.0	12.0
Other	17.0	35.0	16.0
LEIDS-R	105.88 (10.73)	93.79 (14.65)	72.28 (15.23)
RRS	63.85 (10.33)	55.97 (13.02)	40.44 (11.79)
BDI-II	28.50 (10.11)	12.24 (7.50)	3.48 (3.66)
Number of previous episodes	4.73 (3.08)	2.76 (1.92)	-
Current Antidepressant Treatment (%)	58.0	24.0	-
Current Psychological Treatment (%)	50.0	17.0	-

Note. Values refer to mean (and standard deviation) scores unless stated as a percentage. LEIDS-R = Leiden Index of Depression Sensitivity – Revised; RRS = Rumination Response Scale; BDI-II = Beck Depression Inventory-II.

Mood Induction

To determine whether the mood induction had the intended effect, a 3 (Diagnostic Group: currently depressed, recovered depressed, never-depressed) x 2 (Condition: abstract, concrete) x 2 (Time: baseline, post-induction) mixed-model ANOVA with repeated measures on the third factor was conducted with sad mood ratings as the dependent variable. There was a main effect of time, $F (1, 74) = 32.04$, $p < .05$, a main effect of diagnostic group, $F (1, 74) = 12.06$, $p < .05$, and a time x group interaction, $F (1, 74) = 14.95$, $p < .05$. There was no main effect of condition, $F (1, 74) = .73$, $p > .05$, no time x condition interaction, $F (1, 74) = .90$, $p > .05$, no group x condition interaction, $F (1, 74) = .59$, $p > .05$, and no time x group x condition interaction, $F (1, 74) = .47$, $p > .05$. To deconstruct the nature of the time x group interaction, paired samples t-tests were conducted and indicated increased sad mood in response to the sad mood induction for both the recovered depressed, $t (28) = -4.25$, $p < .05$, and never-depressed groups, $t (24) = -6.13$, $p < .05$. However, those who were currently depressed did not show a change in mood, $t (25) = 1.64$, $p > .05$, in response to the neutral mood induction. This indicates that prior to the mood induction, the depressed group had higher levels of sad mood than either the recovered or never-depressed group, but that following the mood induction, recovered and never-depressed groups report increased sad mood, while the neutral mood induction did not change mood in the depressed group. Importantly, and as intended, after the induction, there were no differences between the three groups, $F (1, 77) = .10$, $p > .05$. The change in mood ratings as a result of the mood induction is presented in Figure 5.1.

An identical pattern of results was obtained when the aggregate mood score was used as the dependent variable, with the exception that the currently depressed group reported slightly improved mood following the neutral induction, $t (25) = 2.55$, $p < .05$.

Although this was not expected, an analysis of the mood aggregate score following the mood induction established that the three groups did not differ, $F(1, 77) = .28$, $p > .05$. Therefore, despite the minor improvement in mood reported by currently depressed individuals in response to the neutral mood induction, this group remained sufficiently sad so as to be comparable in mood to the recovered and never-depressed individuals who underwent the sad mood induction.
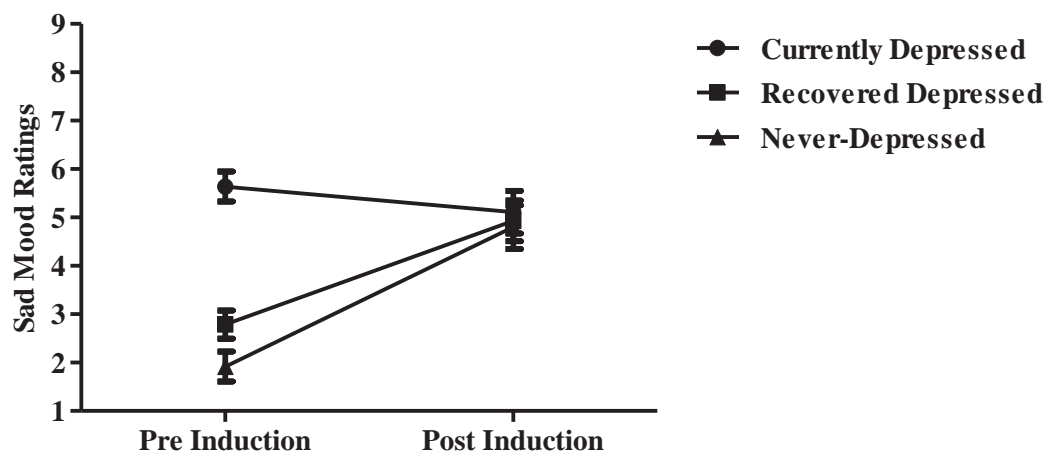
Figure 5.1 Mean and standard error for sad mood ratings prior to, and following, the film clip mood induction.

Memory Characteristics

To examine the characteristics of the positive self-defining memories that participants reported, the groups were compared in terms of participants' ratings of how positive their memory was, the vividness of the memory, and the vantage perspective from which it was recalled (see Table 5.2 for means and standard deviations).

Valence

The average rated positivity of self-defining memories was high, and there were no differences between diagnostic groups, $F(2, 74) = .10$, $p > .05$, or conditions, $F(1, 74) = 1.08$, $p > .05$, although there was a group x condition interaction, $F(2, 74) = 5.16$, $p < .05$. Post-hoc Tukey comparisons indicated that in the concrete condition, the

groups did not differ based on the degree to which their positive memories were rated as positive, $ps > .05$. However, in the abstract condition, recovered depressed participants recalled memories that were rated as less positive than never-depressed participants, $p < .05$. Accordingly, in the crucial processing mode analysis, memory positivity was entered as a covariate.

Vividness

Self-defining positive memories were rated as highly vivid, and there were no differences in vividness according to diagnostic group, $F (2, 74) = 2.57$, $p > .05$, or condition, $F (1, 74) = 0.14$, $p > .05$, nor was there a group x condition interaction, $F (2, 74) =.10$, $p > .05$. This indicates that memories were recalled with comparable vividness across the diagnostic groups and the processing mode conditions.

Vantage Perspective

An analysis of the self-reported vantage from which memories were recalled indicated no effect of condition, $F (1, 74) = .06$, $p > .05$, nor a condition x group interaction, $F (2, 74) = .01$, $p > .05$. However, there was a main effect of diagnostic group, $F (2, 74) = 3.28$, $p < .05$, with post-hoc comparisons indicating that the depressed group reported memories that were less from a field perspective than those who had never experienced depression before ($p < .05$). The recovered group did not differ from either the depressed group or the never-depressed group ($ps > .05$). This indicates that despite explicit instruction to recall positive memories from a field perspective, currently depressed individuals recalled memories that they rated as being less from a field perspective than those recalled by never-depressed participants. It is important to note that despite this difference, the mean vantage rating was 6.23 for the depressed group, on a 9-point scale. Therefore, the memories recalled by this group

were still closer to the field anchor (i.e., score of 9) than the observer anchor (i.e., score of 1).

Specificity and Content

To examine memory specificity, memories were defined as specific if they contained events that lasted for less than one day and that occurred at a particular time and place (Williams & Broadbent, 1986). The proportion of specific memories was high (97.5%). If participants recalled general memories they were prompted to retrieve a specific memory for the purpose of the subsequent exercise. Therefore, prior to the processing mode induction, the experimenter ensured that all participants had retrieved a specific, positive self-defining memory. Memories were coded for content and divided into the domains of achievement, recreation or interpersonal events. Of the memories reported, 44% were of an achievement-based event, 34% were themed around recreational activities, and 22% involved an interpersonal event[8].

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[8] To obtain an estimate of inter-rater reliability, an additional rater blind to group membership re-rated 10% of the memories. For both specificity and content there was perfect agreement between the two assessors.

Table 5.2

Mood Ratings and Memory Characteristics for Positive Self-Defining Memories

	Currently depressed (*n* = 26)		Recovered depressed (*n* = 29)		Never-depressed (*n* = 25)	
	Abstract (*n* = 14)	Concrete (*n* = 12)	Abstract (*n* = 13)	Concrete (*n* = 16)	Abstract (*n* = 13)	Concrete (*n* = 12)
Sad Mood						
Baseline	5.29 (2.05)	6.00 (1.28)	3.08 (1.66)	2.50 (1.63)	1.92 (1.19)	1.92 (131)
Post-Induction	4.64 (2.24)	5.58 (1.44)	4.62 (2.26)	5.25 (2.41)	4.77 (2.62)	4.83 (2.21)
Post-Memory Task	5.14 (2.11)	4.92 (2.11)	2.46 (1.56)	2.13 (1.09)	2.15 (1.52)	2.25 (1.14)
Aggregate Mood						
Baseline	6.64 (5.38)	7.83 (3.61)	0.08 (4.58)	-1.06 (3.61)	-3.00 (3.85)	-3.17 (3.27)
Post-Induction	5.14 (4.38)	5.67 (3.20)	5.15 (5.53)	6.25 (6.77)	4.46 (5.87)	4.92 (5.87)
Post-Memory Task	5.00 (5.43)	3.75 (4.85)	-1.23 (4.02)	-2.25 (3.94)	-2.31 (3.95)	-2.25 (3.62)
Memory Quality						
Valence	8.57 (0.65)	8.08 (1.16)	8.08 (0.76)	8.69 (0.48)	8.76 (0.44)	8.08 (1.16)
Vividness	8.00 (0.88)	6.50 (2.65)	6.84 (2.23)	7.19 (1.97)	7.69 (1.03)	8.42 (0.67)
Vantage Perspective	6.21 (2.49)	6.25 (3.25)	7.85 (1.68)	6.69 (3.20)	7.46 (1.61)	8.42 (1.00)

Note. Values refer to mean and (standard deviation) scores. Baseline = Mood at baseline; Post-Induction = Mood after the induction film clip; Post-Memory Task = Mood after the memory processing task.

Mode of Processing

To ensure that the mode of processing task was effective in inducing a concrete or abstract processing mode, a 3 (Diagnostic Group: currently depressed, recovered depressed, never-depressed) x 2 (Condition: abstract, concrete) ANOVA with ratings of abstract/concrete thinking as the dependent variable was conducted. There was no main effect of diagnostic group, $F (2, 74) = 1.36$, $p > .05$, nor was there a group x condition interaction, $F (2, 74) = 0.44$, $p > .05$. Importantly, there was the critical effect of condition, $F (1, 74) = 24.69$, $p < .05$, such that participants who were allocated to the abstract condition reported thinking about their memory more abstractly ($M = 6.19$, $SE = 0.31$) than those allocated to the concrete processing condition ($M = 4.03$, $SE = 0.31$). This indicates that the processing mode intervention successfully induced the mode of processing intended.

To examine the effect of the processing mode intervention on mood, a 3 (Diagnostic Group: currently depressed, recovered depressed, never-depressed) x 2 (Condition: abstract, concrete) x 2 (Time: after mood induction, after processing task) mixed-model ANOVA was conducted, with repeated measures on the third factor and sad mood ratings as the dependent variable. There was a main effect of time, $F (1, 74) = 47.11$, $p < .05$, a main effect of group, $F (1, 74) = 7.95$, $p < .05$, and a time x group interaction, $F (1, 74) = 10.61$, $p < .05$. There was no main effect of condition, $F (1, 74) = .30$, $p > .05$, no time x condition interaction, $F (1, 74) = 1.85$, $p > .05$, no group x condition interaction, $F (1, 74) = .05$, $p > .05$, and no time x group x condition interaction, $F (1, 74) = .50$, $p > .05$. To deconstruct the time x group interaction, follow-up paired samples *t*-tests were conducted. Results indicated that regardless of the processing mode adopted during memory recall, an improvement in mood was reported by both recovered, $t (28) = 6.02$, $p < .05$, and never-depressed groups, $t (24) = 5.91$, $p <$

.05. However, the currently depressed group did not report any change in mood following the processing mode memory manipulation, regardless of condition, $t(25) = 1.64$, $p > .05$ (see Figure 5.2)[9]. An identical pattern of results was obtained when the aggregate mood score was the dependent variable, such that recovered and never-depressed participants reported improved mood following the processing mode manipulation, ($t(28) = 6.36$, $p < .05$, and $t(24) = 5.77$, $p < .05$, respectively), while for depressed individuals, mood did not change, $t(25) = 1.08$, $p > .05$. These results indicate that never-depressed and recovered depressed individuals benefitted emotionally from positive memory recall irrespective of whether an abstract or concrete processing mode was induced. However, for depressed individuals, mood did not improve in either condition.
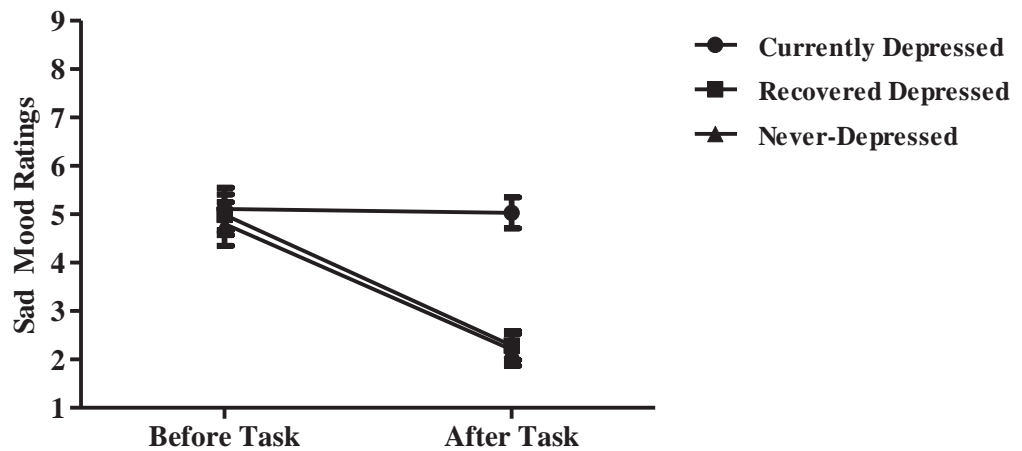
Figure 5.2 Mean and standard error for sad mood ratings prior to, and following, the memory processing mode task.

Discussion

The aim of Study 6 was to investigate the utility of a brief processing mode manipulation that was designed to facilitate mood improvement as a consequence of

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[9] An analysis with memory positivity entered as a covariate was also conducted, which yielded an identical pattern of results (ie., including the critical time x group interaction – $F(1, 73) = 10.42$, $p < .05$, for sad mood and, $F(1, 73) = 9.81$, $p < .05$, for the aggregate mood score). Unadjusted statistics are reported in the text.

positive memory recall. As predicted, never-depressed individuals experienced improved mood after recalling a positive self-defining memory, irrespective of whether an abstract or concrete processing mode was induced. On the basis of the findings of Study 4, for the recovered and depressed groups, it was expected that a concrete processing mode would improve mood, while an abstract processing mode would maintain low mood. The results did not support these hypotheses; rather, recovered depressed individuals benefitted independently of processing mode condition, and depressed participants experienced unchanged mood in both processing mode conditions. That is, depressed and recovered groups were expected to benefit from a concrete but not an abstract mode of processing. Instead, mood improved for recovered, but not depressed participants, irrespective of processing mode condition.

These results warrant some consideration. First, the expected findings pertaining to the never-depressed group is consistent with the literature showing that never-depressed individuals effectively use their positive memories as a way to repair sad mood (e.g., Joormann et al., 2007; Josephson et al., 1996). While the role of processing mode has not previously been investigated in a healthy sample, the results of this study suggest that simply recalling a positive memory, irrespective of the way in which it is recalled, improves mood among healthy individuals. It is likely that focusing on a positive memory results in sufficient elaboration of the memory to have a positive emotional impact in these individuals. Although speculative, it could also be the case that even when processing a memory in an abstract way, the emotional effects of positive memory recall may be too powerful for a ruminative way of thinking to influence mood. That is, the positive emotion associated with the memory may have surpassed any adverse impact of an abstract ruminative processing mode. It is also interesting to consider that the mood ratings reported by this group were remarkably

similar to those reported by Joormann et al. (2007) for their never-depressed group, which suggests that elaboration of a positive memory, regardless of how it is processed, has an emotionally advantageous effect on sad mood for healthy individuals.

For the participants who had recovered from depression, the results partially replicated the findings of Study 4, such that those who were allocated to the concrete condition experienced improved mood following the processing mode intervention. However, based on the processing mode literature, the finding that recovered depressed participants allocated to the abstract processing condition also reported improved mood was unexpected. There are several plausible reasons for this. First, the recovered depressed sample in this experiment had experienced fewer past depressive episodes ($M = 2.76$, $SD = 1.92$) than those in Study 4 ($M = 3.94$, $SD = 3.08$). Drawing on Teasdale's theory, it is proposed that with each depressive episode experienced comes an increase in the severity and magnitude of depressogenic cognitive patterns activated by sad mood. According to this logic, it follows that having experienced fewer previous episodes would be associated with less severe cognitive processes being activated by sad mood. The fact that the recovered depressed participants in this study had a less chronic history could account for the recovered depressed group behaving more like never-depressed individuals. However, similar levels of self-reported cognitive reactivity (as measured by the LEIDS-R) between the recovered samples in the two studies would argue against this suggestion.

Alternatively, improved mood following positive memory recall may have been an artefact of the self-defining memory task itself. In this task, participants are instructed to recall a positive memory that is important to them, and has played some role in their development as a person. These kinds of memories lend themselves to being extrapolated from in order to confirm that they are indeed self-defining. To

illustrate the point, it was not uncommon for participants to report their memory along with an explanation as to the reasons they viewed the event as self-defining (i.e., "*When I found out I had been accepted into a prestigious acting school it was self-defining because it made me believe that I have acting talent and can achieve whatever I set my mind to").* In this way, the task instructions may have inadvertently prompted participants to recall a specific memory and use this memory as a platform for making broader generalisations about the contribution of the event to the individual's life and their sense of self. If this was indeed the case, it would suggest that the abstract processing of positive material may not always lead to deleterious outcomes, as was predicted based on the findings of Study 4. In fact, at least one study (with healthy participants) has found that the abstract processing of a compliment from a romantic partner has more emotionally adaptive consequences than the concrete processing of the same material (Marigold, Holmes, & Ross, 2007). This issue will be more comprehensively addressed in the General Discussion.

With respect to the affective impact of positive memory recall in the currently depressed group, results indicated unchanged mood in both the abstract and concrete conditions. This was predicted for the abstract group, but not for those who received the concrete processing mode manipulation. The finding that the abstract processing of a positive memory did not lead to improved mood among depressed individuals replicates the findings of Study 4 and provides further evidence in support of the idea that ruminative processing is associated with adverse consequences. It is also noteworthy that in Study 4 depressed participants in the abstract condition reported worse mood than recovered depressed participants in the same condition, although this difference did not reach statistical significance. Taking into account that there were methodological

differences between the two experiments, future studies are needed to replicate these effects.

Unexpectedly, depressed participants who received the concrete manipulation did not experience an improvement in mood. It is unclear why this was the case. One possibility relates to the characteristics of the self-defining memories recalled by depressed participants. Specifically, depressed participants recalled their memories less from a field perspective than the never-depressed group, with the recovered group falling in the middle of the two. It is possible then that the memories recalled were accompanied by lower levels of emotion, as has been shown to be associated with a reduced field vantage perspective (Holmes, Coughtrey, et al., 2008). Interestingly, other researchers have also observed that depressed individuals are less likely to recall their positive memories from a field perspective (Lemogne et al., 2006). Of relevance is that these researchers (and others) propose that the tendency to recall positive memories less from a field perspective suggests these individuals do not attribute their positive memories to their current sense of self (e.g., Lemogne et al., 2006; Libby & Eibach, 2002). That is, depressed individuals may view their positive memories as irrelevant to who they are at the time of recall, which would presumably augment the perceived discrepancy between the positive memory and the individuals sense of self – which is exactly what is being proposed to account for the failure of depressed individuals to benefit from positive memory recall. Therefore, this difference in vantage perspective may have contributed, at least in part, to the failure of depressed individuals to experience improved mood following positive memory recall. With respect to other memory features, while the valence and vividness ratings of the positive memories did not differ between groups, the involvement of other memory characteristics not

measured in the current study (e.g., emotional intensity, sensory detail) cannot be ruled out.

Based on the aforementioned possibility that the abstract recollection of positive self-defining memories may not have had a detrimental effect on mood, it is possible that the currently depressed participants *did* experience improved mood as a consequence. Previous research has established that without inducing any distinct mode of processing, depressed individuals feel worse following positive memory recall (Joormann et al., 2007). Therefore, depressed participants may actually have benefitted, and unchanged mood (rather than a worsened mood) may have been the result of the abstract processing of positive self-defining memories. If this were the case, it would lend support to the suggestion that depressed individuals have a natural propensity to process material in a ruminative, abstract way. The inclusion of a no-instruction control group would offer a relatively straightforward way in which this possibility could be tested (to be discussed further in the General Discussion).

The findings of this study are somewhat discrepant from the processing mode literature in which studies have demonstrated the adverse consequences of adopting an abstract, ruminative processing mode on the one hand, and beneficial, adaptive outcomes as a consequence of a concrete processing mode on the other (Watkins et al., 2008). In the current context, the nature of the memory task itself may have been responsible for the comparable affective impact of positive memory recall in the two clinical groups. To clarify the reasons underlying the lack of differential affective impact as a result of manipulating processing mode on positive memory recall, it is recommended that future studies: (i) examine the phenomenological features of the memories recalled, (ii) use different processing mode manipulations, and (iii) employ a

range of memory tasks to delineate whether they produce distinct emotional consequences.

From a clinical perspective, while it is encouraging that recovered depressed participants benefitted from recalling positive self-defining events from their life irrespective of the processing mode adopted, it is concerning that depressed individuals were impaired in their ability to regulate sad mood with these positive memories, regardless of how the memory was processed. This draws attention to the need for research to examine more closely the conditions under which manipulating processing mode has an impact on mood. A number of recent preliminary trials has found that training concreteness (using CBM methods) and explicitly targeting depressive rumination (by encouraging concrete processing) in clinical contexts produces improved treatment outcomes in depressive disorders (e.g., Watkins & Moberly, 2009; Watkins, Mullan et al., 2011). Further work is needed to identify how these processing mode interventions interact with positive material, and in particular, positive memory recall.

An important question is whether the nature of the sad mood prior to memory recall is important in determining the affective impact. Specifically, comparing a naturally occurring sad mood in the depressed group, to an induced sad mood in the recovered and never-depressed groups represents a key methodological limitation of this kind of research. Therefore, replication that involves sad mood of the same nature is needed. However, important ethical considerations need to be addressed with respect to inducing sad mood in an already depressed sample (to be discussed further in the General Discussion).

An important limitation of this study was that temporal information pertaining to the self-defining memory was not recorded. It is likely that the degree to which individuals view positive self-defining events as either discrepant or consistent with their sense of self would be in some way related to the amount of time elapsed since the event occurred. This information, along with additional memory features, should be recorded in future studies.

Study 6 examined the utility of an experimenter-delivered processing mode manipulation that was designed to augment the emotional benefits associated with positive memory recall in depressed, recovered depressed and never-depressed individuals. The key finding was that for never-depressed and previously depressed individuals, memories of positive, self-defining events improved mood, regardless of how the memory was processed. However, for depressed individuals, neither an abstract nor a concrete processing mode facilitated emotional benefits of positive memory recall.

CHAPTER SIX: General Discussion

Introduction

Despite substantial enquiry into the role of memory processes in depression, relatively little attention has been directed towards investigating the involvement of autobiographical memory in depressive recurrence. At the commencement of this thesis, studies in the area lacked necessary control groups, employed designs with limited ecological validity, and focused exclusively on negative memories. Further, the contribution of positive memory processes to depressive disorders had been largely neglected, and the mechanisms responsible for the reduced affective impact of positive memory recall by depressed and recovered depressed individuals had not been examined. With rates of depressive recurrence in excess of 50% in the two years following successful treatment (Vittengl, Clark, Dunn, & Jarrett, 2007; Vittengl, Clark,

& Jarrett, 2010), there is now an urgent need to better understand factors that elevate the likelihood of recurrence. Accordingly, this thesis has provided an initial investigation into how autobiographical memory processes might be involved in depression recurrence.

Using the DAH as a theoretical basis, Studies 1 and 2 examined whether there were any differences in the phenomenological features of cued autobiographical memories recalled by recovered and never-depressed individuals in a sad and a neutral mood. In Study 1, there were no between-group differences for negative memories. However, positive memories were recalled less vividly by formerly depressed individuals, but only in a sad mood. In Study 2, positive memories were examined more comprehensively, and the findings of Study 1 were replicated such that recovered depressed individuals recalled less vivid positive memories than their never-depressed counterparts, but again, only in a sad mood. Given the prescriptive nature of the cued-memory task, it remained unclear as to whether the findings of Studies 1 and 2 could be attributed to the task used, or would generalise to other kinds of autobiographical memory. To address this question, Study 3 examined the features of highly-important, self-defining memories recalled by recovered and never-depressed individuals in a sad mood. Recovered depressed individuals recalled more vivid negative memories and less emotionally intense positive memories than those who had never been depressed before. Together, the findings of these three studies suggest that autobiographical memory features of depression-vulnerable individuals may differ systematically from those of healthy individuals, but only in a sad mood state. While the exact features of memory that differed depended on the type of memory being recalled, there results indicated a general theme whereby recovered depressed individuals recalled negative memories with more intense features (i.e., vividness), and positive memories with less intense

features (i.e., vividness, emotional intensity), than never-depressed individuals, but only in a sad mood.

These findings were built upon in the second part of this thesis, which investigated the affective consequences that follow the recall of positive autobiographical memories. Existing studies (e.g., Joormann & Siemer, 2004; Josephson et al., 1996; Rusting & DeHart, 2000) have established that recalling positive memories is a strategy used by healthy individuals to improve sad mood. However, unlike these individuals, depressed and formerly depressed individuals do not experience emotional benefit from recalling positive events from the past. To examine whether this could be due to ruminative processes that are associated with depression, Study 4 compared the effect of adopting either a concrete or abstract ruminative processing mode following positive memory recall in depressed and recovered depressed individuals. Abstract processing of positive memories was found to be maladaptive in that it did not facilitate recovery from low mood in either clinical group, while concrete processing led both depressed and recovered depressed individuals to experience improved mood following the recall of happy memories. This finding was followed up in Study 5, which examined whether inducing an abstract or concrete mode of processing prior to (rather than following) memory recall would produce similar effects. Unfortunately, the manipulation procedure did not induce distinct processing modes as intended, so no conclusions could be drawn. The final experiment reported in this thesis took a translational approach examined the utility of an experimenter-delivered processing mode manipulation that was designed to amplify the emotional benefits associated with the concrete processing of a positive memory. Study 6 also improved on previous experiments by including a never-depressed control group, and by using a self-defining memory task. This enabled the generalisability of the effects of

processing mode on the affective impact of positive memories to be tested. Contrary to the findings of Study 4, irrespective of the processing mode adopted, recalling positive self-defining memories improved mood for healthy and recovered depressed individuals, but did not change the mood of depressed individuals.

This chapter will focus on the implications of the collective findings reported in this program of research. A conceptual consideration of how the studies reported in this thesis contribute to the existing literature will follow, along with an acknowledgement of the methodological limitations associated with these studies. This chapter will conclude with some discussion of the clinical implications that follow from these findings and outline some suggestions for future research directions.

Memory Characteristics

The first three studies in this thesis provided evidence suggesting that while in a sad mood, individuals who have experienced depression in the past, and are therefore at a heightened risk of experiencing depression in the future, recall autobiographical memories that have distinct memory features, compared to those who have never been depressed before. The findings related to specific memory features will now be summarised in turn.

Vividness

Across Studies 1, 2 and 3, vividness emerged as a key feature that distinguished recovered and never-depressed individuals, but only in a sad mood. These findings are consistent with work from the intrusive memory literature which has illustrated that intrusive negative autobiographical memories tend to be highly vivid (Newby & Moulds, 2011; Patel et al., 2007). Notably, the importance of vividness was not only limited to increased negative memory vividness in recovered depressed individuals in sad mood (i.e., in Study 3), but also the inverse – i.e., reduced vividness – was observed

for positive memories recalled by recovered depressed individuals in sad mood (i.e., in Studies 1 and 2). This suggests that differences in vividness exist across memory type (i.e., cued-recall in the first two studies and self-defining memory in the third) as well as memory valence.

While numerous studies have linked negative memory processes to depression (e.g., Mathews & MacLeod, 2005), the role of positive memories in depressive disorders has been studied to a lesser degree, and as a result, is not yet clear. Evidence of reduced memory vividness in recovered depressed individuals in sad mood is consistent with the finding that dysphoric individuals are impaired in their ability to vividly imagine future positive events relative to non-dysphoric, healthy individuals (Holmes, Lang, et al., 2008; Stöber, 2000). The first two studies in this thesis extended this line of enquiry to show that impaired vividness is not limited to imagination for future events, but also applies to memory for past events. The consistency between the findings for imagined future events and remembered past events accords with data showing that the same neural structures are involved in recalling the past and imagining the future (Addis, Wong, & Schacter, 2007; Schacter, Addis, & Buckner, 2007). The findings from this thesis, together with existing research that has implicated vividness as an important memory feature, suggest that there is something unique about the phenomenological property of vividness, and that it plays a key role in depression. In order to understand the role of vividness more comprehensively, future studies will need to examine how differences in memory vividness influence emotion. Of relevance is the link that has been established between vivid imagery and emotion (for review, see Holmes & Mathews, 2010). This association between imagery and emotion will be more closely considered later in this chapter.

Vantage Perspective

It was surprising that in Studies 1 and 2 the vantage perspective from which both positive and negative memories were recalled by recovered and never-depressed participants did not differ, because previous research has linked depression to the recall of autobiographical memories from an observer perspective (Kuyken & Howell, 2006; Lemogne et al., 2006; Williams & Moulds, 2007a). However, sample differences may explain the discrepant findings because most previous studies employed dysphoric or currently depressed groups, and not a recovered depressed sample. In the one study that has examined a recovered depressed group, the tendency to recall memories more from an observer perspective was found to be characteristic of recovered depressed participants, but only for positive memories (Bergouignan et al., 2008). Unlike the studies reported in this thesis in which sad mood was induced, the participants in the study conducted by Bergouignan et al. (2008) did not undergo a mood induction. Accordingly, meaningful comparisons across the two studies cannot be made.

In light of the findings of Studies 1 and 2, along with a relatively limited evidence base, the role of the vantage perspective from which memories are recalled by recovered depressed participants in sad mood remains unresolved. There is good reason to expect that the vantage perspective from which positive memories are recalled has an impact on emotion (e.g., Holmes, Coughtrey, et al., 2008), with one study finding that adopting a third-person perspective while recalling a positive autobiographical memory reduces the intensity of subsequent positive emotion (Gruber, Harvey, & Johnson, 2009). It is worth mentioning that in Study 6, despite an explicit instruction to retrieve field-based memories, depressed participants recalled their positive self-defining memories more from an observer perspective than did recovered and never-depressed participants. While the impact that this had on the mood effects reported cannot be

ascertained given the design of this study, the finding that depressed individuals had a propensity to recall more observer-based positive memories suggests that the vantage perspective from which memories are recalled in sad mood warrants further consideration as potentially being influenced by depressive status.

Relationship Between Memory Features

It was expected that if memory features did indeed differentiate individuals according to depressive history and mood, then these memory features would likely be clustered with other similar features. For example, as vividness was found to distinguish groups as a function of depressive history and mood status, it is unclear why other features such as sensory detail or emotional intensity also did not differ. This is particularly intriguing given that memory vividness has been shown to correlate with memory detail, memory intensity and memory emotionality (D'Argembeau & Van der Linden, 2006). The fact that memory vividness differed between recovered and never-depressed individuals in sad mood in the first three studies would argue against the possibility that the failure to detect other feature differences was due to either the memory elicitation task used (as both the AMT and self-defining memories were examined), to the valence of the memory (positive in the first two studies but negative in the third).

One reason that differences in other memory features may not have been detected could be due to the methods employed to measure them. The administration of the recently developed MEQ in these studies represents a psychometric improvement on past studies that have exclusively relied on visual analogue scales to index memory features (Williams & Moulds, 2007a). However, on the MEQ, memory features are rated on a 5-point scale. This scale may not be sufficiently sensitive to detect subtle memory feature differences. Continued psychometric evaluation of this instrument,

together with more research into the factor structure of memory features, will clarify this issue. Another possibility is that making immediate memory characteristic ratings may not have allowed participants sufficient time in which to reflect on and make accurate judgments about their memories. To elaborate, perhaps memory characteristics are perceived in a hierarchical fashion, and individuals are able to report on the clarity or vividness of their memories more readily than they are able to process and report more complex features such as vantage perspective, which may require more time to be evaluated. This suggestion will need to be tested by identifying the temporal sequence with which memory features are recalled and are able to be reported.

Mood-Congruent Recall

The findings of the first three studies are interesting from the perspective of the mood-congruent recall literature. Typically, healthy individuals have a tendency to recall memories of the same affective tone as their current mood (Singer & Salovey, 1988). This effect may be even more pronounced in depressed individuals, who show a memory bias involving enhanced memory for negative material (Clark & Teasdale, 1982). In Studies 1 and 2, memory accessibility ratings were explicitly taken, and in Study 3 mood-congruent memory was assessed indirectly by allowing participants to retrieve either negative or positive memories in a sad or neutral mood. Contrary to expectations, recovered depressed participants did not rate their negative memories as more accessible than their positive memories in a sad mood (i.e., in Studies 1 and 2), nor did they recall more negative (rather than positive) self-defining memories in sad mood (i.e., in Study 3). This suggests that even though previous studies have found depression to be associated with a general memory bias towards negative material, this effect may be linked to current symptoms, rather than representing a more stable, trait-like characteristic that remains evident even during the euthymic phase of depression

(i.e., once a depressive episode has remitted). Accordingly, the tendency to recall negative (rather than positive memories) in sad mood, at least as indicated by this program of research, does not distinguish recovered depressed from never-depressed individuals.

It is worthwhile to point out that caution should be taken in making any definitive conclusions in regards to mood congruent recall. This is because first, studies in the clinical literature that have examined positive memory recall have failed to find a mood-congruent effect (e.g., Joormann & Siemer, 2004; Joormann et al., 2007). Second, there have been many challenges to the mood-congruent literature more generally, with several meta-analytic reviews concluding that findings from the field are inconsistent, and that if a mood-congruent effect does exist, it is likely to be very small in magnitude (Blaney, 1986; Matt et al., 1992; Singer & Salovey, 1988). Therefore, although the studies reported in this thesis may not accord with the mood-congruent literature, they are nonetheless consistent with studies from the clinical domain examining memory in the context of dysphoria and depression.

Positive Memory

The experiments reported in this research program emphasise the need for positive memory processes to be considered in both theoretical models and clinical interventions for depressive disorders. Until recently, the role of positive affective experience in depression had largely been neglected, with theory and practice instead concentrating on negative emotion and negative processing biases in the disorder (e.g., Beck et al., 1979; Teasdale, 1988). Conceptually, this is understandable because depression is characterised by elevated negative affectivity. However, it is surprising that the other cardinal symptom of depression, anhedonia (i.e., a diminished ability to

derive pleasure in response to previously rewarding stimuli), has been relatively ignored in the cognitive and experimental literature, as well as in therapeutic approaches.

The importance of positive processes in depression is gaining increased recognition and empirical support (see Dunn, in press, for review). There is now converging evidence from self-report, experimental, behavioural, physiological, and neuroimaging studies that the experience of positive emotion is disturbed in depression. For example, one study showed that depressed individuals exhibit reduced arousal, decreased ratings of pleasantness and happiness, and increased ratings of sadness, in response to positive (but not negative) stimuli, relative to their non-depressed counterparts (Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004). Further, this bias extends beyond dimensions of sadness and happiness, as suggested by the findings of Rottenberg, Kasch, Gross, and Gotlib (2002) which showed that depressed individuals rated humorous films as less amusing than did never-depressed individuals. Additional support has been provided by neuroimaging studies that have uncovered a consistent pattern of reduced activation of reward circuitry in the brain among depressed individuals (e.g., Epstein et al., 2006). Taken together, there is strong reason to expect that depressed individuals experience impairment in the processing of positive material, relative to never-depressed individuals.

These findings can be understood in the context of the Emotion Context Insensitivity Hypothesis (Rottenberg et al., 2005). According to this view, depression is associated with attenuated reactivity to emotional cues, regardless of valence (Bylsma et al., 2008; Rottenberg et al., 2005). The results from this thesis are consistent with this proposal such that they demonstrate that depressed and formerly depressed individuals: (i) recall positive memories with reduced vividness in sad mood, and (ii) report reduced

emotionality of their positive memories as a result of ruminative processing following the recall of positive memories.

It is remarkable that the DAH - a dominant cognitive model of depression which has provided the theoretical basis for this thesis - makes no mention of how positive material and processes may be involved in depressive disorders. An important contribution of the current series of studies to the literature is the evidence that it presents which suggests that for depressive disorders to be understood more comprehensively at a cognitive level, positive memory processes must be considered. More specifically, the findings of this thesis indicate that positive autobiographical memories are recalled with less intense features by formerly depressed individuals in a sad mood, and do not have the same reparative effect on mood as is the case for healthy individuals. The outcome of Study 4 suggested that ruminative processes may be at least in part responsible for the difficulty in improving sad mood with positive memory. However, as indicated by the discrepant findings between Studies 4 and 6, the relationship between positive memory, depressive status, affect and ruminative processing is very complex, and further research is needed to elucidate how these factors interact. Nevertheless, the data presented in this thesis provide support for the suggestion that depression involves a deficit in the processing of positive material (Dunn, in press; MacLeod, Byrne, & Valentine, 1996; MacLeod & Moore, 2000), and emphasises the need for future studies to examine the factors that influence the affective consequences that follow positive autobiographical memory recall.

Positive Memory Recall as an Emotion Regulation Strategy

The findings of Studies 4 and 6 suggest that for both currently and formerly depressed individuals, the way in which positive memories are recalled has consequences for the downstream effects of these memories on mood. In Study 4,

adopting a concrete processing mode after recalling a positive memory led to improved mood in depressed and recovered depressed participants, while an abstract processing mode did not change mood in either of these participant groups. These results were only partially replicated in Study 6, in which recovered depressed participants benefitted from positive memory recall, regardless of the processing mode adopted. Conversely, for depressed individuals, mood did not improve in either processing mode condition. A key difference between these two studies was that in Study 4, a positive memory from a high school was used as the target memory, while in Study 6 participants were instructed to recall a self-defining memory. The conceptual reason for the change in memory type was as an attempt to amplify the emotional benefits of memory recall through the use of a highly significant personal memory. However, the findings of Study 6 suggest that distinct processing modes have differential consequences depending upon the type of memory being recalled. Replication of these findings is needed to confirm whether this is the case.

Abstract Processing

The results of these studies suggest that the abstract processing of some memories, at least for recovered depressed individuals, may not always have a detrimental effect on mood; for example, when the memories that are recalled are considered to be self-defining. To revisit the hypothesised mechanism responsible, it was proposed that the processing of a positive memory at a general, abstract level may draw attention to a discrepancy between one's current low mood and past, happier experiences. In this way, a ruminative, abstract style of thinking was proposed to ameliorate any potential mood benefits produced by a positive memory. Making these comparisons may not have actually been detrimental for recovered depressed participants in Study 6 as a function of the memory task itself. Specifically, participants

were instructed to recall a memory that had played some role in their development and identity. Self-defining memories lend themselves to extrapolation. Indeed, although not instructed to do so, many participants provided justification as to why they considered their memory to be self-defining; that is, they offered the reason that they had selected the particular memory that they described in this task. For example, one participant reported: *"When I found out that I got into university it was self-defining because it showed that I am a hardworking person who can achieve my goals if I put my mind to it"*. Using the specific memory as a platform for making broader generalisations about the contribution of the memory to the individual's life may have meant that under such circumstances an abstract processing mode may not have necessarily been damaging to their mood. Accordingly, by their very nature, self-defining memories may not be as easily amenable to being processed in a way that draws attention to a discrepancy between how the individual currently views themselves, as compared to previous times. This could explain why recovered depressed individuals reported improved mood following memory recall, even in the abstract condition. Interestingly, there is both theoretical and experimental support for this suggestion.

Theoretical support can be derived from the Reflection and Evaluation model (Markman & McMullen, 2003), as discussed in Chapter 4. Briefly, this model outlines that two distinct psychological modes of thinking (evaluation and reflection) are responsible for determining whether making a mental comparison results in affective assimilation or affective contrast. The evaluation mode results in affective contrast, and involves discrepancy-based comparisons as a reference point from which to evaluate one's present standing, while reflection results in assimilation and is characterised by incorporating the relevant information into one's view of oneself. More simply, recalling positive past events can worsen mood if it suggests deterioration in the self

when compared to current standing, but can improve mood if aspects of these positive events are viewed as having been incorporated into the individual's current identity. Using a self-defining memory task essentially encourages participants to reflect on their life and report a personally meaningful event that has contributed to their current sense of self. In this way, adopting an abstract processing mode about a self-defining event may encourage individuals to incorporate information about this event into their current self-identity. This explanation provides a plausible reason as to why the recovered depressed participants in the abstract condition reported improved mood following positive memory recall in Study 6, while in Study 4 they did not.

Experimental evidence also suggests that it is not always the case that processing positive material in an abstract way has negative implications for mood. In a recent study from the social psychology literature, researchers investigated the emotional consequences of recalling a recent compliment from a romantic partner, manipulating whether it was processed in an abstract or concrete way (Marigold et al., 2007). The abstract framing of a compliment (e.g., being asked to explain *"what [the compliment] meant to you and its significance for your relationship")*, as compared to concrete framing (e.g., being asked to report *"exactly what your partner said to you")* led participants to subsequently feel more positive about themselves and their relationships. To explain this finding, the authors speculated that in the abstract condition, the recipient of the compliment viewed the praise in terms of an ongoing experience, rather than as a single example of praise. While there are substantial differences between this study and those reported in this thesis (such as clinical focus, temporal distance from the event being recalled, the content of the material), these results nonetheless suggest that in some circumstances, the abstract processing of positive material may not have a negative impact on emotion.

Concrete Processing

The studies reported in this thesis suggest that adopting a concrete processing mode following the recall of a happy memory has emotionally advantageous effects for recovered depressed individuals, and may under some circumstances be of benefit to depressed individuals. There may be value in considering precisely what it is about concrete processing that produces beneficial affective outcomes. One possibility is that thinking about a positive memory in a specific way is helpful insomuch as it is antithetical to rumination because it provides a distraction away from the self. That is, if an individual is thinking in a concrete way about the details of a past experience, they cannot be making self-comparisons or focusing on their sad mood. Relatedly, previous studies have found that distraction attenuates sad mood among depressed and recovered depressed samples (Donaldson & Lam, 2004; Joormann et al., 2007). It is therefore possible that instructing individuals to focus on a positive memory in a detailed way sufficiently directs attention away from their current state, thereby causing mood to improve. This is consistent with studies that have shown that when individuals are absorbed by a distraction, sad mood is reduced so long as the task is demanding enough to prevent mood-related cognitions (Erber & Tesser, 1992). Further, the helpful effects of distraction on sad mood have been found to be mediated by preventing thoughts pertaining to mood (Siemer, 2005). Accordingly, the adaptive consequences of adopting a concrete processing mode may not actually be due to concrete processing per se, but rather due to the fact that individuals are adequately distracted such that they cannot engage in unhelpful, ruminative, self-focused thinking.

Another possibility is that there is enough conceptual overlap between concrete and imagery-based processing that it is the imagery that accompanies the memory being recalled that is responsible for the beneficial effects of the concrete manipulation on

mood. As mentioned in Chapter 4, the imagery-based processing of positive material has a more potent effect on emotion than the processing of the same information verbally (Holmes et al., 2009; Holmes, Mathews, Dalgleish, & Mackintosh, 2006). The concrete inductions used in this thesis involved asking participants to focus on the sensory, visual, and contextual details of their positive memories. These features lend themselves to recruiting detailed imagery in the recall of the event, which in turn very likely amplifies the emotional impact of the memory.

Related to this point is that inducing a concrete processing mode may have resulted in positive memories being recalled with very intense phenomenological features. While memories were assessed on dimensions of vividness (and vantage perspective in Study 6), the concrete processing task may have intensified the features associated with the memory, which could in part account for the effect on mood. Without the explicit measurement of memory features both before and after the processing mode induction, there is no way to ascertain if this was the case. Given that memory features have implications for memory-related affect (e.g., Williams & Moulds, 2007b), future studies would benefit from assessing whether distinct processing modes influence phenomenological memory features, and in turn, mood.

Finally, and perhaps most simply, a concrete processing mode may be beneficial because it demands the elaboration of positive memories. Specifically, participants were asked to think about their memory for four minutes, which presumably led to participants becoming absorbed by the task. While results from previous studies have shown that the recall of positive memories alone does not improve mood in depressed or recovered samples (e.g., Joormann et al., 2007), in Joormann et al.'s study (2007) participants were instructed to recall as many memories from their high school years as they could think of (within the time constraints). This likely would have limited the

opportunity to elaborate on any one memory. Therefore, it might be that the memory needs to be sufficiently elaborated upon in order for downstream effects on mood to occur. Although the time spent thinking about the memory was the same in both the abstract and concrete conditions, the nature of the instructions given to participants in the concrete processing mode induction may have resulted in greater elaboration of the memory than in the abstract condition. For example, inherent in the concrete manipulation is a greater emphasis on the memory details (i.e., "*play the sequence of events over and over in your mind*") as compared to the abstract manipulation (i.e., "*think about the causes, meanings, and consequences of what happened").* Thus, perhaps the nature of the concrete manipulation itself facilitated memory elaboration in a way that the instructions in the abstract condition did not, and the group differences in emotionality may have arisen, at least in part, as a result of this distinction.

It is not yet clear which aspect of a concrete processing mode assists recovered depressed and (possibly) depressed individuals in improving mood with a positive memory. It may very well be a combination of the reasons discussed above. As is evident from this discussion, a concrete processing mode represents a multi-faceted construct. If concrete processing can be separated out into dissociable elements and tested individually, this may offer a way in which the most effective aspect/s of concrete processing can be identified and capitalised upon. While the importance of dismantling an abstract processing mode into dissociable elements has been raised previously in the literature (Moberly & Watkins, 2006), the results presented in this thesis underscore the need for a concrete mode of processing also to be further decomposed into its possible dissociable elements.

Theoretical Considerations

The findings of this thesis deliver important theoretical implications: for the DAH, and for conceptual models in the rumination literature. Each will be addressed in turn.

The Differential Activation Hypothesis

The studies reported in this thesis have important implications with respect to Teasdale's DAH model of depression and its recurrence. As outlined in Chapter 1, the DAH identifies memory as a core component of cognitive reactivity such that it hypothesises that depressed and never-depressed individuals do not differ in memory recall in neutral mood, but that between-group differences emerge in sad mood. In addition, the DAH holds that the magnitude of cognitive reactivity (i.e., the difference between recall in neutral and sad mood) is predictive of depression recurrence over time (Teasdale, 1988). Although both aspects of this model have been tested with respect to cognitive content (i.e., maladaptive beliefs as indexed by the DAS), the model's hypotheses about the role of memory have not been subject to rigorous empirical investigation. As outlined in Chapter 1, in order to test the DAH comprehensively, two kinds of studies need to be conducted. First, experimental, cross-sectional work is necessary to establish whether recovered depressed and never-depressed individuals exhibit differences in memory when in a sad mood. Then, if differences in memory emerge, longitudinal studies are required to test whether the magnitude of change (i.e., difference between memory functioning in neutral and sad mood) predicts relapse to depression over time. The studies reported in this thesis have provided the cross-sectional work needed to provide a platform for testing the predictive aspects of the DAH. Specifically, findings of Studies 1, 2, and 3 illustrated that unique memory features are differentially uncovered by sad mood between recovered and never-

depressed individuals. In the same way that Segal and colleagues (Segal et al., 1999;

Segal et al., 2006) established that sad mood activates dysfunctional attitudes in

recovered depressed individuals, and that the magnitude of this activation in sad mood

predicts depression recurrence, the next stage in this line of enquiry will be to determine

whether a similar pattern of mood-dependent activation of memory differences predicts

recurrence.

Research of this nature will provide insight into important targets for treatment,

and offer novel avenues through which clinical interventions for depressive disorders

can be improved. Critically, these studies have the capacity provide the empirical basis

showing that while it is necessary for patients to be treated to a symptom-free level (or

at least to a level of clinically-significant symptom reduction), additional strategies to

manage the unhelpful cognitive processes that are uncovered by sad mood also need to

be incorporated into treatment as a way to reduce relapse rates. That is, treatments need

to be developed that train formerly depressed individuals to respond adaptively to the

changes in thinking that are prompted by minor fluctuations in mood in order to

effectively reduce the likelihood of relapse.

Ruminative Processing Mode

According to Watkins' conceptualisation of rumination, the outcome associated

with distinct ways of processing material depends upon the valence of the material

being processed (Watkins, 2008). This proposal has been tested predominantly in terms

of negative material, with studies showing that a concrete processing mode results in

constructive outcomes while abstract thinking about negative material does not (e.g.,

Ehring, Szeimies, & Schaffrick, 2009; Santa Maria, Reichert, Hummel, & Ehring, 2012;

Watkins & Moulds, 2005; Watkins & Teasdale, 2004). The opposite prediction has been

made in regards to positive material – that a concrete processing mode leads to

maladaptive outcomes, while an abstract processing mode produces desirable outcomes (Watkins, 2008). The findings reported in this thesis suggest that at least in the context of depression, the interaction between valence and processing mode is not that straightforward. In Study 4, the concrete processing of a positive memory was found to be adaptive, and in Study 6, an abstract processing mode was also adaptive but only for some participants (i.e., recovered depressed and never-depressed but not currently depressed individuals). Therefore, the relationship between valence and processing mode may depend not only on the valance of the material, but also on the content and type of material being processed, as well as the clinical characteristics of those who are processing it. With the exception of the studies reported in this thesis, only a single (known) study has examined the interaction of positive material and processing mode (e.g., Marigold et al., 2007). Therefore, the experiments reported in thesis have provided a much-needed contribution to the area, and highlight the value of continued research of this nature. This is particularly the case given that a deficit in the processing of positive material is emerging as a factor that is critically involved in the course of depressive disorders (Dunn, in press; MacLeod & Moore, 2000; Morris, Bylsma, & Rottenberg, 2009).

The relationship between material valence, processing mode, material type, and depressive status appears to be complex, and so instead of identifying broad processing mode strategies as either helpful or unhelpful, it may be more fruitful to consider the psychological flexibility with which individuals can adopt a particular processing mode (Watkins, 2008; Watkins, 2011). This is because a strategy that is adaptive in one context may be maladaptive in another. Accordingly, the psychological flexibility needed to switch between strategies that depend on contextual factors will be important

to consider, particularly in terms of treatment (this point is discussed further in the next section).

Clinical Implications

The goal of this research program was to experimentally investigate the involvement of autobiographical memory factors in depression. More specifically, the way in which memory is recalled in sad mood was examined as a way to ultimately suggest novel avenues through which existing treatments for depression could be improved. Many individuals do not respond to existing gold-standard psychotherapies for depression (Butler, Chapman, Forman, & Beck, 2006; DeRubeis et al., 2005) and of those who do, at least half will relapse (Vittengl et al., 2010). Clearly, innovations are needed to improve treatments for depression. Evidence-based treatments such as CBT have tended to focus on negative cognitive material (e.g., negative automatic thoughts) and processing biases (e.g., negative interpretations of ambiguous events) as targets for change. The findings presented in this program of research, together with previous studies, emphasise the need for treatments to also consider the role of positive material and deficits associated with the processing of this material. The clinical suggestion that follows is that the outcomes of psychological interventions for depression may be enhanced by clinicians explicitly teaching patients adaptive ways to recall and process positive material.

The findings reported in this thesis have a number of clinical implications. First, they suggest that the characteristics of autobiographical memories need to be assessed and considered in treatment as possible contributors to the impact of memory on mood. Second, they suggest that the processing mode adopted when recalling positive memories has distinct consequences as to whether formerly depressed individuals (and in some cases, currently depressed individuals) gain emotional benefits from recalling

these memories. Accordingly, directly targeting processing mode in treatment may improve the emotion regulation repertoire of individuals who experience depression. Finally, there may be utility for treatments in general to attend more closely to the processing mode that patients adopt during therapy, particularly when memory and memory processes provide the target for treatment. Each of these implications will be discussed individually below.

Targeting Memory Characteristics

The results presented in this thesis suggest that in instances in which autobiographical memories become the focus of therapy, there may be some benefit in directly assessing their features, including vividness and emotional intensity. The evidence that recovered depressed individuals recall autobiographical memories with different characteristics from never-depressed individuals suggests that there may be value in clinicians assessing the nature and emotional impact of patients' memories, as well as the way in which they respond to them (i.e., ruminating about them, attempting to suppress them). The relationship between the intensity of memory features and the degree of emotionality of memories recalled in sad mood has not been clearly demonstrated, but certainly for intrusive memories, memory characteristics are associated with consequences for mood (Birrer et al., 2007; Newby & Moulds, 2011; Williams & Moulds, 2007b). There is no reason to expect that this relationship would differ in the case of non-spontaneously (i.e., voluntarily) recalled autobiographical memories. The results from this thesis suggest that there may be utility in assisting recovered depressed individuals to recall their positive memories with more intense phenomenological features (i.e., more vividly).

Borrowing from the imagery literature, it is likely that positive memories that are recalled with intense features and images may elicit greater levels of emotion (e.g.,

Holmes, Lang, et al., 2008; Holmes et al., 2009). Notably, it has been suggested that vivid mental imagery serves as an 'emotional amplifier' – with profound effects on emotion (for review, see Holmes & Mathews, 2010). Supporting this proposal, imagery-based information processing produces more powerful emotional consequences than the verbal processing of the same material (Holmes & Mathews, 2005; Holmes et al., 2006; Holmes, Mathews, Mackintosh, & Dalgleish, 2008), which includes material of positive valence (e.g., Holmes et al., 2009; Picket, Coughtrey, Mathews, & Holmes, 2011). Therefore, it is likely that training individuals to recall positive memories with intense features and vivid imagery will have downstream benefits for mood.

This may be achieved in a number of ways. First, providing psychoeducation to recovered depressed patients (e.g., clients who have successfully completed treatment for depression) about how sad mood is likely to activate a cascade of negative thinking patterns may enable individuals to be more vigilant about such processes. Increasing these individuals' awareness about the likelihood of recalling less intense positive memories while they are in a sad mood may lead to the intentional recruitment of more powerful positive memories. Second, engaging in elaboration of positive memories may also be clinically useful to enhance memory intensity. Accordingly, depression-vulnerable individuals might benefit from guidance from clinicians to recall positive memories in an elaborate way, as well as being provided education about the importance of recalling memories in this manner when they are in a sad mood. Further, enquiring about and encouraging the recall of positive events in a manner that maximises rich imagery will be likely to amplify the positive emotion associated with these memories (Hackmann, Bennett-Levy, & Holmes, 2011; Holmes & Mathews, 2010).

More broadly, remembering positive past events with intense phenomenological characteristics and vivid imagery may also have implications for future behaviour. Studies have found a correlation between imagery vividness and detail for past and future events, as well as evidence for a common neural circuitry responsible for remembering past events and imagining future events (D'Argembeau & Van der Linden, 2006; Schacter et al., 2007). Importantly, imagining future events has profound implications for goal setting and achievement (Conway, Meares, & Standart, 2004; Conway, 2001) with studies showing that imagining oneself in a future event increases the probability of actually engaging in the behaviour that is necessary to bring about that event (Gregory, Cialdini, & Carpenter, 1982; Libby, Shaeffer, Eibach, & Slemmer, 2007). Of clinical interest is that the difficulty in generating future positive imagery experienced by dysphoric individuals may reduce the likelihood that people with depression will act on their future goals (Holmes, Lang, et al., 2008). In an empirical test of this idea, Dickson, Moberly, and Kinderman (2011) found that depressed and non-depressed individuals did not differ with respect to their ability to set goals, or in the importance they assign to these goals, but depressed individuals expected the outcomes of their goals to be less likely to eventuate, and felt as though they had less control over them. This finding suggests that an individual's negative cognitive appraisals about their perceived control over goals may impede their ability or motivation to pursue these goals. While the way in which memory features and having a history of depression relate to idiographic goal pursuit and corresponding behaviour is not yet known, this research suggests that depressed and perhaps recovered depressed individuals may be assisted in treatment through training that is designed to address goal-related cognitive biases.

A novel way that this might be achieved is through the use of CBM procedures. CBM refers to computerised training programs in which individuals are systematically trained to process material in a particular way that is designed to target specific cognitive biases. These procedures have been found to successfully ameliorate negative processing biases and generate adaptive reappraisals of positive material (e.g., Blackwell & Holmes, 2010; Holmes et al., 2006; Lang, Moulds, & Holmes, 2009). Interestingly, and of relevance, Lang, Blackwell, Harmer, Davison, and Holmes (in press) recently demonstrated that CBM that targeted interpretation bias in clinically depressed individuals using positive mental imagery reduced depression symptoms. These promising results highlight the clinical utility of using CBM procedures with depressed samples, and offer a useful model for adapting this methodology to train depressed individuals to recall positive memories and imagine positive future events in a manner that maximises their affective impact. Although further empirical investigation is needed with respect to the role of memory feature intensity in depression, CBM may offer a relatively straightforward and cost-effective method through which to train individuals to recall positive events in an emotionally charged way, and related to this, may be a powerful means by which to teach clients to generate positive appraisals relating to goal attainment.

Autobiographical Memory as a Treatment Target

The results reported in the latter part of this thesis (i.e., Study 4 and Study 6) underscore the importance of taking into account the way in which emotional material is processed as having important consequences for treatment outcome. These findings also suggest that explicitly targeting memory processes could provide a useful adjunct to existing treatments for depressive disorders. Some researchers have already examined targeting memory as a novel approach to treatment, with encouraging results. For

example, Raes, Williams, and Hermans (2009) found that a brief group-based intervention designed to reduce overgeneral memory recall led to increased memory specificity following treatment. Given that overgeneral memory recall has been shown to predict depression over time and is associated with increased risk of recurrence (e.g., Dalgleish et al., 2001; Williams et al., 2007), data indicating that it is amenable to change through psychological treatment suggests a valuable avenue through which recurrence rates may be reduced. Another example of a psychological treatment that directly targets memory is competitive memory training (COMET; Ekkers et al., 2011; Korrelboom, M., Huijbrechts, & Daansen, 2009; Korrelboom, van der Weele, Gjaltema, & Hoogstraten, 2009), which is an adjunctive intervention for psychological difficulties (i.e., low self-esteem). COMET protocols incorporate memory recall and positive imagery as core components, and involve repeated rehearsal and elaboration about positive past memories as a way to assist clients reach concordance between emotion (i.e., what they feel) and intellect (i.e., what they know). Interestingly, the goal of COMET is to produce preferential recall of positive material, consistent with the suggestion of the utility of such an approach in the treatment of depression - an idea put forward by Brewin (2006). Together, these treatments indicate that there is merit in targeting memory processes as a way to develop innovative strategies that enhance treatment outcomes for depression.

The findings of Study 4 suggest that training a concrete processing mode may improve mood in depressed and recovered depressed individuals following the recall of a positive memory. Of relevance is that Watkins and Moberly (2009) recently developed a training program designed to enhance concrete thinking, which was found to reduce depression symptoms and rumination in a dysphoric sample (Watkins & Moberly, 2009). Accordingly, this concreteness training program may be useful as a

way to amplify positive emotion associated with positive memory recall. However, given that the findings of Study 6 show that abstract processing may similarly be helpful for recovered depressed individuals in maximising positive affective impact of a positive self-defining memory, more research is needed before any definitive conclusions about the best treatment approach can be made. As a caveat, given that processing mode is likely to be influenced by contextual factors (i.e., material valence), what might be more clinically advantageous is to develop ways to teach individuals with depressive disorders to switch between abstract and concrete thinking, depending on what will produce the most desirable outcome in that particular circumstance (Watkins, 2008). The findings of Studies 4 and 6 suggest that depressed and recovered depressed individuals are able to adopt a distinct processing mode when instructed to do so. Focusing on the flexibility with which these modes can be applied and the degree to which an individual can switch from one to the other will be a necessary dimension to consider in terms of processing mode-based interventions.

The findings of this research program suggest that for existing therapies which involve the recall of positive autobiographical memories as a core component, the *way* in which memory is recalled is important. For example, in a study of Life Review Therapy, practiced retrieval of positive autobiographical memories was found to be effective in reducing depressive symptoms in older adults (Serrano, Latorre, Gatz, & Montanes, 2004). The findings reported in this thesis raise the possibility that the treatment benefits may have been augmented had attention been paid to the processing mode adopted during memory recall. Accordingly, treatments that involve positive memory recall as a core component (such as COMET) should routinely assess processing mode and encourage individuals to adopt the processing mode that will provide the most beneficial emotional outcome, given the context.

Cognitive Processing Approaches to Relapse Prevention

The studies reported in this research program contribute to the growing recognition of the need to take into account how formerly depressed individuals process cognitive material. Each of the six experiments conducted in this thesis incorporated a depression-vulnerable (i.e., recovered depressed) participant group in order to promote insight into memory processes which become activated by a sad mood and may elevate the risk for depressive recurrence. Differences in memory features, and the processing mode adopted when recalling positive memories, emerged as candidates to consider as possible cognitive risk factors.

This information can meaningfully inform relapse prevention strategies because a symptom-reduction approach alone does not target residual cognitive characteristics which are activated by a sad mood. In order to target these factors directly, relapse prevention approaches could incorporate a mood challenge as a way to trigger a cascade of residual negative thinking processes. Once activated, patients could be explicitly taught how to address and manage these patterns. One way this might be achieved is by using CBM procedures to train a concrete processing bias following a mood challenge. This might be particularly valuable in light of a recent study that found that never-depressed individuals shift to a more concrete way of thinking after a sad mood induction, while depressed individuals do not (Watkins, Moberly, & Moulds, 2011). As an initial step, whether recovered depressed individuals also fail to show a shift to a concrete way of thinking will first need to be examined.

Encouragingly, some recently developed treatments that aim to reduce depressive relapse have addressed the need to target unhelpful cognitive processes during the euthymic phase of depression. For example, directly targeting rumination after individuals have recovered from a depressive episode using rumination-focused

CBT (RFCBT) has been found to produce high response and remission rates (Watkins et al., 2007), suggesting that this approach may be useful prophylactically, as a way to reduce recurrence. Further, mindfulness-based cognitive therapy (MBCT; Segal et al., 2002) teaches formerly depressed patients to disengage with ruminative thought processes and instead attend to the present moment in a more detailed and sensory manner, not unlike a concrete processing mode. Interestingly, preliminary evidence has now linked mindfulness training to enhanced positive affectivity in response to pleasant, everyday activities (Geschwind, Peeters, Drukker, van Os, & Wichers, 2011). Together, these studies emphasise the potential value of explicitly targeting cognitive processes, beyond or perhaps as an adjunct to more traditional approaches.

Limitations and Avenues for Future Research

Sample Selection

Four of the six studies reported in this thesis used a primarily undergraduate sample. All participants were administered the Mood Module of the SCID-IV to confirm clinical status, which is accepted practice in clinical research (Ehring et al., 2008). As would be expected given the prevalence rates of depression (e.g., Kessler et al., 2005), the number of formerly depressed individuals in the sample needed to be increased in order to produce comparable cell sizes. To this end, a history of depression was specified as a condition of participation in some studies (Studies 3 and 5), which was verified by participants' responses on the SCID-IV. For Studies 1 and 2, rather than specify a history of depression as a necessary criterion for participation, community volunteers were used to supplement the undergraduate sample. This method of combining two distinct sample groups within the one study is not ideal from a rigorous scientific perspective because it is possible that there may have been systematic differences between the groups such as age and depression chronicity. That said, the

proportion of community volunteers in each study was low (17% in Study 1 and 28% in Study 2), and statistical analyses were conducted to ensure that any between-group differences that emerged (e.g., in age) were controlled for in the analyses. A limitation associated with the use of a predominantly undergraduate sample is that participants were likely to be young and well-educated, with a relatively non-chronic depressive history. Whether the findings from these studies would generalise to a more chronic and older sample will need to be tested. This issue of generalisability was addressed in Studies 4 and 6 which employed community-recruited clinical samples in order to examine participants of a wider age range, and who would be expected to vary in depression chronicity.

Sample Size

Overall, the studies in this thesis had adequate sample sizes, and the number of participants in the experimental cells was comparable with other studies that have compared the cognitive processes of depressed and formerly depressed individuals (e.g., Dent & Teasdale, 1988; Ehring et al., 2010; Miranda et al., 1990). Nonetheless, limited power in some studies may have reduced the capacity to detect between-group differences. This was particularly the case in Studies 3 and 4. In Study 3, in order to remove the possible influence of carry-over and contamination effects associated with recalling consecutive self-defining memories of varying valence, only a single memory for each participant was entered into the analysis. This resulted in substantially reduced power, which likely limited ability to detect key differences. In Study 4, the pattern of means suggested that the groups differed according to depressive history (in addition to processing mode condition), but the statistical analyses did not support this interpretation. Again, it is likely that limited power may have obscured actual between-

group differences. Therefore, recruitment of larger samples in the replication and extension of this research is needed.

Design

The cross-sectional nature of the studies contained in this thesis precludes definitive conclusions about whether mood-dependent differences in memory processing increase the risk of future recurrence among depression-vulnerable individuals. As discussed previously, in order to take the next step of testing the predictive aspect of the DAH, longitudinal designs are required to examine whether the memory processes that are activated by a sad mood in recovered depressed individuals predict depressive illness over time. Whether distinct patterns of autobiographical memory features predict relapse will establish whether recurrence might be reduced via explicit targeting of these factors in treatment. Furthermore, experiments examining how memory factors change over the course of depression (i.e., during or after an episode) will also help to delineate aspects of memory that are associated with current depression symptoms, as compared to those that are more stable, trait-like characteristics which remain during the euthymic phase of depressive illness. Again, the findings of such work will help to identify the specific memory features that are likely to reduce recurrence if targeted in treatment.

When previously depressed individuals experience a mildly sad mood, this represents the critical point in time at which effective emotion regulation strategies need to be used to facilitate recovery (Teasdale, 1988). Improving mood at this point may offset further deterioration which is proposed by Teasdale's model to be responsible for triggering a depressive episode. There would potentially be great value in examining what happens to depression-vulnerable individuals who are provided with training to develop adaptive emotion regulation skills that are specifically designed to manage mild

experiences of dysphoria. Longitudinal research that tracks formerly depressed patients and assesses whether an improved ability to curtail mild experiences of sad mood has implications for preventing future recurrence would be beneficial in this respect. Indeed, prospective studies that identified cognitive reactivity as a risk factor for relapse (e.g., Segal et al., 2006) have had a remarkable impact on the way that relapse prevention for depression is treated (i.e., by prompting the development of mindfulness approaches).

Control Groups

Throughout the second part of this thesis (i.e., Studies 4, 5 and 6), an argument has been made for the case that it is thinking about (at least some kinds of) positive memories in a ruminative, abstract way that prevents depressed and recovered depressed individuals from experiencing improved mood after positive memory recall. However, as these studies did not include a no-instruction control group, only conclusions about relative differences between an abstract and concrete processing mode can be drawn. Some researchers have made the argument that performance in a no-instruction control condition would be difficult to interpret given the tendency of depressed individuals to naturally engage in rumination – which they very well may default to in the absence of an active cognitive manipulation (see Watkins & Moulds, 2005, for a discussion of this issue). Further, the way in which depressed and recovered depressed individuals habitually think about their positive memories remains unknown in the absence of such a condition. Therefore, the inclusion of an additional control group to whom no instructions about processing mode are provided would first, allow for the impact of an abstract and concrete processing mode to be compared to no-instruction at all, and second, clarify whether depressed and formerly depressed individuals have a tendency to process their positive memories in an abstract, ruminative way. The inclusion of such a group is a crucial next step in this sequence of studies.

Measurement Issues

Self-Report Data

The findings of this thesis are somewhat limited by their reliance on self-reported assessment of memory characteristics and mood. As a result, the influence of factors such as demand characteristics cannot be ruled out. To this end, the studies were designed in such a way that they built upon the preceding studies, with attempts made to replicate and extend previous findings. This was particularly the case for Studies 1 and 2, in which the key question was examined in two separate studies as a way to improve confidence in the results of Study 1, through their replication in Study 2. For Studies 4 and 6, it is difficult to reconcile how demand characteristics would have been able to account for the findings. Nevertheless, reliance on self-reported information represents a key limitation of clinical experimental research of this type. With continued replication and extension in studies that employ a variety of memory elicitation tasks and self-report measures, confidence in the reliability of the findings will increase.

Diagnostic Assessment

Throughout the studies reported in this thesis, all participants were administered the Mood Module of the SCID-IV. For practical reasons, inter-rater reliability was not assessed in Studies 1, 2, 3 or 5. However, in the two studies in which inter-rater reliability was examined, there was a high level of agreement between the two assessors ($> .90$). Therefore, there is no reason to expect that the diagnoses obtained in the remaining studies would differ in this regard, although of course it is not possible to draw any definitive conclusions without reliability data.

With the exception of Studies 1 and 2[10], the clinical interviews were conducted at the commencement of the experimental session. For ethical reasons, clinical group membership needed to be assessed prior to the experimental procedures so as to ensure that any participants who were experiencing a current MDE were not administered the sad mood induction. The unavoidable effect of this was that questions pertaining to experiences of depression may have primed participants as to the focus of the study. Indeed, in recruitment advertisements these studies were identified as being about mood (among other variables, such as thinking styles and imagination), as stipulated by the UNSW Human Research Ethics Advisory Panel (Behavioural). Therefore, participants would not have been entirely blind to the purpose of each study, although it is unlikely that this knowledge would account for the obtained pattern of results. It is more plausible that assessing depression at the start of the session may have reminded participants of past, painful experiences, possibly lowering their mood. The mood inductions that followed may have diminished or eliminated these effects. In any case, random assignment meant that groups would have been unlikely to have differed systematically with respect to the impact of this material.

The clinical assessment included only the Mood Module of the SCID-IV, rather than the entire interview. This was for two reasons: (i) due to time constraints, and (ii) because participants were not going to be excluded on the basis of having another disorder. Depression is highly comorbid with other psychological conditions, and so to exclude on the basis of comorbidity would not have yielded a group of participants truly representative of a community sample. Therefore, it is not known how the presence of comorbid disorders would influence the results. Future studies which examine purely depressed samples would clarify this issue – although the value of research of this

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[10] In these two studies, high BDI-II scores and the endorsement of suicidal ideation were used to identify participants for whom it was not ethically appropriate to administer the sad mood induction. Any such participants were excluded, as noted in the relevant Method sections.

nature seems somewhat questionable: first, because of the prevalence of comorbidity, and second, because disorders of emotion tend to have more in common than they differ (Barlow, Allen, & Choate, 2004). Notably, transdiagnostic treatment approaches are capitalising on similarities between disorders as a way to target common processes, and ultimately improve treatments (Harvey, Watkins, Mansell, & Shafran, 2004).

Non-Equivalence of Mood Inductions

Inherent in depression research involving induced mood-states are ethical considerations surrounding procedures that worsen the mood of already depressed individuals. In the two studies in this thesis that included currently depressed participants (i.e., Studies 4 and 6), a neutral mood induction was administered to these groups of participants because they were, by definition, already experiencing low mood. This protocol directly replicates that employed by Joormann et al. (2007). Nonetheless, methodologically, the use of non-equivalent mood inductions between groups (i.e., a sad mood induction for recovered and never-depressed participants, but a neutral mood induction for currently depressed participants) represents a limitation.

Interestingly, the depressed group in both studies actually reported a slightly improved mood as a result of the neutral induction. This is unlikely to be an artefact of the induction materials themselves because different film clips were used across the two studies (one of a nature scene, one of a do-it-yourself home improvement demonstration). It could be that the clips were sufficiently distracting from participants' depressed state, and this resulted in improved mood in depressed individuals. Such a suggestion is consistent with the literature showing that when individuals are sufficiently absorbed in a task, sad mood is attenuated because thoughts about current mood state are prevented (Erber & Tesser, 1992; Siemer, 2005).

This raises the conceptual issue of whether a neutral mood induction can ever be truly neutral, without causing distraction from current mood. From a scientific perspective, while it is not ideal to administer different experimental procedures to different groups, one way in which this difficulty may be overcome is to compare the naturally-occurring sad mood among depressed individuals to induced sad mood in non-depressed groups. Omitting the neutral mood induction altogether for the depressed group would prevent the influence of distracting material. Of course, whether groups were then matched according to other procedural factors (e.g., time, exposure to film-based stimuli) presents another challenge. In any case, future studies would benefit from comparing naturally-occurring low mood in depressed groups to induced low mood in recovered and never-depressed groups. Replication in the field using a combination of naturally occurring and induced mood comparisons will assist in establishing the generalisability of results across different kinds of mood induction procedures.

Additional Possibilities for Future Work

The current program of research has identified positive memory processes as critically involved in depression, and has contributed to the emerging picture showing that depressive disorders are associated with a deficit in the processing of positive material (Dunn, in press). Further insight into how positive affect is involved in depression more generally would be beneficial. Anecdotally, it is not uncommon for depressed patients to report that the 'familiarity' of being in a depressed state offers some kind of comfort and safety. It therefore makes sense that perhaps some individuals who experience depressive disorders may not actually *want* to experience positive affect, and consequently attempt to dampen their positive emotion when they do experience it. Johnson and colleagues (Feldman, Joormann, & Johnson, 2008; Johnson et al., 2008) have raised this point in the literature, suggesting that how individuals

respond to positive affect, and whether they engage in any strategies designed to intentionally dampen (or amplify) this emotional state will have important implications for the treatment of affective disorders. Related to this idea, recent work has demonstrated that depressive symptoms not only correlate with attempts to dampen positive affect, but actually predict depression symptoms prospectively (Raes, Smets, Nelis, & Schoofs, 2012). This convincingly illustrates that understanding how individuals respond to positive affect will need to be considered if depression is to be better-treated in the future.

Relatedly, the emotion regulation literature has largely focused on how depressed and depression-vulnerable individuals tend to use maladaptive emotion regulation strategies (Campbell-Sills et al., 2006), despite having the capacity to engage in more helpful strategies (Ehring et al., 2010). Taking into account depressed and formerly depressed individuals' responses to positive emotional experience may assist in providing insight into the mechanisms responsible for their deficits in emotion regulation. Of interest is that Joormann and Gotlib (2010) recently found that depressed participants exhibit reduced cognitive inhibition in the processing of negative material, which was associated with the use of unhelpful emotion regulation strategies (such as expressive suppression and rumination). The findings presented in this thesis illustrate why it is that strategies designed to aid recovery of sad mood are so important in preventing the escalation of sad mood into depression. Understanding the contribution of other additional cognitive processes (such as cognitive inhibition, executive control, the influence of working memory) is imperative if the trajectory from a mildly sad mood into depression is to be disrupted.

It will also be necessary for the relationship between processing mode, positive material and emotion to be examined more comprehensively. While Watkins has drawn

together evidence suggesting that depressed individuals have a trait-like tendency towards adopting an abstract processing mode particularly in the context of sad mood (Watkins, 2011), how this specifically relates to positive material and depression vulnerability is not yet known. Experience sampling methods might be particularly well-suited to these kinds of investigations given that a recent study successfully measured the relationship between ruminative processes and negative affect using this technique (Moberly & Watkins, 2010).

Concluding Comments

Two goals of the current research program were outlined in the introductory chapter. The first was to provide an empirical test of the DAH which improved on previous studies methodologically and thus provided a rigorous test of this conceptual account. The second was to examine rumination as a possible mechanism responsible for the finding that depressed and formerly depressed individuals do not experience emotional benefits from recalling positive memories in a sad mood. Focusing on recovered depressed individuals throughout this thesis has allowed for suggestions about how memory factors might contribute to depression vulnerability. These findings now await the necessary prospective studies in order to establish whether memory differences between formerly and never-depressed individuals in sad mood elevate the risk of future recurrence.

There is now recognition that if recurrence rates of depression are to be reduced, variables that elevate the risk for relapse following the resolution of a depressive episode need to be better understood. This thesis has provided some preliminary evidence to address this need by suggesting that positive autobiographical memory processes are critically involved in depressive disorders. The findings of the studies reported have shown for the first time that formerly depressed individuals recall positive

memories with less emotionally intense features than those who have never been depressed before, but that this is only the case during experiences of sad mood. Further, the difficulty experienced by depressed and formerly depressed individuals in using positive memories as a way to regulate and recover from sad mood is likely to be influenced by the way in which this memory is recalled. Thinking in a general, abstract way as compared to a concrete, detailed way is likely to have critical downstream implications for affect. The explicit targeting of processing mode offers an exciting new avenue through which treatments for depression as well as interventions that seek to prevent depressive recurrence might be improved.

Overall, the findings of this thesis highlight the importance of comparing depressed, formerly depressed and never-depressed individuals on basic memory processes. Together, the results of these experiments suggest that impairments in the processing of positive memory material associated with the disorder are amenable to change. Accordingly, clinical interventions that target memory deficits hold promise as a possible means by which psychologists may be better able to treat depression and reduce its recurrence.

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APPENDICES

Appendix A: Processing Mode Induction Instructions and Prompts (Study 4)

Abstract Condition

I would now like you to spend some time thinking about this event and to analyse the causes, meanings, and consequences of what happened. Use the following prompts to assist you to do this.

Work through each of the questions in your own time. If you finish before the end of the exercise, please come back up to the top of the page and read through each question again until instructed to stop.

What kind of person were you at the time?

How did you think your life would turn out when this event took place?

Has life turned out the way that you expected? Why?

How is your life different now to how it was then?

What does this event say about you as a person?

Why do you think that your life has unfolded in the way that it has?

Think about the major events that have happened in your life since the event. Why do you think these things have occurred?

Did you expect things to go the way that they did?

Are you the same person now as you were then?

How does your current life compare to the life you expected you would live when the event occurred?

Concrete Condition

I would now like you to focus on the memory that you have just described. Play the scene over in your head like you are replaying a movie of how the event unfolded. Use the following prompts to assist you to do this.

Work through each of the questions in your own time. If you finish before the end of the exercise, please come back up to the top of the page and read through each question again until instructed to stop.

Get an image of the event in your mind. What kind of day was it? Sunny? Overcast?

Visualise what you were wearing.

Where were you? Inside? Outside?

Were other people there? What where they saying? How were they acting?

What were the thoughts running through your head at the time?

What were the sensations going through your body during the event?

Imagine what your surroundings looked like.

What could you smell?

What sounds could you hear?

Play the sequence of events that took place over and over in your mind.

Appendix B: Processing Mode Manipulation Check (Studies 4, 5 and 6)

To ensure that effectiveness of the processing mode inductions used in Study 4, 5 and 6, participants were instructed to indicate the degree to which they were focused on themselves, and how much they were thinking in an abstract or concrete way during the task. These items were taken from Watkins & Teasdale (2001) and following their procedure, participants were provided with examples of each processing mode to assist them in making ratings.

*I would like you to rate, **how much you were focusing on yourself** during the memory task that you just completed.*

1	2	3	4	5	6	7	8	9

not at all focused on myself   extremely focused on myself

*I would like you to rate, **how much you were thinking in an abstract way - that is, thinking about general, hard to pin down, higher-level concepts, themes or ideas (compared to thinking about concrete, physical objects or specific actions, situations or events)** during the task. For example, thinking about the meaning of an event would be more abstract than thinking about what you did in a situation.*

1	2	3	4	5	6	7	8	9

not at all abstract,   extremely abstract,
completely concrete   not at all concrete

Appendix C: Mode of Processing Training Scenarios (Original Version)

These processing mode training scenarios were taken directly from Watkins, Moberly and Moulds (2008). Below are the thirty original, English versions of the scenarios as well as the instructions for each condition.

Abstract:

I would like you to focus on why it happened, and to analyse the causes, meanings, and implications of this event.

Concrete:

I would like you to focus on how it happened, and to imagine in your mind as vividly and concretely as possible a 'movie' of how this event unfolded.

Scenarios

1. Over the past few months you have barely been able to meet your household expenses, as well as make regular mortgage payments. Today you receive your credit card bill including your expenses over Christmas, which are much larger than you planned for.

2. You go for a job interview. You are well prepared and able to answer the questions competently. The interview panel are friendly and encouraging, and you leave feeling very confident that you had performed well enough to secure the position.

3. You are about to give an important presentation at work that will summarise the project you have been running for the past 12 months. It is very important that you make a good impression, as a number of senior staff are present. You feel quite nervous, and you notice that as the presentation continues, the audience are reacting negatively towards what you are saying.

4. Today you celebrated your birthday. Your best friend surprises you by arranging and preparing a surprise dinner for your close friends. You are touched by their effort in going to so much trouble on your behalf, and feel that they must truly value your friendship.

5. You have an argument with your best friend. You have only had a few minor disagreements in the past, but this argument becomes heated and she tells you that she feels that she will never be able to trust you again. You are shocked and hurt.

6. A few months ago you bought some raffle tickets to help raise funds for local services in your community. Today you receive an unexpected phone call, in which a lady informs you that you had won first prize in the raffle, which was a week's holiday to Spain for you and a friend.

7. You have arranged a weekend away with a group of four old school friends, and have been looking forward to it for several months. The day before you are due to leave, two of the friends suddenly cancel on you without giving a clear reason. On hearing this, the remaining friend then also tells you that she would prefer not to come along.

8. You and your sister decided to take a course of sailing lessons. Today you had your first lesson. You really enjoyed the chance to learn something new, as well as spend some quality time outdoors with your sister.

9. You and your partner have spent the past year renovating your apartment. Today you finished the last job of painting the sitting room. The changes you have made look just the way you envisaged, and you are really pleased with the result. You are confident that you will stand to make a significant profit when you sell the property.

10. Two of your closest friends have been abroad travelling over the past 12 months. You have really missed their company, and they are due to arrive home today. You are going to pick them up from the airport, and are feeling very excited about seeing them after such a long time.

11. You are attending a series of evening pottery classes. You were surprised and pleased when the class instructor tells you that you have a natural flair, and encourages you to enter some of your pieces in a competition at the local fair. In tonight's class it is announced that you received first prize in the competition for a vase that you made.

12. You have recently started a new job. Although you have tried very hard to be friendly and polite to your new colleagues, they do not make any effort to include you in conversation. Today you overhear them making arrangements to socialise after work, but they do not invite you along.

13. You have recently applied for a promotion. It is your annual appraisal. You are called into your boss' office. He looks at your file for a few moments and then tells you that your request for a promotion has been turned down.

14. You have recently started dating someone new. Today you went for a long walk together, and spent several hours talking about the things that are important to you both. You feel a very strong connection with this person, and enjoy discussing your many shared values and beliefs.

15. Your yearly exams are scheduled for next week. You have been studying hard over the past three months, and have prepared lots of revision notes on your computer. Today you logged on to your computer to find that the hard drive had crashed, and all of your work is lost.

16. Your brother and sister recently had a serious argument over money. The situation remains unresolved, and now other family members, including extended family, have become involved and taken sides in their disagreement. Today, your sister phones you up and is very distressed and angry. She has a go at your brother and tries to find out whose side you are on. She wants you to support her side of the argument. You feel trapped and in conflict.

17. The company you work for has recently experienced financial difficulties. Yesterday five of your co-workers were unexpectedly sacked. Today, your boss has called a sudden meeting with you and your other team members. When you are all in his office, he begins to talk about how your team needs to be streamlined and downgraded. You now feel that your own position is not secure.

18. Today is your graduation ceremony. You enjoyed your studies and did well at university, so you are looking forward to having your achievements recognised. You are also looking forward to celebrating your graduation with your classmates, who you felt very supported by throughout your time at university.

19. You have been in a long-term relationship for some time. Increasingly it has become clear that it was not working and that your partner and you had different goals and plans for the future. You have decided to end the relationship. Today, you sit down with your partner to tell them that it is over. Your partner is upset and protests. It is very difficult for you, as you still have strong feelings for your former partner.

20. Some new neighbours have moved in next door. Every night since they arrived they have had people around visiting and have been playing loud music until the early hours of the morning. During the day they have frequent arguments, and generally make lots of noise. This morning, at 3am, they have a loud argument with lots of shouting which wakes you up. You have had enough. You tell them to be quiet. They get abusive towards you.

21. On the weekend you went on a long hike in the local national park. You had never hiked in this park before, and found the scenery quite spectacular. You were particularly impressed with the view from the top of the lookout, from where you could see the surrounding countryside for miles.

22. You have a good relationship with your roommate at college. One day, unexpectedly, they tell you that they have requested to switch to another room in the hall, but they do not give you a reason for their decision. You feel puzzled and confused.

23. You have an 8am appointment in the city for a job interview. You wake up an hour late and despite getting dressed frantically and rushing to the bus stop, you miss the bus. You will almost certainly be late for the interview.

24. A cousin of yours is getting married today. Many of your relatives have travelled long distances to come to the wedding, including some that you have not seen for many years. It will be great to see your family together again to celebrate the occasion.

25. Today you bought a new car – a very attractive convertible. You've worked hard to save over the past five years in order to afford it, and you were able to buy a 2003 model. You see this purchase as a significant achievement, and feel very proud as you drive the car home today.

26. Last week you arrived home from holidays to find that your house had been burgled. After reporting the break-in to the police, you rang your insurer to inform them of the incident and to discuss lodging a claim. You were told that your insurance policy had lapsed, so you were not covered for damages to your property, or for any of your stolen possessions.

27. You are in a road traffic accident. As you pull out into a junction, a van smashes into the side of your car, shunting you along the road. Your car is a write-off. You are badly bruised and your chest hurts. The fire brigade cut you out of the car and an ambulance takes you to hospital. The doctor says that you have bad whiplash and several broken ribs.

28. Today you finished a project that you have been directing at work for the past year. Your team celebrated over a lunch that was arranged by your boss. Your boss also gave a speech thanking you for your commitment and praising the performance of the team. You feel satisfied and valued by your boss.

29. You have decided to go travelling through Asia for six months. You are due to leave today, and have finished packing and making all of your preparations. You have always wanted to visit that part of the world, and feel very excited in anticipation of all of the experiences you will have.

30. Yesterday you were informed that you have been promoted at work. Although you have been working hard and hoped that this would be acknowledged and rewarded in the long-term, you are nevertheless a reasonably new member of staff, so you are surprised and delighted to be promoted so soon.

Appendix D: Mode of Processing Training Scenarios (Adapted for Study 5)

The processing mode training procedure was adapted from Watkins, Moberly and Moulds (2008). To make the material more relevant to an undergraduate Australian sample (compared to a community-based English sample) some scenarios were modified. Below are the thirty adapted scenarios as well as the instructions for each condition.

Abstract:

I would like you to focus on why it happened, and to analyse the causes, meanings, and implications of this event.

Concrete:

I would like you to focus on how it happened, and to imagine in your mind as vividly and concretely as possible a 'movie' of how this event unfolded.

Scenarios

1. You go for a job interview. You are well prepared and able to answer the questions competently. The interview panel are friendly and encouraging, and you leave feeling very confident that you had performed well enough to secure the position.

2. You are about to give an important presentation at work that will summarise the project you have been running for the past 12 months. It is very important that you make a good impression, as a number of senior staff are present. You feel quite nervous, and you notice that as the presentation continues, the audience are reacting negatively towards what you are saying.

3. Today you celebrated your birthday. Your best friend surprises you by arranging and preparing a surprise dinner for your close friends. You are touched by their effort in going to so much trouble on your behalf, and feel that they must truly value your friendship.

4. You have an argument with your best friend. You have only had a few minor disagreements in the past, but this argument becomes heated and she tells you that she feels that she will never be able to trust you again. You are shocked and hurt.

5. A few months ago you bought some tickets for a draw to help raise funds for local services in your community. Today you receive an unexpected phone call, in which a lady informs you that you had won first prize, which was a week's holiday to Noosa for you and a friend.

6. You have arranged a weekend away with a group of four old school friends, and have been looking forward to it for several months. The day before you are due to leave, two of the friends suddenly cancel on you without giving a clear reason. On hearing this, the remaining friend then also tells you that she would prefer not to come along.

7. You and your sister have decided to learn how to surf. Today you had your first lesson. You really enjoyed the chance to learn something new, as well as spend some quality time at the beach with your sister.

8. You and your partner have spent the past year renovating your apartment. Today you finished the last job of painting the lounge room. The changes you have made look just the way you envisaged and you are really pleased with the result. You are confident that you will stand to make a significant profit when you sell the property.

9. Two of your closest friends have been abroad travelling over the past 12 months. You have really missed their company, and they are due to arrive home today. You are going to pick them up from the airport, and are feeling very excited about seeing them after such a long time.

10. You are attending a series of evening life-drawing classes. You were surprised and pleased when the instructor tells you that you have a natural flair, and encourages you to enter some of your pieces in a local competition. In tonight's class it is announced that you received first prize in the competition for one of your sketches.

11. You have recently started a new job. Although you have tried very hard to be friendly and polite to your new colleagues, they do not make any effort to include you in conversation. Today you overhear them making arrangements to go for a drink after work, but they do not invite you along.

12. You have recently applied for a promotion. It is your annual appraisal. You are called into your boss' office. He looks at your file for a few moments and then tells you that your request for a promotion has been turned down.

13. You have recently started dating someone new. Today you went for a long walk together, and spent several hours talking about the things that are important to you both. You feel a very strong connection with this person, and enjoy discussing your many shared values and beliefs.

14. Your yearly exams are scheduled for next week. You have been studying hard over the past three months, and have prepared lots of revision notes and saved them on your memory stick. Today you logged on to your computer to find that your memory stick was blank, and all of your work is lost.

15. Your brother and sister recently had a serious argument over money. The situation remains unresolved, and now other family members, including extended family, have become involved and taken sides in their disagreement. Today, your sister phones you up and is very distressed and angry. She has a go at your brother and tries to find out whose side you are on. She wants you to support her side of the argument. You feel trapped and in conflict.

16. The company you work for has recently experienced financial difficulties. Yesterday five of your co-workers were unexpectedly sacked. Today, your boss has called a sudden meeting with you and your other team members. When you are all in his office, he begins to talk about how your team needs to be streamlined and downgraded. You now feel that your own position is not secure.

17. Today is your graduation ceremony. You enjoyed your studies and did well at university, so you are looking forward to having your achievements recognised. You are also looking forward to celebrating your graduation with your university friends, who you felt very much supported by throughout your time at university.

18. You have been in a long-term relationship for some time. Increasingly it has become clear that it was not working and that your partner and you had different goals and plans for the future. You have decided to end the relationship. Today, you sit down with your partner to tell them that it is over. Your partner is upset and protests. It is very difficult for you, as you still have strong feelings for them.

19. Some new neighbours have moved in next door. Every night since they arrived they have had people around and have been playing loud music until the early hours of the morning. During the day they have frequent arguments, and generally make lots of noise. This morning, at 3am, they have a loud argument with lots of shouting which wakes you up. You have had enough. You tell them to be quiet. They get abusive towards you.

20. On the weekend you went on a long hike in the local national park. You had never hiked in this park before, and found the scenery quite spectacular. You were particularly impressed with the view from the top of the lookout, from where you could see the surrounding bush for miles.

21. You have a good relationship with your roommate at college. One day, unexpectedly, they tell you that they have requested to switch to another room in the hall, but they do not give you a reason for their decision. You feel puzzled and confused.

22. You have an 8am appointment in the city for a job interview. You wake up an hour late and despite getting dressed frantically and rushing to the bus stop, you miss the bus. You will almost certainly be late for the interview.

23. Your cousin is getting married today. Many of your relatives have travelled long distances to come to the wedding, including some that you have not seen for many years. It will be great to see your family together again to celebrate the occasion.

24. Today you bought a hot new convertible. You've worked hard to save over the past five years in order to afford it, and you were able to buy a 2011 model. You see this purchase as a significant achievement, and feel very proud as you drive the car home today.

25. Last week you arrived home from holidays to find that your house had been burgled. After reporting the break-in to the police, you rang your insurer to inform them of the incident and to discuss lodging a claim. You were told that your insurance policy had lapsed, so you were not covered for damages to your property, or for any of your stolen possessions.

26. Today you finished a project that you have been directing at work for the past year. Your team celebrated over a lunch that was arranged by your boss. Your boss also gave a speech thanking you for your commitment and praising the performance of the team. You feel satisfied and valued by your boss.

27. You are in a car accident. As you pull out into a junction, a van smashes into the side of your car, shunting you along the road. Your car is a write-off. You are badly bruised and your chest hurts. The fire brigade cut you out of the car and an ambulance takes you to hospital. The doctor says that you have bad whiplash and several broken ribs.

28. You have decided to go backpacking through South-East Asia for six months. You are due to leave today, and have finished packing and making all of your preparations. You have always wanted to visit that part of the world, and feel very excited in anticipation of all of the experiences you will have.

29. Over the past few months you have barely been able to meet your household expenses, as well as make regular mortgage payments. Today you receive your credit card bill including your expenses over Christmas, which are much larger than you planned for.

30. Yesterday you were informed that you have been promoted at work. Although you have been working hard and hoped that this would be acknowledged and rewarded in the long-term, you are nevertheless a reasonably new member of staff, so you are surprised and delighted to be promoted so soon.

Appendix E: Experimenter-Delivered Processing Mode Manipulation Script (Study 6)

Abstract Processing Script

We are now going to do a memory and imagination exercise. I would now like you to think about the memory that you have just described for the next few minutes. You do not need to say anything during this exercise, but I would like you to think about the answers to the questions that I ask.

Some people prefer to close their eyes during this exercise, but it is entirely up to you and only do what you feel comfortable with. Start by taking a few slow deep breaths.

I want you to begin by thinking about the memory that you just described to me, and analysing the causes, meanings, and consequences of what happened.

Why did the event from the memory occur? What does it mean that the event took place? What are the implications that have followed on as a result?

Think about what kind of person you were at the time that the event occurred.

Are you different now from how you were then? Why do you think that is?

Consider the thoughts that you had at the time the event occurred. Why were you thinking in that way? What does having those kinds of thoughts mean?

Since then, has the way you think about these kinds of things changed?

How did you think things would turn out when this event took place? Have things unfolded in the way that you expected? What has that meant for you?

Think about the major events that have happened since the event from the memory. What has caused these things to happen? What consequences have followed?

Think about the things that are different about you now compared to who you were when the event from the memory took place. What has been the cause of that? What consequences have followed on as a result?

Continue thinking about the causes and meanings of the events in the memory, and the consequences it has had for you.

When you are ready you may open your eyes.

Concrete Processing Script

We are now going to do a memory and imagination exercise. I would now like you to focus on the memory that you have just described for the next few minutes. You do not need to say anything during this exercise, but I would like you to think about the answers to the questions that I ask.

Some people prefer to close their eyes during this exercise, but it is entirely up to you and only do what you feel comfortable with. Start by taking a few slow deep breaths.

Begin by imagining what you saw during the memory that you just described to me. Allow yourself to emerge in the location the memory took place and focus your attention on seeing what you saw through your own eyes at the time.

Recall what kind of day it was at the time. Were you inside or outside? If you were outside you might notice a slight breeze or the sun shining on you. What were the surroundings like? Was the air fresh and crisp? Or was it hot and stuffy?

Notice the people who were there with you. Imagine the faces of the people central to the memory and try to picture them exactly as they were during the event. See their faces clearly and remember what they looked like.

What were they saying at the time? What were they doing? What were you doing?

Recall the thoughts that were running through your head at the time. Really bring to mind the things that you were thinking about at the time that the event occurred.

What were you feeling at the time? Focus all of your attention on how experiencing those emotions made you feel. Let yourself notice the sensations going through your body and allow yourself to feel what it was like at the time.

Allow yourself to be immersed by the memory – consider where it happened, who was there, what you were thinking, how you were feeling and really bring the essence of the memory into the room with you as you focus on it.

Let the events of the memory play themselves out in front of you, from beginning to end. Play the sequence of events over and over in your mind as though you are watching a movie of how the events unfolded.

Continue paying attention to the specific details of the memory.

When you are ready you may open your eyes.