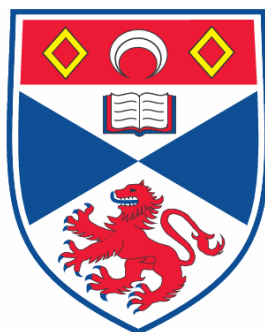


**AN INVESTIGATION INTO THE ROLE OF THOUGHT  
SUPPRESSION IN THE RETRIEVAL OF AUTOBIOGRAPHICAL  
MEMORIES**

**Julia Neufeind**

**A Thesis Submitted for the Degree of PhD  
at the  
University of St. Andrews**



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AN INVESTIGATION INTO  
THE ROLE OF THOUGHT SUPPRESSION  
IN THE RETRIEVAL OF AUTOBIOGRAPHICAL MEMORIES

by  
Julia Neufeind

Thesis submitted for a Doctor of Philosophy (PhD)

2008

**University of St. Andrews**

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## ABSTRACT

This program of research was designed to examine the role of thought suppression in the retrieval of autobiographical memories (ABMs). The principal theory proposed here is that thought suppression is an important mechanism in explaining certain ABM retrieval patterns relevant to trauma and self-harm. Study 1 examined the role of thought suppression as a correlate of ABM retrieval in a nonclinical student sample, and showed that higher levels of thought suppression were significantly correlated with the faster recall of negative episodic ABMs as well as the recall of fewer personal semantic memories. Study 2 used a suppression manipulation procedure designed to examine whether this was a causal relationship, and revealed that induced thought suppression directly led to a significant enhancement in the retrieval of negative episodic ABMs as well as significantly fewer overgeneral first responses to negative cues. Furthermore, the induced thought suppression also resulted in the recall of significantly fewer personal semantic memories. Together these results support the theory that thought suppression is an important factor in ABM recall. The enhanced recall of negative memories could be particularly important in individuals who are self-harming, suicidal and/or suffering from PTSD, as enhanced negative recall has previously been observed in these populations. In order to further examine how thought suppression affects ABM retrieval and whether the enhanced negative recall observed in Study 2 was a result of mood-congruent recall, Study 3 used a similar suppression manipulation paradigm to examine the effects of induced thought suppression on mood. The results suggested that

the enhanced negative ABM recall was unlikely to have been a by-product of the suppression manipulation resulting in a more negative mood state. Finally, Study 4 examined the role of thought suppression and ABM recall in a clinical sample of self-harming adolescents (who also reported high levels of post-traumatic stress symptoms). The results showed that levels of thought suppression were significantly higher in the self-harmers than the control group, indicating that thought suppression is an important coping mechanism in self-harmers. Furthermore, in terms of the autobiographical memory retrieval, it was found that the self-harmers were significantly faster in their retrieval of negative episodic ABMs and recalled fewer personal semantic memories than the control group. Multiple regression analysis of the data revealed that thought suppression remained as the most important predictor of variability in negative episodic ABM retrieval and personal semantic memory retrieval, even when variability explained by symptoms of depression and PTSD was considered. This program of research extends current theories of ABM retrieval by identifying thought suppression as a cognitive mechanism that directly affects the retrieval of both episodic as well as personal semantic ABMs. The theoretical importance and clinical relevance of this program of research are discussed.

# TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENTS	ii
ABSTRACT	iii
LIST OF TABLES AND FIGURES	ix
CHAPTER 1: Introduction	1
1.1    Introduction	1
1.2    What is Autobiographical Memory?	2
1.3    Why Study ABM?	11
1.4    ABM Recall and Emotional Disorders	12
1.5    Underlying Cognitive Mechanisms	16
1.6    Thought Suppression and Autobiographical Memory Recall	20
1.7    Aims of this Program of Research	25
1.8    Thesis Overview	28
CHAPTER 2: Methodology	30
2.1    Introduction	30
2.2    Measures of ABM Recall	31
2.3    Measures of Mood	38
2.4    Measures of Post-traumatic Stress Reactions	41
2.5    Measures of Thought Suppression	43
2.6    Videos for the Thought Suppression Tasks (Pilot Study)	45
CHAPTER 3: Empirical Study 1:	51
<i>EXPLORING THE ROLE OF THOUGHT SUPPRESSION AS A CORRELATE OF AUTOBIOGRAPHICAL MEMORY RECALL</i>	
3.1    Introduction	51
3.2    Method	55
3.2.1    Design	55
3.2.2    Participants	55

3.2.3	Materials	56
3.2.4	Procedure	58
3.3	Results	59
3.3.1	Traumatic Experiences	59
3.3.2	Correlational Analyses: Independent Variables	60
3.3.3	Thought Suppression and ABM Recall	61
3.4	Discussion	63
CHAPTER 4: Empirical Study 2:		69
<i>THE EFFECTS OF INDUCED THOUGHT SUPPRESSION ON ABM RECALL</i>		
4.1	Introduction	69
4.2	Method	75
4.2.1	Design	75
4.2.2	Participants	75
4.2.3	Materials	76
4.2.4	Procedure	80
4.3	Results	81
4.3.1	Replication of Correlations from Chapter 3	81
4.3.2	Effectiveness of the Suppression Manipulation	81
4.3.3	Effects of Thought Suppression on Memory for Video	82
4.3.4	Effects of Thought Suppression on ABM Recall	83
4.3.5	Nature of the Specific ABM Recall	87
4.4	Discussion	88
CHAPTER 5: Empirical Study 3:		95
<i>THE EFFECTS OF INDUCED THOUGHT SUPPRESSION ON MOOD STATES</i>		
5.1	Introduction	95
5.2	Method	103
5.2.1	Design	103
5.2.2	Participants	103
5.2.3	Materials	104



5.2.4	Procedure	105
5.3	Results	106
5.3.1	Participant Characteristics	106
5.3.2	Effectiveness of the Suppression Manipulation	107
5.3.3	Effects of Thought Suppression on Mood	108
5.3.4	Power Analyses	111
5.4	Discussion	111
CHAPTER 6: Empirical Study 4:		117
EXAMINING THE ROLE OF 'THOUGHT' SUPPRESSION AND ABM RECALL IN SELF-HARMING ADOLESCENTS		
6.1	Introduction	117
6.2	Method	121
6.2.1	Design	121
6.2.2	Participants	122
6.2.3	Materials	122
6.2.4	Procedure	125
6.3	Results	127
6.3.1	Participant Characteristics	127
6.3.2	Self-Harming Behaviour and Suicide Ideation	128
6.3.3	Traumatic Experiences	129
6.3.4	ABM Recall	130
6.3.5	Multiple Regression Analysis	133
6.3.6	Nature of the Specific ABM Recall	136
6.4	Discussion	137
CHAPTER 7: Discussion		144
7.1	Introduction	144
7.2	The Role of Thought Suppression in ABM Recall	144
7.3	The Effects of Thought Suppression on Mood	145
7.4	ABM Recall and Thought Suppression in Emotional Disorders	145
7.5	Theoretical Implications	146

7.6	Clinical Implications	155
7.7	Methodological Limitations of this Program of Research	158
7.8	Concluding Comments	162
REFERENCES		164
APPENDICES		188
	Appendix to Chapter 2 (Methodology)	189
	Appendix to Chapter 3 (Study 1)	206
	Appendix to Chapter 4 (Study 2)	212
	Appendix to Chapter 5 (Study 3)	225
	Appendix to Chapter 6 (Study 4)	235

## LIST OF TABLES AND FIGURES

1.1	(Figure)	The structure of ABM	5
2.1	(Table)	Positive versus negative video ratings	48
2.2	(Table)	Video ratings versus neutral scores	49
3.1	(Table)	Frequency of reported most traumatic event, means (s.d.) for IES-R and WBSI-E for each traumatic event	59
3.2	(Table)	Means (s.d.) for WBSI, IES-R and HADS and correlations between the subscales	60
3.3	(Table)	Descriptive statistics for the measures of ABM retrieval	62
4.1	(Table)	Means (s.d.) of the emotional content and frequency of the cue words for versions A and B of the AMT	76
4.2	(Table)	Gender ratio, means (s.d.) for age, suppression (self-report), reported intrusions (i.e. button presses) and WBSI per suppression condition	82
4.3	(Table)	Means (s.d.) for memory of the video per suppression condition	83
4.4	(Table)	Means (s.d.) of ABM measures pre and post manipulation per suppression condition	83
4.1	(Figure)	Means (s.e.) of recall latencies to cue words on the AMT pre and post manipulation per suppression condition	85
4.5	(Table)	Means (s.d.) for number of repeated memories, recent memories and direct recalls pre and post manipulation per suppression condition	87
5.1	(Table)	Gender ratio, means (s.d.) for age and WBSI per suppression condition	106
5.2	(Table)	Means (s.d.) for suppression (self-report) and reported intrusions (i.e. button presses) per suppression condition	107
5.3	(Table)	Means (s.d.) for TMD and each POMS subscale pre and post manipulation per suppression condition	109
5.1	(Figure)	Means (s.e.) for TMD pre and post manipulation per suppression condition	110
6.1	(Table)	Gender ratio, means (s.d.) for age, BPVS, WBTHS, CDI and WBSI per participant group	128
6.2	(Table)	Number (frequency) of responses to the Suicide Ideations Interview (self-harmers only, n = 20)	128
6.3	(Table)	Number (frequency) of traumatic events and most traumatic experiences per participant group	130
6.4	(Table)	Means (s.d.) of the ABM measures per participant group	130

6.1	(Figure)	Means (s.e.) of recall latencies to cue words on the AMT per participant group	132
6.5	(Table)	Linear correlations for the independent variables: CDI, WBTHS and WBSI-E	133
6.6	(Table)	Multiple regression model for latency to retrieve specific negative episodic memory (model $r = .495$ , $p < 0.05$ )	134
6.7	(Table)	Multiple regression model for personal semantic memory retrieval (model $r = .374$ , $p < 0.05$ )	135
6.8	(Table)	Means (s.d.) for number of repeated memories, recent memories and direct recalls per participant group	137

## *Chapter 1*

### INTRODUCTION AND OVERVIEW

“Nothing fixes a thing so intensely in memory as the wish to forget it”

- Michel de Montaigne (1533 – 1592)

#### *1.1 Introduction*

Autobiographical Memories (ABMs) are memories that individuals have of their own past. A person’s ABM can be conceptualized as a record of the experiences of a lifetime, which go together to give the person a sense of self (Baddeley, 1997). Therefore, the study of ABM is of particular interest because of its strong link with the concept of the self (e.g. Conway & Pleydell-Pearce, 2000). Furthermore, ABM retrieval is often studied with respect to clinical psychology. The ability to recall ABMs is known to be affected in numerous psychological disorders, including depression, post-traumatic stress disorder (PTSD), as well as in self harming and suicidal individuals. However, while the fact that ABM recall *is* affected in these clinical conditions is well documented (for a review see Williams, Barnhofer, Crane, Hermans, Raes, Watkins & Dalgleish, 2007), the empirical research that investigates *why* this is the case is limited. The aim of the current research program is to examine the potential role of one particular cognitive mechanism that may underlie and affect ABM retrieval, namely conscious thought suppression.

This introductory chapter reviews previous theoretical and empirical work that has examined ABM recall. It starts by defining the nature and

structure of ABM and presents the Self-Memory System (Conway & Pleydell-Pearce, 2000) as a predominant model of ABM retrieval as well as highlighting the emphasis in this model on the relationship between ABM and an individual's sense of self. Specific motivations for studying ABM retrieval are presented, with particular emphasis on the clinical relevance, which leads to a review of ABM recall patterns and deficits in the emotional disorders relevant to this program of research. The chapter then turns to examine possible reasons for these differences in ABM recall in clinical samples versus controls, and identifies conscious thought suppression as a theoretically important mechanism that could be related to ABM recall. Finally, the chapter gives an overview of this program of research and specifies the main issues that are investigated in this thesis in order to examine the role of thought suppression in the retrieval of ABMs.

### *1.2 What is Autobiographical Memory?*

In the widest sense, autobiographical memories are representations of information relating to the self. These are often emotional memories that are fundamental to the sense of self and personal goals (Conway & Pleydell Pearce, 2000). As such, ABM is central to an individuals' ability to function, to create a self-identity and to process emotion (Williams et al., 2007).

In the broadest sense, ABMs can be episodic (i.e. memories for events of ones past, e.g. remembering a certain holiday) or personal semantic (i.e. memory for facts from ones past, e.g. remembering the name of a primary school teacher) in nature (Conway, 1987).

### *1.2.1 Episodic Autobiographical Memory*

Episodic memory is memory of unique, concrete and temporally dated events that are time and place specific (Tulving, 1972). Episodic ABMs, therefore, are personal experiences that can be placed at some point in the past (Baddeley, 2001). A key aspect of episodic ABMs that is relevant to the present program of research is that they can be recalled at different levels of specificity. For the purpose of research employing a widely used cue word paradigm to elicit emotional episodic autobiographical memories (see section 2.2.1), specific episodic memories have been defined as memories for an event that lasted less than one day and occurred at a specific time, e.g. “the moment when my partner proposed to me” (Williams & Broadbent, 1986). Elicited autobiographical memories that are not specific usually take the form of either extended memories (i.e. referring to a time that lasted longer than a day) or categoric memories (i.e. generic summary of a type of event) (Williams & Dritschel, 1992). An example of an extended memory would be “my holiday in Australia” and a categoric memory would be “the piano lessons that I had as a child”. Together, extended and categoric memories are referred to under the umbrella term of overgeneral memory, meaning any type of memory that does not refer to a specific event. Williams and Dritschel (1992) found that these two types of overgeneral memories are independent of each other, primarily because overgeneral memory retrieval in emotional disturbance is associated only with the increased recall of categoric memories, but not with the recall of extended memories.

### *1.2.2 Personal Semantic Memory*

Semantic memory is memory for facts that are culturally shared and not temporally specific and includes knowledge of facts, objects, concepts, as well as words and their meanings (Tulving, 1972). Personal semantic memory is factual knowledge of one's past, such as one's home addresses, names of teachers, places of work, etc. (Kopelman, Wilson & Baddeley, 1989). It is different from episodic autobiographical memory in that it does not require the recall of information relating to when or where it was first learned (Williams et al., 1999); therefore the validity of personal semantic memory is not dependent upon a certain event. Furthermore, it has also been argued that personal semantic memory differs from episodic memory in that it is not perceptual in nature (Brewer, 1986), and that personal semantic information that is frequently rehearsed is not thought to be indexed by event related information (Conway, 1987).

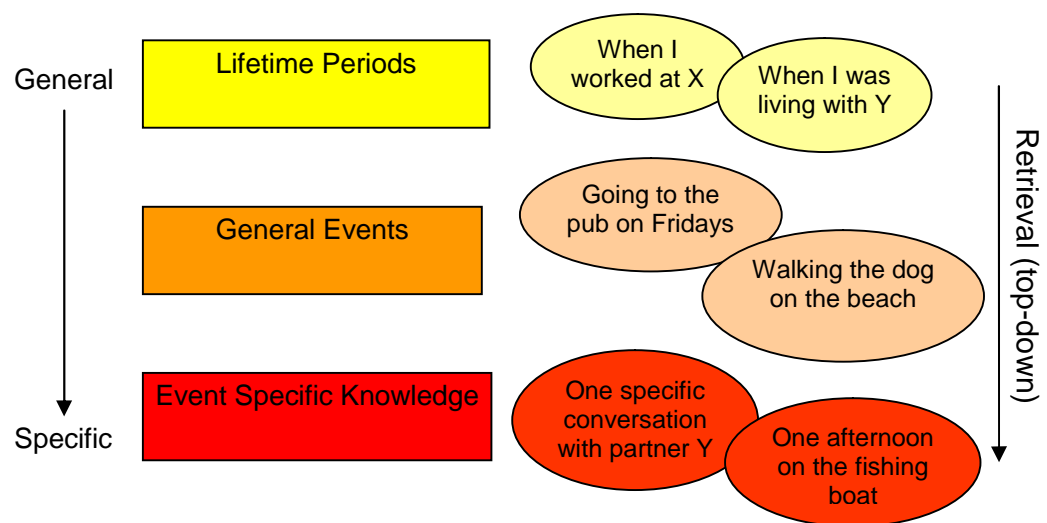
It has been argued that there is a certain amount of overlap between personal semantic and episodic ABM, especially in the sense that the retrieval of certain personal semantic information may involve the activation of episodic memories (Conway, 1987). For instance, if asked for the personal semantic information "have you ever been to France?" the search for an answer may well involve recalling episodic memories from a recent holiday in France. However, because there are sufficient characteristics that differ between personal semantic and episodic ABM, they will be assessed separately in the present program of research, which is consistent with previous research (e.g. Hunter & Andrews, 2002, Stokes et al., 2004).



### 1.2.3 The Structure of Autobiographical Memory

Autobiographical Memories are not thought to be stored as an infinite number of separate memory units. Instead, the retrieval of ABMs is conceptualized as a reconstructive process. The autobiographical information from which ABMs are constructed is thought to be stored in an autobiographical memory knowledge base (Conway & Pleydell-Pearce, 2000). According to this predominant model or ABM, autobiographical knowledge is hierarchically organized in an interlinked network consisting of different levels of specificity. These levels range from “lifetime periods” at the most general level and “general events” at an intermediate level to “event specific knowledge” (ESK) at the most specific level (see Figure 1.1). Numerous empirical studies have found evidence to support this hierarchical organization of autobiographical memories (Barsalou, 1988; Conway & Bekerian, 1987; Conway & Rubin, 1993).

Figure 1.1: The structure of ABM (adapted from Conway & Rubin, 1993)



Representations stored at the most general level are thought to be predominantly abstract and semantic in nature. Information stored at this level takes the form of memories for lifetime periods. Lifetime periods are prolonged and themed periods of an individual's life and generally have distinct start and end points (e.g. living with a certain partner).

Representations at the intermediate level, i.e. "general events", can either be in the form of repeated events (e.g. "going to the pub on Friday nights") or extended events (e.g. "the holiday in Spain"). These two types of "general events" represent the two distinct types of overgeneral ABM mentioned above in Section 1.2.2; that is, categoric and extended memory. Taken together, the information stored at the "lifetime periods" and "general events" levels forms the conceptual self, where information regarding an individuals' attitudes and beliefs are stored. Specific episodic memories are stored as "event specific knowledge" at the lowest point in the hierarchy. ESK consists of highly specific, sensory/perceptual information.

When the information is stored within the autobiographical memory knowledge base, a memory can be generated as a result of two different processes: generative retrieval or spontaneous/direct retrieval (Conway & Pleydell Pearce, 2000). Generative retrieval starts by initially accessing verbal/abstract information in the form of either "lifetime period" or "general event" knowledge, which then activates interconnected representations further down in the hierarchy (top-down retrieval) until the relevant ESK is accessed. For example, when a person tries to remember a time when they felt happy, they might begin the search at the level of lifetime periods and think about the time when they were living with a specific partner. From there the

search for a specific memory might continue by accessing a category of general events, for instance holidays with this partner. This process, in turn, could lead to the activation of event specific knowledge within that category, for instance a specific night when the couple had dinner in a special romantic restaurant. This search is conscious and is thought to be controlled by supervisory executive processes which continuously monitor the search in order to determine if it is successful. If it is not, these processes refine the pattern of activation of representation within the autobiographical memory knowledge base. Therefore, an important role of these supervisory executive processes is the demanding task of inhibiting the activation of representations that are irrelevant to the present search. For instance, in the above example, the activation of any representation that would not lead to the activation of a happy ESK needs to be inhibited in order for the search to be successful.

Spontaneous or direct retrieval, on the other hand, is automatic. This type of retrieval occurs when ESK is directly activated by strong cues, which can be either internal or environmental. The activation of a specific memory (ESK) by direct retrieval is faster and less resource demanding than generative retrieval. To illustrate this, a person might be walking down the street and see a person they remember, and a memory about a specific event with that person might come to mind immediately, without any form of generative retrieval. It is important to note that most memories that can be activated by direct retrieval are linked to representations higher up in the hierarchy of organisation (e.g. a certain lifetime period) and are therefore also available for generative retrieval. However, in certain cases, such as traumatic intrusions, this may not always be the case. In this case a memory might be suddenly

recollected as a result of an external stimulus, whereas it was not previously available for recollection by generative retrieval.

Central to the above model of ABM is the relationship between the autobiographical memory knowledge base and an individual's sense of self, as it contains the information a person has about him or herself. The self, and more specifically the goals of the self, function as control processes that modulate the formation of autobiographical memories. This complex process is described as the Self-Memory System (Conway & Pleydell-Pearce, 2000). The purpose of the system is to continuously create and maintain a record of experience that is to be used to guide the pursuit of personal goals, as well as forming an integrated representation of one's self that is consistent with personal goals. Therefore, the Self-Memory System is conceptualized as being composed of the autobiographical memory knowledge base and the "working self". The working self operates numerous working-memory control processes within the system that ensure that the self-memory system and its components remain consistent with desired self-schemas and possible selves (Conway & Pleydell-Pearce, 2000).

According to the Self-Memory System, the goal structure of the working self determines both how autobiographical information is encoded and plays an important role in the construction of autobiographical memories during generative retrieval. The valence of an experience is determined by the degree of discrepancy between the autobiographical information and the goals of the working self. If the information is consistent with the goals of the working self and affirms them, it is experienced as positive. In contrast, the greater the discrepancy between the experience and the goals of the working

self, the more negative the information is perceived to be (Conway & Pleydell-Pearce, 2000). For instance, if an individual has “being an intelligent person” as an active goal of the working self, then autobiographical information relating to receiving an academic award will be perceived as positive, because it affirms the goal of “being intelligent”. However, another incident where the person receives a poor grade on an exam will be seen as a negative event, because it contradicts this particular goal of the working self.

Depending on the context of the current goals of the working self, the recollection of the same episodic memory can be experienced as both positive and negative at different times. For instance, an overweight person might remember an ESK of visiting a swimming pool as positive if it is within the goal-context of “being an active and outgoing person”, as this particular goal is affirmed by the recollection. If, on the other hand, the same memory is activated within the context of the goal of “being an attractive and slim person”, then the memory can be seen as negative as it contradicts the goal.

A large role of the control processes of the working self is the reduction of discrepancies between the information in the autobiographical memory knowledge base and the goals of the working self (Conway & Pleydell-Pearce, 2000). If a specific episodic memory (i.e. ESK) is consistent with the current goals of the working self (i.e. positive) it readily becomes linked to general representations higher up in the hierarchy (i.e. lifetime periods and general events), and is then available to be activated by generative retrieval.

If, on the other hand, an ESK is not relevant to or in extreme cases even inconsistent with the goals of the working self, this knowledge cannot be

readily integrated into the Self-Memory System and linked to higher level representations. In order to assimilate the autobiographical information the goals for the working self can sometimes be adjusted in such a way that consistency between the information in the autobiographical memory knowledge base and the goals for the working self is achieved. If this is the case, the memory can subsequently be assimilated. However, in more extreme cases, when the information poses a large inconsistency with the goals of the working self, the only way of controlling the discrepancy is for the ESK not to be linked to higher level representations, which in turn means that it will not become an integrated part of the Self-Memory System. Memories of traumatic events in particular generally contradict the goals of the working self, and therefore cannot be readily assimilated into the Self-Memory System. For instance, if a person has the goal of “being a safe person”, a memory of an incident of abuse would be highly discrepant with that goal. The memory itself is therefore unlikely to be integrated into the Self-Memory System, and is then often not available for cued recall, while intrusions of the material (i.e. direct retrieval) are still possible. According to the Self-Memory System, the aim of therapy in such cases should be to achieve the successful assimilation of the traumatic memories into the autobiographical memory knowledge base by reducing the discrepancy between the autobiographical information and the current goals of the working self.

Though widely employed, the empirical evidence for the Self-Memory System remains very limited. One study has directly investigated the relationship between autobiographical memory retrieval and personal goals (Sutherland & Bryant, 2005). In a small mixed sample of adult survivors of

motor vehicle accidents and assaults, participants were asked to report five episodic memories that they considered to be self-defining, as well as complete a short questionnaire that identified current goals. Participants with PTSD reported more self-defining memories that were trauma-related than those without a diagnosis of PTSD (but who had nevertheless survived a traumatic event) and non-trauma exposed controls. These results indicated that sufferers of PTSD are more pre-occupied with the traumatic event than those who do not have the disorder. Furthermore, the retrieval of trauma related self-defining memories was significantly correlated with reporting personal goals that were related to overcoming the traumatic experience. These findings are consistent with the predictions of the Self-Memory System, as in the case of PTSD, the content of the memory recall matched the current goals of the individuals. However, although this evidence is consistent with the theory proposed by the Self-Memory System, it only addresses one aspect of the model and deals with a very limited population of adult survivors of civilian trauma.

### *1.3 Why study Autobiographical Memory Recall?*

A key motivation for studying ABM retrieval in the present program of research is the potential for it to aid our understanding of the cognitive processing biases associated with psychopathology. Insights into these cognitive biases can lead to the developments of therapeutic interventions. ABM recall is important in clinical settings, as virtually all “talk-based” psychotherapies require the patient to recall events or experiences from their past (e.g. Rubin, 1996) as a step towards processing and re-evaluating this

information. The ability to recall ABMs is therefore important for many therapeutic settings.

Furthermore, certain ABM retrieval patterns have been directly linked to certain emotional states (e.g. Williams, 1996) and numerous psychological disorders (see Section 1.4). For instance, in the case of depression, the inability to retrieve specific ABMs (i.e. overgeneral episodic recall) has been empirically linked to other problems, such as problems with imagining future events (Williams, Ellis, Tyers, Healy, Rose & MacLeod, 1996) and poor social problem solving skills (Evans, Williams, O'Loughlin & Howells, 1992; Goddard, Dritschel & Burton, 1996, 1997, 1998, 2001; Raes, Hermans, Williams, Demyttenaere, Sabbe, Pieters & Eelen, 2005; Scott, Stanton, Garland & Ferrier, 2000; Williams, Barnhofer, Crane & Beck, 2005). Consistent with this research, the ability to solve social problems has been shown to be dependent on the ability to recall specific ABMs (e.g. Pollock & Williams, 2001).

#### *1.4 Autobiographical Memory Recall and Emotional Disorders*

As would be expected, autobiographical memory retrieval is naturally affected in degenerative amnesias, such as age-related dementia and Alzheimer's Disease (e.g. Baddeley, 1997). However, while this is acknowledged here, the focus of this present program of research is on the cognitive mechanisms that may underlie autobiographical memory retrieval patterns in emotional disorders.

Initially, early research in the area of memory and emotion has revolved around mood-congruent memory retrieval, and several studies found



support for a mood-congruent memory bias in dysphoria (Clark & Teasdale, 1982; Lloyd & Lishman, 1975; Teasdale & Fogarty, 1979). In these studies, participants who were in a dysphoric mood state were shown to retrieve negative autobiographical memories relatively faster than positive memories.

However, a seminal study by Williams and Broadbent (1986) revealed that a sample of suicidal patients were not only slower to produce memories in response to positive cues than controls, but additionally were more likely than controls to fail in the retrieval of a specific memory in response to both positive and negative cue words by producing overgeneral memories instead. Furthermore, these differences could not be explained by general deficits in cognitive functioning, as participants across all groups showed no difference in their performance on a semantic memory task.

Following this serendipitous finding by Williams and Broadbent (1986), many subsequent studies have focused on examining this overgeneral memory recall phenomenon. In terms of psychopathology, the tendency to recall overgeneral memories (or problems with specific episodic ABM recall) has been extensively documented to be related to depression (see Williams et al., 2007 for a review), suicidal and parasuicidal thoughts and behaviours (Evans, Williams, O'Loughlin & Howells, 1992; Pollock & Williams, 2001; Sidley, Whitaker, Calam & Wells, 1997; Sinclair, Crane, Hawton & Williams, 2007; Williams & Broadbent, 1986; Williams, Ellis, Tyers, Healy, Rose & MacLeod, 1996), as well as post-traumatic stress disorder (de Decker, Hermans, Raes & Eelen, 2003; Henderson, Hargreaves, Gregory & Williams, 2002; Hermans, Van den Broeck, Belis, Raes, Pieters & Eelen, 2004; Kuyken & Brewin, 1995; McNally, Lasko, Macklin & Pitman, 1995; McNally, Litz,

Prassas, Shin & Weathers, 1994; Raes, Hermans, Williams & Eelen, 2005; Stokes, Dritschel & Bekerian, 2004; Wessel, Merckelbach & Dekkers, 2002). However, a recent review paper of the literature on overgeneral memory retrieval and trauma has concluded that overgeneral episodic ABM retrieval is unlikely to be a result of mere exposure to a traumatic event, but instead is more consistently associated with psychopathological conditions such as depression and PTSD (Moore & Zoellner, 2007). Furthermore, the tendency to retrieve overgeneral ABMs has also been documented in schizophrenia (Harrison & Fowler, 2004; Iqbal, Birchwood, Hemsley, Jackson & Morris, 2004; Neuman, Blairy, Lecompte & Philippot, 2007; Riutort, Cuervo, Danion, Peretti & Salame, 2003). A single study has also demonstrated overgeneral memory retrieval in Borderline Personality Disorder (BPD) (Jones, Heard, Startup, Swales, Williams & Jones, 1999), however, subsequent research has failed to replicated these results (Arntz, Meeren & Wessel, 2002; Kremers, Spinhoven & Van der Does, 2004). A further study assessing ABM recall latencies also found no difference was found between BPD sufferers and controls in the latency to retrieve a specific ABM (Renneberg, Theobald, Nobs & Weisbrod, 2005).

While the predominant focus in the literature has been on overgeneral ABM retrieval, a number of studies have hinted at a different pattern, namely that of a negative facilitation effect. In 1988, Williams and Dritschel found that a group of overdose patients produced significantly more specific first responses to negative cues than positive cues, a pattern which was reversed for the control group. In another study using a group of depressed individuals as participants, high levels of childhood trauma were found to be significantly

correlated with more specific recall to negative but not to positive cue words (Peeters, Wessel, Merckelbach & Boon-Vermeeren, 2002). Burnside, Startup, Byatt, Rollinson and Hill (2004) found that childhood sexual abuse survivors who had a history of previous major depression produced significantly fewer categoric responses to negative cue words than those abuse survivors without a history of major depression. Finally, in a sample of mood disturbed adolescents, Swales, Williams and Wood (2001) observed a positive correlation between hopelessness and the number of specific memories recalled in response to negative cue words. However, in retrospect the authors speculated that this correlation was a result of a number of the parasuicidal adolescents recalling the same traumatic memory in response to multiple negative cue words. Taken together, these studies indicate that in certain cases, particularly when there is a history of trauma and/or self-harming behaviour, negative memories can actually be *more* accessible than positive memories.

The critical question here is to ask why memory recall is affected in such a way and what could underlie the discrepancy in ABM recall patterns in sufferers of PTSD and/or individuals who self-harm, where recall is either unselectively overgeneral or a negative facilitation effect is observed. This question is central to the motivation behind the present program of research and is considered in more detail in the following section (section 1.5).

Finally, a number of studies have also demonstrated that as well as episodic ABM recall, personal semantic memory recall may also be linked to psychopathology. Interestingly, while overgeneral ABM recall is observed in numerous emotional disorders, personal semantic memory deficits have so far

only been observed in PTSD (Hunter & Andrews, 2002; Meesters, Merckelbach, Muris & Wessel, 2000; Stokes, Dritschel & Bekerian, 2004). It should be noted here that the trauma in these studies occurred in childhood, and the consensus is that the personal semantic information has either not been encoded properly, or has been forgotten as a by-product of traumatic amnesia affecting the period of time that surrounds the trauma, possibly due to hippocampal dysfunction in trauma survivors (Hunter & Andrews, 2002). However, research investigating personal semantic memory retrieval in emotional disorders is limited, and the present program of research aims to expand on this literature.

### *1.5 Underlying Cognitive Mechanisms*

In the past, research revolving around ABM recall in the emotional disorders has focused primarily on identifying clinical populations in which the ability to recall ABMs is different from controls, and to describe these different ABM recall patterns (see Section 1.4). With this established, the direction in research is turning towards attempting to understand *why* ABM recall is affected, and this research is described in the present section.

A recent review paper (Williams et al., 2007) summarises the predominant theories that explain the phenomenon of overgeneral autobiographical memory retrieval, namely functional avoidance, ruminative thinking, and reduced executive resources. The functional avoidance explanation holds that the function of overgeneral memory recall is to protect the individual from the experience of negative emotions activated by certain ESKs (Conway & Pleydell-Pearce, 2000, see also Affect Regulation

Hypothesis: Williams, Stiles & Shapiro, 1999). The search during generative retrieval is thought to be truncated before such negative ESKs are activated. Because ESKs are sensory and perceptual in nature, the activation of an ESK is believed to be reminiscent of the actual event. Specific ABM retrieval can therefore activate the same emotions experienced at the time of the event. If the ESK contradicts the goals of the working self and is negative in nature, then the activation would be a negative experience in itself. Therefore, overgeneral ABM is thought to be a type of functional avoidance, and occurs primarily to protect the individual from the negative affect associated with negative, or goal-contradicting, specific memories (ESK). According to this theory, however, only negative ABM recall should be affected and positive memory recall should remain intact; a pattern which is not confirmed by empirical data, which has consistently demonstrated overgeneral ABM recall for both positive and negative memories. Even more contradictory to this theory are the cases of trauma and self harm where a negative facilitation effect is observed (section 1.4). The enhanced retrieval of negative ABMs cannot be explained by the functional avoidance model of overgeneral ABM retrieval, as negative memories should, if anything, be less accessible. In one study using an undergraduate student sample, an avoidant coping style was found to be significantly correlated with reduced ABM specificity (Hermans, Defranc, Raes, Williams & Eelen, 2005). However, a major shortcoming of this study is that the role of avoidance was not considered separately for positive and negative memories (see Chapter 3). Rather than selectively affecting only negative memories, it is thought that this retrieval inhibition,

once it has developed, unselectively affects the retrieval of both positive and negative memories (e.g. Williams, 1996).

A further cognitive mechanism that is likely to be related to overgeneral ABM retrieval is rumination. This explanation of overgeneral ABM retrieval is supported by empirical evidence which has demonstrated that the cognitive coping mechanism of rumination is associated with overgeneral autobiographical memory retrieval in depression. A series of experiments were conducted using experimental manipulation paradigms in which participants were either instructed to ruminate by engaging in self-focused analytic thinking (e.g. “think about how they feel and why they feel this way”), or to distract themselves by thinking about perceptual information that does not relate to the self (e.g. “think about the sound of a raindrop falling down a window pane”) (Lyubomirsky & Nolen-Hoeksema, 1995; Watkins & Teasdale, 2001, 2004; Watkins, Teasdale & Williams, 2000). The results of these studies showed that in the presence of depressed mood, rumination results in significantly more overgeneral ABM recall to both positive and negative cue words, while distraction leads to more specific ABM retrieval. Watkins and Teasdale (2001) further examined whether the self-focused or the analytical thinking component of rumination was responsible for leading to the subsequent overgeneral ABM retrieval. In a study conducted with adults suffering from major depression, Watkins and Teasdale (2001) found that while self-focused thinking influenced the degree of the depressed mood, it alone did not lead to overgeneral ABM retrieval. The analytical thinking component, however, directly resulted in overgeneral ABM retrieval in response to both positive and negative cue words. While the

effects of rumination on ABM retrieval are only observed in the presence of dysphoric mood (Lyubomirsky & Nolen-Hoeksema, 1995), these studies nevertheless demonstrate that cognitive coping mechanisms can be directly related to, and may even be the direct cause of, certain ABM retrieval patterns.

The final explanation that has been offered to account for overgeneral ABM retrieval is that of reduced executive resources. According to Conway and Pleydell-Pearce (2000), generative retrieval of specific ABMs (ESK) is an effortful process that requires executive resources (see Section 1.2.3). The model suggests that when resources are limited the generative retrieval process can be affected at numerous stages. Empirical evidence for this theory comes from studies where significant correlations were observed between reduced working memory capacity and overgeneral ABM retrieval in elderly participants (Winthorpe & Rabbitt, 1988) as well as poorer performance on a word fluency task and overgeneral ABM retrieval in normal controls (Williams & Dritschel, 1992). Furthermore, the ability to retrieve specific memories (as part of a narrative) has been found to be related to the function of supervisory control processes in young children (Fivush & Nelson, 2004) and in brain damaged participants (Baddeley & Wilson, 1986). Finally, from a series of laboratory experiments designed to further investigate the role of executive control in overgeneral ABM retrieval in depression, Dalgleish et al. (2007) concluded that reduced executive control plays a significant role in explaining the overgeneral memory retrieval patterns typically observed in individuals suffering from depression. This again makes this model of reduced executive resources as an explanation of overgeneral autobiographical

memory is particularly relevant to individuals suffering from depression, where cognitive resources are known to be strained (e.g. Ellis & Ashbrook, 1988).

However, while extensive theories have been formulated to explain overgeneral ABM recall (particularly in individuals suffering from depression), no theory exists to date that specifically explains the negative facilitation effect which is sometimes observed in individuals suffering from traumatic stress responses and/or those who self harm. If an individual recalls negative information about the self relatively easier than positive memories, this could in theory have a negative impact on their overall self-schema, which in turn could have a knock-on effect on confidence, self-esteem and wellbeing. The first step in understanding this negative facilitation effect of episodic ABMs retrieval is to identify *why* it occurs, and on a cognitive level identify which processes are related to and responsible for this phenomenon. The next section of this thesis discusses thought suppression as a theoretically important mechanism that could be related to this negative facilitation effect.

### *1.6 Thought Suppression and Autobiographical Memory Recall*

Thought suppression refers to the conscious effort used to direct attention away from a particular thought (Wegner, Schneider, Carter & White, 1987). The concept was first introduced by Pierre Janet (Janet, 1889), shortly before the Freudian concept of repression was introduced (Freud & Breuer, 1895). Unfortunately, although there are important differences in the two processes, the terms have often been used interchangeably. Brewin and Andrews (1998) have pointed out that as an unconscious process, repression



implies the need for unconscious mechanisms to block all conscious processing of the repressed material, which results in a failure to encode this information. They further argued that this lack of encoding implies that repressed memories can not be accessed consciously. Thought suppression, on the other hand, refers to the conscious effort to not recall material that has been encoded to some degree at least and could be accessed if the individual should choose to retrieve it (Brewin and Andrews, 1998). Suppression, therefore, refers to an inhibition of storage or retrieval, rather than encoding.

As a cognitive coping strategy, thought suppression has been highlighted to play an important role in numerous psychological disorders, including depression, specific phobias and post-traumatic stress disorder (for an overview see Purdon, 1999). In the case of post-traumatic stress, not only is avoidance a key symptom of the disorder (American Psychiatric Association, 1994), but thought suppression has also been argued to be an important underlying mechanism that is responsible for the maintenance of chronic PTSD by directly hindering the assimilation of trauma-related memories (Ehlers & Clark, 2000). In an empirical investigation into the coping styles in post-traumatic stress disorder, it was found that thought suppression was positively correlated with intrusion and avoidance symptoms of PTSD, and furthermore, that PTSD patients scored significantly higher on a measure of a suppressive coping style when compared to both anxiety patients and healthy controls (Amir, Kapla, Efroni, Levine, Benjamine & Kotler, 1997).

The process of thought suppression is thought to require the effective operation of two mental processes: an operating process and a monitoring

process (Wegner, 1994). Initially, the mental content that is to be suppressed has to be marked for suppression, which in itself cues the material for recall. Following this, the two processes act simultaneously in an attempt to exert mental control. The operating process is effortful and cognitively demanding, and searches for mental content that yields the desired state (i.e. not activating the “to be suppressed” material). A simultaneously operating automatic and ironic monitoring process, on the other hand, searches for mental contents that signal failure of mental control by activation of the material that is to be suppressed. For instance, when trying to suppress any thoughts of white bears, the goal of the cognitively demanding operating process acts to activate representations that are of anything but white bears, while the unconscious and far less demanding monitoring process searches for mental representation that indicate white bears.

Thought suppression can be seen as an adaptive coping strategy if it is successful in temporarily inhibiting a thought that is inappropriate or if the thought can not be addressed at the moment in time when it occurs. For instance, successfully suppressing a thought of needing to go shopping during a business meeting can be adaptive, as it can free cognitive resources to be available for the meeting.

If used frequently, however, suppression of a particular thought or memory is viewed as a maladaptive coping strategy, and it typically results in a paradoxical effect. Contrary to intentions, suppression often results in an increased frequency of intrusions of the suppressed material into consciousness (for a review see Abramowitz, Tolin & Street, 2001). The paradoxical effects of thought suppression are thought to occur when the

operating process of the suppression is undermined, thereby leaving the ironic monitoring process to search for and focus on mental contents that signal failure of the operating process (Wegner, 1994). In a seminal study by Wegner, Schneider, Carter and White (1987), participants were instructed to suppress thoughts of a white bear for a period of five minutes, and subsequently reported an increased frequency of thoughts about white bears as compared to the control participants who were instructed to express thoughts about white bears. Furthermore, in the five minute period following the task, participants in the suppression condition experienced a “rebound effect”, a continued preoccupation with thoughts of white bears.

These paradoxical effects of thought suppression have been found to extend from thoughts of white bears (Wegner, Schneider, Carter & White, 1987) to stereotypical preconceptions (Macrae, Bodenhausen, Milne & Jetten, 1994), episodic memories of neutral film clips (Wegner, Quillian & Houston, 1996), traumatic film clips of a grizzly bear attack (Rassin, Merckelbach & Muris, 1997) and a fatal office fire (Davies & Clark, 1998), as well as obsessional thoughts (Purdon & Clark, 2001). Furthermore, these effects have been found to extend to suppressed autobiographical memories of past relationships (Wegner & Gold, 1995), bereavement (Rassin, Merckelbach & Muris, 2001), and traumatic memories of a motor vehicle accident (Beck, Gudmundsdottir, Palyo, Miller & Grant, 2006).

The theory of thought suppression holds that when mental capacity is reduced (for instance by stress, time pressure, or increased cognitive load), the effortful operating process is undermined. By virtue of being far less cognitively demanding, however, the simultaneous automatic monitoring

process remains intact, thereby continuously activating the very mental content that was meant to be suppressed (Wegner, Erber & Zanakos, 1993). Numerous empirical studies have demonstrated that the ironic effects of thought suppression are more prone to occur when mental capacity is diminished. For instance, in studies where participants were subjected to cognitive load, the paradoxical effects of thought suppression were exacerbated (Mikulincer, Dolev & Shaver, 2004; Wegner & Erber, 1992; Wegner, Erber & Zanakos, 1993; Wenzlaff, Rude, Taylor, Stultz & Sweatt, 2001). Further support for the theory that successful thought suppression depends on sufficient cognitive resources comes from studies in which experiencing fewer intrusions in a suppression task was significantly correlated with better performance on a measure of working memory capacity (Brewin & Beaton, 2002; Brewin & Smart, 2005).

Additionally, recent research has suggested that suppression itself can incur cognitive costs and hinder other cognitive processes. For instance, in a situational emotion suppression task, it was found that suppression impaired incidental memory for information presented during the suppression task (Richards & Gross, 1999). In another experiment, participants were asked to suppress all negative thoughts and memories during a stream-of-consciousness task, and content analysis revealed that thought suppression led to significantly less causal reasoning and discrepancy seeking (Beevers & Scott, 2001).

### *1.7 Aims of this Program of Research*

The aim of the present program of research is to investigate the role of thought suppression in the retrieval of both episodic as well as personal semantic ABMs. Because of the paradoxical effects of thought suppression, as well as its importance in PTSD (a disorder where the negative facilitation effect of ABM retrieval has been observed – see Section 1.4), it is hypothesized that suppression could be a mechanism that is related to a negative facilitation effect of ABM retrieval, much like rumination as a coping mechanism is related to overgeneral ABM retrieval in depression (see Section 1.5). The investigation of this hypothesis is the purpose of the current program of research; in the first instance by establishing whether a link exists between thought suppression and ABM retrieval patterns, and then by opening the research into investigating how thought suppression affects ABM retrieval. Finally, the importance of thought suppression in ABM is assessed in a clinical sample of participants.

During the course of this program of research, two studies have been published that have examined the direct effects of thought suppression on ABM retrieval. Schönfeld, Ehlers, Böllinghaus and Rief (2007) set out to examine the effects of thought suppression on overgeneral ABM retrieval in adult survivors of assault. All participants were asked to suppress their thoughts of the assault while completing a standard oral autobiographical memory test (AMT – see Section 2.2.1) and also completed a further AMT under control conditions (i.e. no suppression instructions) in a counterbalanced order. Those assault survivors who met the criteria for a diagnosis of PTSD reported significantly higher levels of trait suppression

than the assault survivors without a diagnosis of PTSD. In terms of ABM retrieval, Schönfeld et al. (2007) found that, firstly, individuals with PTSD recalled significantly more categoric memories and had more omissions in response to cue words (when these two dimensions were considered together) than those individuals who did not meet the PTSD criteria. However, these effects were only observed when all assault related memories retrieved in response to the cue words were removed from the analysis. This was done because the assault-related memories were thought to be specific by default. Overgeneral ABM retrieval was found to be significantly correlated with PTSD symptom severity but not working memory capacity as measured by a digit span task (Schönfeld et al., 2007). When the participants were subjected to the thought suppression task, these overgeneral ABM retrieval effects were enhanced, that is, the individuals with PTSD retrieved more categoric memories and had more omissions than those without PTSD. The authors offer two possible explanations for these results. Firstly, Schönfeld et al. (2007) argue that overgeneral memory in PTSD depends on the degree of effortful thought suppression, and that the more an individual with PTSD suppresses, the higher the overgeneral ABM retrieval. The second explanation that is offered is that cognitive load is higher for individuals with PTSD than those who do not meet the criteria for a diagnosis. Therefore, the suppression condition is a more effortful task for individuals with PTSD than those without the disorder (Schönfeld et al., 2007). However, in this study the material that was suppressed (i.e. the assault) differed for each participant, which implies that the suppression task was different for each participant. Furthermore, only one dimension of accessibility of ABMs, namely

overgeneral retrieval, was considered in this study, and no measures of latency were taken. However, most relevant to this program of research, Schönfeld et al (2007) did not assess any valence effects in the ABM retrieval, and personal semantic memory retrieval, which is consistently affected in PTSD (Section 1.4) was also not assessed.

A second study utilised a suppression manipulation to assess the effects of thought suppression on ABM retrieval with respect to valence effects and did indeed find a negative facilitation effect (Dalgleish & Yiend, 2006). A sample of dysphoric adults were asked to recall a specific and negative event from their past, and were subsequently asked either to suppress this memory or were given no specific instructions. It was found that thought suppression resulted in the faster recall of negative episodic memories. This study, however, had several methodological limitations, such as no baseline measures of ABM retrieval were taken, the suppressed material was different for each participant, and not all participants in the depressed group were depressed at the time of testing. These limitations are discussed in more detail in Chapter 4 of this thesis. The present program extends to other populations (including nonclinical student groups, as well a group of clinical adolescents), and also seeks to examine the effects of thought suppression not only on episodic, but also on personal semantic memory retrieval. The motivation behind examining the effects of thought suppression on personal semantic memory is that the reduced ability to retrieve personal semantic information is a key memory feature in PTSD (section 1.4), a disorder in which both the negative facilitation effect has been observed (section 1.4) and where thought suppression is a theoretically important variable.

## *1.8 Thesis Overview*

The literature reviewed in this chapter highlights conscious thought suppression as a theoretically important mechanism that may be related to ABM retrieval patterns. The purpose of this program of research is to investigate the role of thought suppression in the retrieval of both episodic as well as personal semantic autobiographical memories.

Initially, the role of thought suppression in ABM retrieval has to be established. Accordingly, Chapter 3 investigates the role of thought suppression as a correlate of ABM recall in a non-clinical undergraduate student sample while current levels of dysphoric mood and post-traumatic stress symptoms are taken into account (Study 1). Chapter 4 (Study 2) employs a suppression manipulation and aims to replicate the findings of Study 1 and to establish a causal effect of thought suppression on ABM retrieval patterns. Chapter 5 (Study 3) employs a similar suppression manipulation to investigate the effects of thought suppression on mood. This study was conducted to establish whether the previously observed effects of thought suppression on ABM recall could be explained as occurring as a result of a mood-congruent retrieval effect.

Finally, after having established the role of thought suppression in ABM retrieval in non-clinical samples, this program of research turns to investigating the levels of thought suppression, ABM retrieval patterns and correlations between the two variables in a clinical sample of self-harming adolescents with high levels of trauma in Chapter 6 (Study 4).

This initial chapter has highlighted the theoretical importance of conscious thought suppression in ABM retrieval patterns, and justified the



need for empirical research in this area. The research in this thesis employs various methodologies to investigate this concept and thus make inferences about the role of thought suppression in ABM retrieval. Analogue studies in non-clinical student samples allow for insights into the causal effects of thought suppression on ABM recall, as well as clarifying the role of a mood-congruency effect in mediating this relationship. Finally, this thesis documents an investigation into the role of thought suppression and ABM retrieval in a clinical sample.

This thesis now turns to present the methodology employed throughout this program of research, before presenting the four empirical studies that were conducted as part of this program of research.

## *Chapter 2*

### METHODOLOGY

#### *2.1 Introduction*

This chapter will introduce the psychological tests and measures which are most relevant to this program of research. Three different measures used to assess ABM retrieval are presented, namely the Autobiographical Memory Cueing task (AMT - Williams & Broadbent, 1986) and two modified versions of the Autobiographical Memory Interview (AMI - Kopelman, Wilson & Baddeley, 1989). Because ABM retrieval is known to be affected in depression and PTSD (see Section 1.4), these factors were controlled for in the relevant studies. Accordingly, the measures used to assess mood (Hospital Anxiety and Depression Scale – HADS: Zidmond & Snaith, 1983; Children’s Depression Inventory – CDI: Kovacs & Beck, 1977; Profile of Mood States – POMS: McNair, Lorr & Droppleman, 1971) and post-traumatic-stress reactions (Impact of Event Scale – IES-R: Weiss, 1996; When Bad Things Happen Scale – WBTHS: Fletcher, 1996) in this program of research are discussed in this chapter. A measure of thought suppression, the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) is also presented. Finally, this chapter presents a pilot study which was designed to assess the suitability and valence of two video clips, which were used as the material to be suppressed in the suppression manipulation studies in Chapters 4 and 5.

## *2.2 Measures of ABM Recall*

Multiple psychological measures exist to assess an individual's ability to retrieve information from their past. A number of these measures are designed to elicit episodic ABM retrieval using emotional cue words; other measures elicit episodic and personal semantic memory retrieval using temporal cues and specific questions. The Autobiographical Memory Test (AMT – Williams & Broadbent, 1986), a cueing technique, was employed in this program of research as the main measure to assess episodic autobiographical memory retrieval. The AMT has been employed widely to study episodic ABM retrieval in the emotional disorders (for a review see Williams et al., 2007). Variations of the Autobiographical Memory Interview (AMI – Kopelman et al., 1989), a semi-structured interview for eliciting autobiographical information by focussing on different time periods of the participants' pasts were employed to assess personal semantic memory as well as episodic ABM retrieval in the present program of research.

### *2.2.1 The Autobiographical Memory Test (AMT)*

This measure was first introduced by Williams & Broadbent (1986) and was designed to test cued recall of episodic ABMs. The AMT is based on Galton's cue word paradigm (Galton, 1883). Participants are verbally presented with individual cue words and are instructed to retrieve a memory from their past in response to each cue word. Usually the cue words alternate between positive and negative valance, but a number of studies have also included neutral cue words. In the majority of studies this is administered as an oral test, where both the cue words and responses are presented verbally.

However, a number of studies have also used a written variant of the AMT (e.g. Wessel, Meeren, Peeters, Arntz & Merckelbach, 2001; Arntz, Meeren & Wessel, 2002; Henderson, Hargreaves, Gregory & Williams, 2002; Peeters, Wessel, Merckelbach & Boon-Vermeeren, 2002), and in terms of overgeneral recall these studies generally either failed to produce any results (Wessel et al., 2001; Arntz et al., 2002) or produced results that are generally consistent with the existing literature (Henderson et al., 2002; Peeters et al., 2002). While the written versions are attractive because they are timesaving as participants can be tested in groups, one major shortcoming of the written versions of the AMT is that the response time to retrieve a memory cannot be measured, and only the nature of the first memory can be considered for analysis (see below). In order to obtain a very sensitive index of the accessibility of episodic ABMs (i.e. both in terms of specificity and recall latencies), participants were interviewed individually using the oral version of the AMT throughout this program of research.

If both positive and negative cue words are used, a general assumption is made that the memories the participants retrieve are consistent the valence of the cue words. Because the present program of research focuses on valence effects, the assumption of emotional congruence between cue words and memories was verified by two raters on 50% of the memories retrieved in the first experiment, where it was confirmed that this consistency is high (see Section 3.2.3.1). Furthermore, because valence effects are of interest in the present program of research, it is important that positive and negative cue words are matched to ensure that it is not relatively easier to retrieve memories to one set of the cue words. 27 undergraduate students

were asked to rate each cue word used in the present program of research on the dimensions of imageability, concreteness, and how readily they felt the word would elicit a specific memory (Hauer, Wessel, Geraerts, Merckelback & Dalgleish, in press). The mean scores for each cue word are presented in Appendix A.1.1 and analysis is reported in the method sections of the relevant empirical studies (Sections 3.2.3.1, 4.2.3.1 and 6.2.3.2).

For the purpose of scoring the memory responses elicited by the AMT, a specific memory is defined as an event that took place at a specific time and place and lasted less than one day. Participants are encouraged to retrieve a specific memory as quickly as possible (this instruction was primarily given to explain the presence of the stopwatch), and for each cue word the time taken to recall a specific memory is recorded in seconds. This measurement is taken from the moment the cue word is presented to the time when the participant begins the verbal recall of a relevant memory, but utterances such as “now let me think!” are ignored. Furthermore, the nature of the first memory that is recalled (specific or overgeneral) for each cue word is also recorded. Participants are given 3 practise words to ensure that they have understood the instructions. If the first memory the participant reports is overgeneral in nature, the participant is prompted again to think of a specific event. The participant is also prompted again to think of a specific memory if the first response is a semantic associate of the cue word. Should a participant fail to recall any memory within the timeframe of one minute, a recall time of 60 seconds is noted for that cue word and the next word is presented. This is then noted as an omission.

Overgeneral ABM recall on the AMT can occur in one of two ways: categoric or extended memory recall. Categoric ABMs are memories that refer to specific events that occur repeatedly (e.g. “Friday nights at the pub”) and extended ABMs refer to events that lasted longer than one day (e.g. “My holiday in Cuba”) (see Section 1.2.2). Because determining the nature of the memory (specific, extended, categoric) is somewhat subjective, inter-rater reliability is required for this dimension, which is consistently found to be high. For instance, in the seminal study by Williams and Broadbent (1986), two independent researchers rated 20% of the memories recalled by the participants as specific or overgeneral and this resulted in 87% and 93% agreement with the experimenter’s ratings. In the present program of research, for each study employing the AMT, one independent rater was asked to rate 20% of the recalled memories as either specific or non-specific (overgeneral or semantic associate). Consistent with previous research, inter-rater reliability for specific/non-specific memories was found to be high in this program of research, and the results are reported separately for each study that employed the AMT in the relevant chapters of this thesis (Section 3.2.3.1, Section 4.2.3.1 & Section 6.2.3.2).

The accessibility of episodic ABMs can then be analysed on the two dimensions of latency to recall a specific memory and the nature of the first recall. The longer it takes to recall a specific memory, the less accessible it is thought to be. Similarly, if the first recall is not a specific ABM, this error in retrieving a specific memory when requested to do so also provides evidence that the specific memory is less accessible. The retrieval of an overgeneral memory or the failure to retrieve any memory within 60 seconds both

constitute errors on the AMT. In the present program of research, the issue of accessibility is examined by considering the recall latencies to positive versus negative cue words separately.

For the purpose of the present program of research, data analysis was conducted with respect to the latency to retrieve a specific memory and the number of first responses that were specific memories for each participant as indexes of accessibility. No separate analysis was conducted for omissions (though they were reflected in the data as latencies of 60 seconds) and semantic associates, or the different types of overgeneral memories produced (i.e. categoric versus extended).

### *2.2.2 The Children's Autobiographical Memory Interview (CAMI)*

This Children's Autobiographical Memory Interview (CAMI: Bekerian, Dhillon & O'Neill, 2001; see also Stokes, Dritschel & Bekerian, 2004) is a semi-structured interview used to assess children's and adolescents' ability to retrieve personal semantic as well as episodic ABMs across different lifetime periods. It is based on the Autobiographical Memory Interview (AMI, Kopelman, Wilson & Baddeley, 1989), which is similar in format, but designed for adult participants. The AMI is generally used to assess memory recall in elderly and neurologically impaired participants, for instance to investigate the memory deficits associated with dementia. Examples of memories that are elicited by these interviews include naming friends from school (for personal semantic memory items) and recalling a specific incident that happened during the time at primary school (as an example of an episodic memory question). The difference between the AMI and the CAMI

lies in the specific lifetime periods that are covered in the interviews. The AMI covers a whole lifespan, inquiring about events such as marriage and career moves, which are not relevant to young people. Accordingly, the CAMI only covers lifetime periods that are appropriate for school-aged children, with the most recent lifetime period referring to secondary school.

The CAMI consists of 54 questions that attempt to elicit personal semantic memories. One point is given for the recall of each item, resulting in a possible total score for personal semantic memory recall of 80 (as some items require multiple responses, for instance naming three friends from school). Names are always given half a point each for first and last names recalled, so that the recall of a full name is also given one point on the personal semantic scale. The CAMI also includes 16 episodic memory questions, each of which can result in a maximum score of three points. One point is given for the dimensions of time, place, and specificity of the memory recalled, thereby resulting in a possible total episodic memory score of 48.

The Autobiographical Memory Interviews (AMI and CAMI) differ from the cue-word paradigm (AMT) in numerous ways. The interviews focus on eliciting memory recall using temporal cues; participants are requested to retrieve autobiographical information from different lifetime periods. The AMT, on the other hand, focuses on eliciting a specific memory, regardless of how long ago it occurred or the associated lifetime period. Moreover, the AMT cue words used to elicit memories are often emotional, thereby encouraging the retrieval of emotional ABMs. In contrast, the AMI and CAMI do not include an emotional dimension. The emotional dimension of the AMT is crucial to this program of research, as it aims to specifically



investigate the facilitated recall of negative episodic ABMs (see Section 1.7). Furthermore, previous studies failed to detect any differences in episodic memories as measured by the AMI between survivors of trauma versus controls and have speculated that this was due to the lack of an emotional dimension within this measure (Hunter & Andrews, 2002). A final difference between the ways in which the AMI and AMT assess episodic ABM retrieval is that the AMI does not give a time limit within which the participant has to produce a response to the questions. Therefore, response latency can not be assessed on the AMI, which makes the AMT a more sensitive measure of accessibility of episodic ABMs.

Therefore, while variations of the AMI are primarily used to assess personal semantic memory in this program of research, the AMT is used to investigate episodic ABM recall, as it takes into account the valence of the memory, as well as recording the length of time it takes the participant to retrieve a specific memory.

### *2.2.3 The Student's Autobiographical Memory Interview (Student's AMI)*

The Student's Autobiographical Memory Interview was developed for this program of research by combining items from both the CAMI and the AMI to make it suitable for an undergraduate student sample (see Appendix A.1.2 for this interview). The Student's AMI covered the three lifetime periods of early childhood, adolescence, and recent (university) life. For each lifetime period there are 21 personal semantic memory items (such as names of people the participant went to school with) and 9 episodic memory items (such as what they did on their first day of school), which are scored

according to the same criteria as the AMI. One point is given for each correct personal semantic fact that is recalled, resulting in a possible total score of 63. Each episodic item is given one point for time, place and specificity of the memory, resulting in a possible total score of 27.

### *2.3 Measures of Mood*

Autobiographical Memory retrieval is known to be affected in depression, and therefore two of the studies in this program of research had to take the participants' current levels of depression into account (Chapter 3 and Chapter 6). The first of these two studies used a nonclinical undergraduate student sample, and therefore used the Hospital Anxiety and Depression Scale (HADS; Zidmond & Snaith, 1983) in order to assess both levels of depression as well as anxiety in the participants. The Children's Depression Inventory (CDI; Kovacs & Beck, 1977) was used instead of the HADS in Chapter 6, because it is better suited for the adolescent participant sample in that study.

Another study in this program of research (Chapter 5) assessed the effects of thought suppression on mood, and therefore required a mood measure both at baseline and following the suppression manipulation. The Profile of Mood States (POMS; McNair, Lorr & Droppleman, 1971) was used as a sensitive measure to detect changes in the mood of the participants as a result of the manipulation.

### *2.3.1 The Hospital Anxiety and Depression Scale (HADS; Zidmond & Snaith, 1983)*

This 14-item self-report questionnaire was used in this program of research to measure symptoms of depression and anxiety in an undergraduate student sample over the seven days prior to testing. Seven questions each are used to assess current symptoms of depression and anxiety and items alternate in describing a symptom of depression or anxiety. Each item has 4 possible responses, which are scored from 0-3, with 0 given to the response indicating the absence of the described symptom of anxiety/depression and a score of 3 given to the response indicating the most severe symptoms. Therefore, both subscales of depression and anxiety have possible scores ranging from 0 to 21, with 21 indicating the most severe symptoms. Both the factor stability and internal consistency of the HADS are high (Moorey, Greer, Watson, Gorman, Rowden, Tunmore, Robertson & Bliss, 1991; Mykletun, Stordal & Dahl, 2001).

### *2.3.2 The Children's Depression Inventory (CDI; Kovacs & Beck, 1977)*

This 27-item self-report questionnaire is designed to measure depression in children and adolescents over the past 14 days. Each item describes a symptom of depression and has 3 possible responses, which are scored from 0-2. A score of 0 indicates the absence of that particular symptom of depression, and a score of 2 given to the response indicating the most severe symptom of depression. The scale therefore ranges from 0 to 54, with higher score indicating more severe symptoms of depression. The cut-off score for defining severe symptoms of depression was set at 19 or above

by Kovacs (1981). The CDI has been found to have good internal consistency as well as discriminant reliability (Smucker, Craighead, Craighead & Green, 1986; Carey, Faulstich, Gresham, Ruggiero & Enyart, 1987; Doerfler, Felner, Rawlinson, Raley & Evans, 1988). The CDI was used in the study presented in Chapter 6 as it is suitable for the adolescent participant sample.

### *2.3.3 The Profile of Mood States (POMS; McNair, Lorr & Droppleman., 1971)*

The POMS is a 65 item self-report scale used to assess current levels of mood. Each item consists of a mood adjective, which participants are asked to rate on a Likert scale ranging from 1 “Not at all” to 5 “Extremely”, depending on how the participant is feeling at that particular moment. Together, the 65 items form the 6 subscales of Tension – Anxiety, Depression – Dejection, Anger – Hostility, Vigor – Activity, Fatigue – Inertia, and Confusion – Bewilderment. The scores from the subscales are added together, except for the Vigor – Activity subscale score, which is instead subtracted from the total, in order to obtain a score for the total mood disturbance (TMD) of the participant. The POMS has a consistent factor structure, as well as good convergent and discriminant validity (Nyenhuis, Yamamoto, Luchetta, Terrien & Parmentier, 1999).

The POMS was specifically selected for a study that assessed the effects of thought suppression on mood (Chapter 5) because of the multiple dimensions of mood that it assesses, but more importantly, because of its sensitivity to changes in mood over time, which this particular study attempted to capture.

## *2.4 Measures of Post-traumatic Stress Reactions*

Because ABM is also known to be affected in individuals suffering from post-traumatic stress reactions (PTSD) (see Section 1.4), levels of this condition had to be taken into account in two studies (Chapter 3 and Chapter 6). In the non-clinical student sample (Chapter 3), the Impact of Event Scale – Revised (IES-R; Weiss, 1996) was used to assess trauma-related intrusions and avoidance as an index of post-traumatic stress reactions, rather than attempting to establish a full diagnosis of PTSD in this non-clinical sample. Chapter 6, on the other hand, engaged a sample of self-harming adolescents, where a diagnosis of PTSD was much more likely. Therefore, the When Bad Things Happen Scale (WBTHS; Fletcher, 1996) was selected for this study as a self-report diagnostic measure of PTSD that is suitable for an adolescent sample.

### *2.4.1 The Impact of Event Scale – Revised (IES-R; Weiss, 1996)*

This 22-item self-report questionnaire is used to measure symptoms of traumatic intrusions (7 items), avoidance (8 items), and hyperarousal (7 items) which participants have experienced over the seven days prior to testing as a result of a single traumatic event. Participants respond to the 22 symptom statements by rating how often they have experienced the symptoms over the past week, with the response options being “not at all”, “rarely”, “sometimes” or “often”. Possible scores on the IES-R range from 0 to 110, with higher scores indicating more frequent and more severe symptoms. Psychometric properties of this scale are good, with good internal consistency as well as test-retest consistency (Weiss, 1996).

However, one limitation of the IES-R is that it requires participants to respond to the item with respect to a single traumatic event. In order to overcome this limitation, previous studies have resorted to having control participants complete it in response to an event which they all shared, for instance having received orthodontic treatment (Stokes, Dritschel & Bekerian, 2004). One problem with this approach is that the participants may have experienced other adverse events, which could have been more “traumatic” in nature. In this case the IES-R scores would not give an accurate measure of the trauma-related symptoms that the participant is actually experiencing. In order to overcome this limitation, a “trauma questionnaire” was employed in this program of research (see Appendix A.1.3 and A.1.4). This questionnaire requires participants to identify their most traumatic experience by selecting one of nine categories of traumatic events prior to completing the IES-R. The categories are based on commonly reported traumatic events in the literature and are: accident, serious medical condition/injury, medical treatment/procedure, sexual abuse, physical abuse, divorce of parents, death of a loved one, illness of a loved one, and other. Participants are then required to complete the IES-R with respect to their most traumatic experience. Because a shared but generic event, such as having received orthodontic treatment may not have been the most traumatic experience for the participants, completing the IES-R together with the trauma questionnaire is more likely to result in a more accurate index of the amounts of post-traumatic stress reactions that participants are experiencing at the time of testing.

#### *2.4.2 When Bad Things Happen Scale (WBTHS; Fletcher; 1996)*

The When Bad Things Happen Scale is a self-report questionnaire which is suitable for children and adolescents to assess post-traumatic stress symptoms. The scale consists of 90 questions which participants answer by ticking one of three boxes: “never”, “some” or “lots”. However, only the first 58 items of the scale assess immediate PTSD symptoms, with 4 items assessing whether the event was sufficiently traumatic and distressing, 16 items assessing intrusiveness, 23 items assessing the avoidance, and 15 items assessing the hypertension as a result of the traumatic event. The remaining 32 items of the WBTHS focus on possible co-morbid symptoms of post-traumatic stress such as anxiety, depression, feelings of guilt and dangerous behaviours. Because this measure was used in this program of research to measure PTSD symptoms, only the initial 58 items of the WBTHS were used accordingly (see Appendix A.1.5). Possible scores on the WBTHS range from 0 to 116, with higher scores indicating more frequent symptoms. Preliminary data gathered from 30 children ages 7 to 14 suggests that this measure provides high internal consistency and is a valid measure of PTSD (Fletcher, 1996).

#### *2.5 Measures of Thought Suppression*

In order to assess the participants’ trait tendency to suppress unwanted thoughts, the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) was used throughout this program of research. The WBSI consists of 15 statements such as “There are things I prefer not to think about” which the participants rate on a 5 point Likert scale, ranging from

“strongly agree” to “strongly disagree”. Possible scores on the WBSI range from 0 to 75. Subsequent factor analyses of this measure remain somewhat ambiguous, with some studies supporting a satisfactory uni-dimensional construct (e.g. Wegner & Zanakos, 1994), while other studies report support for multiple factors (Blumberg, 2000; Hoving & de Jong-Meyer, 2003; Rassin, 2003). While these latter studies have identified thought suppression as the primary factor, a secondary factor which measures a general tendency to experience intrusive thoughts has also been proposed. This poses a serious problem when thought suppression is to be studied in psychological disorders where a tendency to experience unwanted intrusions is high such as depression (Kuyken & Brewin, 1995; Brewin, Hunter, Carroll & Tata 1996) and most notably PTSD (see for instance, Ehlers & Clark, 2000). In participants suffering from these conditions the scores on the WBSI might be artificially exaggerated due to the tendency to experience intrusions rather than a suppressive coping style (Rassin, 2003).

It is therefore important to determine which items of the WBSI most strongly define and measure thought suppression. By applying item-response theory, Palm and Strong (2007) have identified 6 items of the WBSI which are effective in making discriminations throughout different levels of thought suppression. These 6 “effective” items retained strong and highly significant correlations with the full scale of the WBSI, as well as the Acceptance and Action Questionnaire (AAQ; Hayes et al, 2004), a measure of emotional avoidance.

Throughout this program of research the full WBSI has been used. However, in order to obtain a purer measure of the tendency to engage in



thought suppression, the 6 “effective” suppression items (as identified by Palm & Strong, 2007) have been used as the primary indicator of a suppressive coping style. This sub-set of items was chosen in order to avoid the possibility of “false” correlations between the full WBSI and measures of clinical conditions such as depression and PTSD.

## *2.6 Videos for Thought Suppression Tasks (Pilot Study)*

### *2.6.1 Video Pilot Study - Introduction*

A suppression manipulation task was used in two studies of this program of research to investigate the effects of thought suppression on ABM retrieval (Chapter 4) and mood (Chapter 5). In order to ensure that all participants were suppressing the same information they were shown a short video clip and were asked either to monitor or to suppress any thoughts and memories of the clip immediately thereafter. There were two separate clips; one was selected for its negative content and realistically depicts a grizzly bear attacking a tourist. A second video clip was selected for its positive content and consists of a cartoon of a squirrel gathering nuts. The two video clips were of a similar length (~ 4 minutes). A pilot study was conducted in order to assess the suitability and valence of these video clips. The purpose of the pilot study was to determine the valence of the video clips to ensure that they could subsequently be used as suitability positive and negative material for suppression in a suppression manipulation experiment (Chapter 4 and Chapter 5). Specifically, this pilot study aimed to assert that the two video clips differed significantly from each other in terms of their valence ratings, and that the clips were also significantly different from a neutral rating, with

the negative clip being rated as significantly more negative than neutral, and the positive clip as significantly more positive.

## *2.6.2 Pilot Study - Method*

### *2.6.2.1 Design*

A matched between subjects design with two conditions (positive versus negative video) was used, where the participants between the conditions were matched for age and gender. The independent variable was the valence of the video clip (positive or negative) and the dependent variables were the ratings on the scales of the Video Valence Questionnaire.

### *2.6.2.2 Participants*

34 undergraduate students (28 females, 6 males) participated in this pilot study on a voluntary basis. The mean age of the participants was 19.35 (range 18-21, s.d. = 0.93).

### *2.6.2.3 Materials*

#### *2.6.2.3.1 "Negative Video"*

The video that was used as negative material to be suppressed (see Chapter 4 and Chapter 5) is a about 4 minutes long and realistically depicts a grizzly bear attack on a tourist (taken from "*Faces of Death*"). The clip has previously been used in similar suppression tasks (Rassin et al, 1997) where it was selected for its aversive and emotional nature.

#### 2.6.2.3.2 “Positive Video”

The video clip that was used as the positive material to be suppressed (see Chapter 5) is also about 4 minutes long and is a cartoon of a squirrel gathering nuts (“*Scrat’s Missing Adventure - Gone Nutty*” taken from “*Ice Age*”).

#### 2.6.2.3.3 Video Valence Questionnaire

This questionnaire was designed for the present study and consisted of nine 100mm Visual Analogue Scales (VAS) ranging from one emotional extreme to the other. A rating of 0 indicates the most positive score and 100 the most negative score that a subscale could achieve, with a score of 50 being a hypothetical neutral rating. The individual scales were selected for their valence, but care was taken to not select adjectives which were felt to be particularly descriptive of either one of the clips (e.g. “violent”). The scales were: happy – sad, appealing – aversive, agreeable – disagreeable, positive – negative, good – bad, easy to watch – hard to watch, tolerable – intolerable, reassuring – unnerving and calm – anxious.

#### 2.6.2.4 Procedure

Participants were tested together in a classroom setting in groups of 3 to 12 per session, and after giving informed consent were either shown the video of the grizzly bear attack (“Negative Video”,  $n = 17$ ), or the cartoon video of the squirrel (“Positive Video”,  $n = 17$ ). They were then given the Video Valence Questionnaire to complete before being fully debriefed. For

the information sheet and debriefing form see Appendix A.1.6 and Appendix A.1.7.

### 2.6.3 Pilot Study – Results

#### 2.6.3.1 Participant Characteristics

Participants were matched for age and gender, therefore each video was rated by 14 females and 3 males, and the mean ages for both participant groups were also similar (mean age = 19.35, s.d. = 0.93).

#### 2.6.3.2 Positive versus Negative Video Ratings

In order to assess whether the ratings of the two video clips differed significantly from each other, the means of each scale were compared using between subjects t-tests. The results showed that the mean ratings differed significantly on all scales ( $p < 0.001$ ). The Bonferroni adjustment method to correct the p-values for an increased probability of a type I error yields an adjusted alpha level of 0.006, indicating that all differences remained significant at  $p < 0.05$ . In all cases, the negative video was rated as being significantly more negative than the positive video (see Table 2.1).

Table 2.1: Positive versus negative video ratings:

Scale	Negative	Positive	T	p
happy – sad	77.47 (10.39)	30.88 (20.17)	8.47	< 0.001
appealing – aversive	84.47 (9.55)	16.41 (11.44)	18.83	< 0.001
agreeable – disagreeable	81.53 (11.74)	16.88 (12.49)	15.55	< 0.001
positive – negative	86.29 (9.27)	30.76 (16.35)	12.18	< 0.001
good – bad	77.18 (15.75)	22.00 (15.66)	10.24	< 0.001
easy to watch – hard to watch	73.71 (19.86)	11.18 (12.98)	10.87	< 0.001
tolerable – intolerable	67.76 (19.07)	11.59 (10.14)	10.72	< 0.001
reassuring – unnerving	84.71 (13.07)	37.94 (13.89)	10.11	< 0.001
calm – anxious	89.06 (6.28)	48.41 (22.52)	7.17	< 0.001

### 2.6.3.3 Video Ratings versus Neutral Ratings

In order to assess the actual valence of each video clip, one-sample t-tests were used to compare the mean ratings for each video to a hypothetical neutral rating of 50 on each scale. The results showed that the negative video was rated as significantly more negative than neutral on all subscales ( $p < 0.001$ ) and the positive video was also rated as significantly more positive than neutral on all subscales ( $p < 0.001$ ), except for reassuring – unnerving ( $p < 0.003$ ). The only exception occurred for the subscale of calm – anxious for which the mean score for the positive video was less (i.e. more positive) than the hypothetical neutral rating of 50, but not significantly so (see Table 2.2 for a summary of the results). Bonferroni adjustments yielded a new alpha level of 0.006, indicating that all significant differences remain significant at  $p < 0.05$ .

Table 2.2: Video ratings versus neutral scores

Scale	Negative		Positive	
	t	p	t	p
happy – sad	10.90	< 0.001	- 3.91	< 0.001
appealing – aversive	14.88	< 0.001	- 12.11	< 0.001
agreeable – disagreeable	11.08	< 0.001	- 10.93	< 0.001
positive – negative	16.14	< 0.001	- 4.85	< 0.001
good – bad	7.12	< 0.001	- 7.37	< 0.001
easy to watch – hard to watch	4.92	< 0.001	- 12.33	< 0.001
tolerable – intolerable	3.84	< 0.001	- 15.61	< 0.001
reassuring – unnerving	10.95	< 0.001	- 3.58	< 0.003
calm – anxious	25.65	< 0.001	- 0.29	= 0.78

### 2.6.4 Pilot Study – Discussion

The results show that the two video clips differ significantly from each other in terms of their valence. Specifically, the negative video clip was rated as significantly more negative than the positive clip on all scales. Moreover, the negative clip was also rated as significantly more negative than a hypothetical neutral rating on each scale. The positive video clip was also

rated as significantly more positive than a hypothetical neutral rating on each scale except for the calm – anxious scale. Overall the results show that both video clips are noticeably different and extreme in their respective positive and negative valence. Therefore, both clips were deemed as suitable material for the suppression manipulation studies of this program of research (Chapter 4 and Chapter 5).

STUDY 1: EXPLORING THE ROLE OF THOUGHT SUPPRESSION  
AS A CORRELATE OF AUTOBIOGRAPHICAL MEMORY RECALL <sup>1</sup>

*3.1 Introduction*

As a first step in assessing the role of thought suppression in the retrieval of autobiographical memories, this first study of this program of research investigated whether a suppressive coping style is correlated with different aspects of ABM retrieval.

The recall of overgeneral episodic ABMs has been well established in the literature and has been linked with psychopathology (see Section 1.4), with overgeneral ABM retrieval having been documented in both individuals with depression and PTSD. However, a recent review has argued that overgeneral ABM retrieval is unlikely to be related to the mere exposure to traumatic events, but is instead related to psychopathological conditions such as major depression and PTSD (Moore & Zoellner, 2007). Indeed, the ABM recall patterns in individuals with a history of trauma tend to be somewhat heterogeneous (see Section 1.4). On the one hand, overgeneral episodic ABM retrieval is reported (deDecker et al., 2003; Henderson, et al., 2002; Hermans et al., 2005; Kuyken & Brewin, 1995; McNally et al., 1995; McNally et al., 1994; Raes et al., 2005; Stokes, Dritschel & Bekerian, 2004; Wessel, Merckelbach & Dekkers, 2002). Other studies, however, have reported a positive association between trauma and the enhanced retrieval of negative episodic ABMs (Peeters et al., 2002; Burnside et al., 2004; Swales, Williams &

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<sup>1</sup> The study outlined in the present chapter was provisionally accepted to be published in Behaviour Research and Therapy pending minor alterations to the manuscript (11-12-2007)

Wood, 2001). A key question is which individual difference factors could be responsible for these different patterns of ABM retrieval observed in individuals with a history of trauma.

In the case of depression, individual difference factors have been reported to be related to ABM retrieval. In particular, past research has demonstrated that a tendency to engage in rumination can directly lead to overgeneral ABM retrieval in depression (see Section 1.5), highlighting the importance of coping mechanisms in understanding ABM retrieval patterns.

In the case of PTSD, a theoretically important coping mechanism is thought suppression (see Section 1.6). Avoidant coping may occur in response to negative memories, which are, by definition, likely to be present in survivors of traumatic experiences. Could thought suppression therefore be an individual difference factor, which like rumination in depression, contributes to explaining the ABM retrieval patterns we see in PTSD?

To date, one study has investigated the role of thought suppression, along with other types of avoidant coping in the retrieval of episodic ABMs. In a sample of 60 school-aged adolescents, an avoidant coping style, including the dimension of thought suppression, was significantly correlated with the retrieval of fewer specific episodic ABMs (Hermans, Defranc, Raes, Williams & Eelen, 2005). The authors explain the correlation between thought suppression and overgeneral ABM retrieval by arguing that thought suppression may act as an affect-regulating mechanism (Hermans et al., 2005). Intense emotional experiences are thought to be associated with the retrieval of specific episodic ABMs. Therefore, if the generative retrieval is terminated at a general level (i.e. an overgeneral memory), the specific memories and



associated emotions are never accessed (see Section 1.5), thereby protecting the individual from such intense emotions. However, the authors did not distinguish between the retrieval of positive versus negative memories. Furthermore, the AMT was presented as a written task, so response times could not be considered as an index of accessibility of positive versus negative episodic ABMs.

However, because valence effects were not considered by Hermans et al. (2005), it is possible that thought suppression may nevertheless be a mechanism underlying the negative facilitation effect. It is well documented that thought suppression often results in a paradoxical effect, making the suppressed thought, which is arguably negative in nature, more accessible (see Section 1.6). It is therefore possible that thought suppression could activate other negative information, thereby making negative representations more accessible. More accessible negative information could then, in turn, prompt more thought suppression in order to cope with these increased thoughts and memories.

Another memory pattern associated with trauma is that of reduced personal semantic memory retrieval (Hunter & Andrews, 2002; Meesters et al., 2000; Stokes, Dritschel & Bekerian, 2004). As an important cognitive coping mechanism in PTSD, thought suppression may therefore also be related to personal semantic memory retrieval. Accordingly, the present study investigates the correlations between thought suppression and both episodic as well as personal semantic memory retrieval.

The present study employed a nonclinical student sample to examine the correlations between thought suppression and ABM retrieval irrespective

of any specific psychopathology. A sample of undergraduate students were given measures of both episodic and personal semantic ABM recall, as well as a measure of the trait tendency to engage in thought suppression in order to cope with unwanted thoughts and memories. The present study expands the research by Hermans et al. (2005) by distinguishing between the retrieval of positive versus negative ABMs. Furthermore, the present study used a oral version of the AMT, in order to obtain a measure of response latency to positive and negative cue words, as well as the number of specific memories produced in response to the cue words. Despite the nonclinical participant pool, levels of post-traumatic stress symptoms and dysphoric mood were also measured and considered in the statistical analyses, as it is well established that ABM retrieval is affected in depression and PTSD (see Section 1.4).

Because of the exploratory nature of this study, the predictions regarding thought suppression and episodic ABM retrieval remain two-tailed. More specifically, consistent with the findings of Hermans et al. (2005), thought suppression may be correlated with increased overgeneral ABM retrieval to both positive and negative cue words (affect regulation). However, because of the paradoxical effects of thought suppression, it is also possible that thought suppression may be related to a pattern of enhanced retrieval of negative episodic ABMs. Furthermore, if thought suppression is indeed related to the ABM recall patterns found in PTSD, it is expected that increased thought suppression would be correlated with a reduced ability to retrieve personal semantic information. All of these correlations are expected to remain significant even when levels of post-traumatic stress responses and depression have been controlled for.

## *3.2 Method*

### *3.2.1 Design*

Stepwise multiple regression analysis was used to assess which independent variables explained most of the variability observed in the ABM retrieval patterns. The different aspects of ABM recall were treated as the dependent variables, and the independent variables were the levels of symptoms of anxiety and depression (HADS), traumatic intrusion, avoidance and hyperarousal (IES-R) as well as total WBSI scores and “effective” suppression scores from the six WBSI items identified by Palm and Strong (2007) as an index of trait thought suppression. Each dependent variable was predicted separately by all the independent variables together, which was followed by stepwise multiple regression to eliminate those independent variables that did not significantly account for any variability in the ABM recall.

### *3.2.2 Participants*

The participants were fifty (39 female and 11 male) undergraduate students from the University of St. Andrews. Participation was on a voluntary basis, and occurred in return for a small financial compensation. The mean age of the participants was 21.58 years (s.d. = 3.47).

### *3.2.3 Materials*

#### *3.2.3.1 Autobiographical Memory Test (AMT) (Williams & Broadbent, 1986)*

See Section 2.2.1 for a description of the AMT and how it was administered. The AMT was used in the present study to measure the participants' ability to retrieve specific episodic ABMs of both positive and negative valence. The ten cue words used in the present study were: lonely, happy, hurt, safe, clumsy, interested, angry, successful, sorry and surprised, which were the original AMT cue words used by Williams and Broadbent (1986). No differences were found between the positive and negative cue words in terms of imageability, concreteness, and how readily raters felt that they may elicit a specific memory (see Section 2.2.1 and Appendix A.1.1). Two researchers subsequently rated the memories recalled by the participants as either overgeneral or specific. Inter-rater reliability was calculated for a random sample of 20% of the participants and was found to be high (Cohen's Kappa  $K = 0.80$ ). Furthermore, in order to verify the assumption that retrieved memories match the valence of the cue words, 50% of the recalled memories were subsequently rated by two raters as either positive or negative. It was found that for 96% of the memories recalled the valence of the memory matched the cue word valence. Discrepancies between the memories and cue word valence were only found for three memories (1%). Additionally, there were seven memories where the valence was deemed ambiguous (e.g. the memory "an e-mail that I got on Monday" in response to the cue word 'surprised'). The inter-rater reliability for valence was also found to be very

high (Cohen's Kappa  $K = 0.96$ ). Therefore, it can be assumed that in the vast majority of cases the retrieved memory matches is consistent with the valence of the cue word.

### *3.2.3.2 Student's Autobiographical Memory Interview (S-AMI)*

See Section 2.2.3 for a description of this measure. The S-AMI was used in the present study primarily to obtain a measure of the participants' ability to retrieve personal semantic memories.

### *3.2.3.3 Hospital Anxiety and Depression Scale (HADS) (Zidmond & Snaith, 1983)*

See Section 2.3.1 for a description of this measure. This measure was used in the present study to obtain an index of the participants' current levels of depressed mood and anxiety.

### *3.2.3.4 Impact of Event Scale – Revised (IES-R) (Weiss, 1996) and Trauma Questionnaire*

See Section 2.4.1 for a description of this measure. The IES-R was used in the present study to measure participants' current symptoms indicative of post-traumatic stress reactions, namely intrusions of the traumatic event, avoidance thereof, as well as hyperarousal. A full diagnostic measure of PTSD was not used in this study as the participants were general undergraduate university students and not expected to suffer from PTSD. Because the IES-R has to be completed with reference to a single traumatic event, it was preceded by a "trauma questionnaire" (see Section 2.4.1) which

required participants to first identify their most traumatic experience so that the IES-R could subsequently be completed with reference to this event.

### *3.2.3.5 White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994)*

See Section 2.5 for a description of this measure. The WBSI was used in the present study to obtain a measure of the participants' levels of trait predisposition to engage in thought suppression in order to cope with unwanted thoughts and memories.

### *3.2.4 Procedure*

Participants were tested individually and were fully informed about the nature of the study prior to the testing. After giving informed consent, participants completed the measures in the above order. The measures of ABM were given first to prevent contamination from the other measures. As part of the debriefing the participants were asked to engage for 2 minutes in a distraction procedure (taken from Nolen-Hoeksema & Morrow, 1993). This small task was given to lift the participants' mood and counter any possible negative impact that the completion of the mood and trauma questionnaires may have had. Participation was voluntary and all participants received a small financial compensation for their time. The information sheet (A.2.1), consent form (A.2.2) and debriefing form (A.2.3) for this study are included in the appendix.

### 3.3 Results

#### 3.3.1 Traumatic Experiences

The participants completed the IES-R in response to their most traumatic experience, as identified by the trauma questionnaire. The number of participants who chose each of the trauma categories as their most traumatic experiences as well as the average IES-R and “effective” WBSI scores (Palm & Strong, 2007) for each trauma type are summarized in Table 3.1. As can be seen, the most common traumatic experience reported by the participants was “other trauma”, followed by “death of a loved one” and “serious medical condition/injury”.

Table 3.1: Frequency of reported most traumatic event, means (s.d.) for IES-R and WBSI-E for each traumatic event

Type of Event	Frequency	IES-R	WBSI-E
Accident	4 (8%)	22.50 (18.77)	22.50 (3.87)
Serious Medical Condition/Injury	6 (12%)	39.67 (16.75)	20.33 (3.67)
Medical Treatment/Procedure	2 (4%)	30.50 (33.23)	18.00 (1.41)
Sexual Abuse	3 (6%)	30.67 (37.74)	17.67 (9.07)
Physical Abuse	4 (8%)	10.25 (6.70)	21.75 (1.71)
Divorce of Parents	4 (8%)	25.50 (24.28)	20.75 (5.85)
Death of a loved one	8 (16%)	28.88 (31.22)	17.38 (2.92)
Illness of a loved one	3 (6%)	33.00 (29.81)	20.00 (2.65)
Other (e.g. witnessing violence, bad experiences with drugs, relationship break-ups)	16 (32%)	39.69 (28.09)	19.94 (5.11)

IES-R = Impact of Event Scale-Revised, WBSI-E = “effective” suppression items of the WBSI.

There were no significant differences in the IES-R ( $F_{(8,41)} < 1$ ) scores nor in effective thought suppression ( $F_{(8,41)} < 1$ ) across the different types of trauma reported. The data was therefore collapsed across the different trauma types for the remainder of the analysis.

### 3.3.2 Correlational Analyses: Independent Variables

Mean scores and Pearson product-moment correlation coefficients of the independent variables are presented in Table 3.2. As can be seen, the full WBSI scale was significantly correlated with all subscales of the IES-R as well as the HADS. However, the 6 items that were identified as effective indicators of thought suppression (Palm & Strong, 2007) were only significantly correlated with the avoidance subscale of the IES-R, and not the intrusion and hyperarousal subscales. This correlation pattern further supports that these items provide an effective and uncontaminated measure of avoidance coping, rather than a general tendency to have intrusive thoughts, which some items of the full WBSI have previously been identified to capture (see Section 2.5). At the same time, the effective items of the WBSI also remained highly correlated with the full WBSI scale. All subscales of the IES-R were also significantly and positively correlated with each other (all  $p < 0.01$ ). Because of these high inter-correlations the IES-R was treated as a single scale of post-traumatic stress symptoms in the subsequent multiple regression analysis (see Section 3.3.3).

Table 3.2: Means (s.d.) of the WBSI, IES-R and HADS and correlations between the subscales<sup>a</sup>

	Mean (S.D.)	Correlations					
		WBSI	WBSI-E	IES-I	IES-A	IES-H	HADS-A
WBSI	48.08 (9.78)	---					
WBSI- E	19.78 (4.46)	.832**	---				
IES-I	11.80 (10.04)	.259*	.154	---			
IES-A	12.38 (9.28)	.347**	.318*	.818**	---		
IES-H	7.60 (8.91)	.255*	.180	.779**	.645**	---	
HADS-A	8.62 (3.84)	.569**	.446**	.250*	.130	.377**	---
HADS-D	3.28 (2.70)	.439*	.336**	.322*	.174	.442**	.673**

<sup>a</sup> WBSI = White Bear Suppression Inventory; WBSI-E = effective items from the WBSI (Palm & Strong, 2007); IES-I = intrusion subscale; IES-A = avoidance subscale; IES-H = hyperarousal subscale; HADS-A = anxiety subscale; HADS-D = depression subscale

\*  $p < 0.05$ , two tailed, \*\*  $p < 0.01$ , two-tailed



### *3.3.3 Thought Suppression and ABM Recall*

A series of multiple regression analyses were conducted in order to establish the degree to which thought suppression accounts for variability in ABM recall. Different dimensions of ABM recall scores were treated as separate dependent variables, and a separate multiple regression analysis was carried out for each of these dimensions of ABM retrieval. These dimensions consisted of 1) total overall latency for the recall of specific memories to all cue words (AMT); 2) total latency to recall negative episodic memories (AMT); 3) total latency to recall positive episodic memories (AMT); 4) number of personal semantic memories recalled (S-AMI); and 5) overall episodic ABM recall as measured by the S-AMI (see Appendix A.2.4 for the complete multiple regression models). The number of overgeneral ABMs recalled in response to cue words on the AMT could not be used as an indicator of accessibility of positive and negative memories as there was a ceiling effect for both positive and negative memories. Therefore insufficient variability in the data was found; in fact, out of the 50 participants, 32 never produced a single overgeneral memory, and 47 eventually produced specific memories to all 10 cue words when they were prompted to do so. The means and standard deviation as well as the empirical (observed) range and theoretical (possible) range of all the dimensions of ABM retrieval considered in the present study are presented in table 3.3 below.

Table 3.3: Descriptive statistics for the measures of ABM retrieval

ABM variable	Mean (S.D.)	Empirical Range	Theoretical Range
<i>AMT:</i>			
Total latency (sec.)	99.97 (34.45)	33.20 – 198.20	0 – 600
Positive latency (sec.)	51.22 (23.78)	16.80 – 145.00	0 – 300
Negative latency (sec.)	48.97 (20.95)	16.40 – 99.10	0 – 300
Total first specific*	9.5 (0.79)	7 – 10	0 – 10
Positive first specific*	4.74 (0.53)	3 – 5	0 – 5
Negative first specific*	4.76 (0.59)	2 – 5	0 – 5
<i>S-AMI:</i>			
Personal Semantic	59.89 (3.37)	49.00 – 63.00	0 – 63
Episodic	24.76 (2.59)	18.00 – 27.00	0 – 27

\* omitted from the analysis because of lack of variability

#### HADS Depression, HADS Anxiety, IES-R Scores and WBSI

“effective” suppression scores were treated as independent variables in the multiple regression analysis. The IES-R was treated as a single indicator of trauma-induced symptoms, rather than considering the three separate subscales, because the subscales were highly correlated with each other (see section 3.3.2)<sup>2</sup>.

For each multiple regression model, stepwise regression analysis was used subsequently in order to reduce the independent variables to only those that could significantly account for the variability in the dependent variable. For both the overall latency and latency to retrieve a positive ABMs, none of the independent variables remained as significant predictors after the stepwise regression analysis was applied, indicating that these dimensions of ABM retrieval are not associated with any of the independent variables. In the case of latency to retrieve negative episodic ABMs, only suppression remained as a significant predictor after the stepwise regression analysis ( $r = -.363$ ,  $p < 0.01$ ). This result indicates that the more the participants engaged in thought

<sup>2</sup> The analysis was repeated using the three subscales of the IES-R to replace the total IES-R score as a single independent variable, and it was found that like the total IES-R scores, all subscales were removed in the stepwise multiple regression analysis in each case. Therefore, the results of this analysis did not differ from those reported here.

suppression as a trait coping strategy, the faster their recall of negative episodic memories. Similarly, following stepwise regression analysis, only thought suppression remained as a significant predictor of variability in the number of personal semantic memories that were recalled (as measured by the Student's AMI),  $r = -.386$ ,  $p < 0.01$ . This indicates that higher levels of trait thought suppression were correlated with the recall of fewer personal semantic memories. As with overall latency and latency to retrieve positive episodic ABMs, the quantity and quality of episodic memories recalled for different lifetime periods on the Student's AMI were not significantly accounted for by any of the independent variables after the stepwise multiple regression analysis.

Because suppression was significantly correlated with both the depression and anxiety subscale of the HADS (see table 3.2), the possibility of the correlations between thought suppression and latency to retrieve negative episodic memories as well as personal semantic memory being mediated by either depression or anxiety were considered. However, mediational analysis as specified by Baron and Kenny (1986) yielded no significant results.

### *3.4 Discussion*

The findings of the present study revealed that higher levels of thought suppression were significantly correlated with the faster recall of specific negative episodic memories, as well as the recall of fewer personal semantic memories. In terms of the episodic ABM retrieval, these results are inconsistent with those obtained by Hermans et al. (2005). Instead of being unselectively related to overgeneral ABM retrieval, it appears that thought

suppression is also related to the enhanced retrieval of negative ABMs. Thought suppression could, therefore, be an individual difference factor that may contribute to explaining the heterogeneous findings regarding the episodic ABM retrieval patterns observed in trauma samples (Section 1.4).

In this nonclinical student sample, current levels of dysphoric mood, anxiety, and IES scores (i.e. intrusion and avoidance of trauma-related stimuli) failed to account significantly for any variability in ABM recall. However, symptoms of psychopathology such as depression and PTSD were relatively low in this nonclinical student sample, and there may have simply been too little variability in these variables to observe any correlations. Nevertheless, the core findings of the present study could still have important implications for clinical psychology, as the recall patterns that were correlated with higher levels of thought suppression, i.e. reduced personal semantic memory recall as well as enhanced negative episodic memory recall are similar to those also found in individuals suffering from PTSD. Therefore, it is theoretically possible that a suppressive coping style could be one of the factors that influence whether or not a person will develop cognitive symptoms of PTSD following a traumatic experience. This possibility is considered in detail in the general discussion of this thesis (Section 7.6).

There was a ceiling effect for the number of specific first responses in response to cue words on the AMT. Therefore, it was not possible to investigate any possible correlation between levels of thought suppression and number of overgeneral responses to the AMT cue words. This was likely a result of the nature of the actual cue words that were used. The cue words used in the present study have both a relatively high frequency and high

emotional content, making memory retrieval easier. In future studies of this program of research this problem will be addressed by employing different cue words of lower frequency, to make the recall of specific memories somewhat more challenging, thereby increasing the likelihood of overgeneral responses.

The lack of a results on the number of specific memories recalled in the present study means that it cannot be directly compared to prior research, which has demonstrated that thought suppression was correlated with fewer numbers of specific memories recalled (Hermans et al., 2005). These discrepant results may be due to the numerous methodological differences between the two studies. First of all, the present study used the original ten cue words of the AMT (Williams & Broadbent, 1986), while Hermans et al. (2005) used a different set of words where only three cue words overlapped with those used in the present study. The original 10 cue words which were used in the present study are words of relatively high frequency and of high emotional content. This could mean that the retrieval of specific ABMs was relatively easier in response to the cue words used in the present study than to those used by Hermans et al. (2005), thereby resulting in more specific responses. However, more importantly, the two studies differ in the ways in which the AMT was administered. In the verbal paradigm which was used in the present study, overgeneral memories are indirectly corrected by repeatedly prompting the participant to retrieve a specific memory following an overgeneral response. It is possible that this indirect feedback makes repeated overgeneral ABM retrieval by the same participant less likely. In the written

version of the AMT used by Hermans et al. (2005), no such prompts could be given, and hence overgeneral memory retrieval was never indirectly corrected.

Secondly, Hermans et al. (2005) imposed more constraints on what constitutes an acceptable specific memory by stipulating that the specific memory had to be longer than a week ago and that the same memory could not be repeated twice. Because no such instructions were given in the present study, specific memory retrieval was relatively easier, as more memories constituted acceptable responses. On the other hand, by imposing more restrictions on acceptable responses, it is likely that Hermans et al. (2005) increased the cognitive load of the participants during the ABM retrieval task. Reduced executive control has been established to play a significant role in the retrieval of overgeneral ABMs (see Section 1.6). The differences in the higher cognitive load between the two studies could also contribute to explaining the differences in the number of overgeneral memories recalled by the participants.

Furthermore, while the present study found that thought suppression was only related to faster negative ABM retrieval, Hermans et al. (2005) did not consider positive and negative memory retrieval separately. Indeed, because Hermans et al. (2005) used a written version of the AMT, response latency could not possibly be considered at all in this prior research study, and is therefore another dimension on which the two studies cannot be compared. The present study has highlighted the importance of response latency when assessing the accessibility of positive versus negative episodic ABMs. Even when the number of overgeneral ABM retrievals could not be taken into account because of ceiling effects, the response latency has nevertheless

indicated an interesting pattern. Because overgeneral ABM retrieval has only two response categories (either the memory is overgeneral or it is specific), latency can be seen as a much more sensitive indicator of accessibility of ABMs.

The second key finding of the present study is that of a significant correlation between thought suppression and reduced personal semantic memory retrieval. Personal semantic memory retrieval is so far only documented to be affected in PTSD, and not in other psychopathologies (see Section 1.4). This provides further support of the importance of thought suppression as an individual difference factor which is particularly important in PTSD. However, the assumption so far has been that personal semantic memory is affected as a result of childhood trauma because it is never properly encoded under such circumstances (Hunter & Andrews, 2002). The present study, on the other hand, indicates that by virtue of being variable and correlated with a cognitive coping mechanism, perhaps personal semantic memory may not be as stable as previously assumed. Further research is needed to investigate this possibility, but the present study has provided an important basis to further explore the effects of thought suppression on personal semantic memory retrieval.

However, while the present study offers a promising indication that thought suppression may play an important role in ABM recall, the correlational nature of the study limits the interpretability of these results. Before any conclusions can be drawn regarding the causal effects of thought suppression on ABM retrieval, the crucial next step in this program of

research must be to determine the causal nature of this relationship, which is addressed in the following chapter.



## *Chapter 4*

### STUDY 2: THE EFFECTS OF INDUCED THOUGHT SUPPRESSION ON ABM RECALL<sup>3</sup>

#### *4.1 Introduction*

Following the fruitful findings of the correlational study in Chapter 3, where higher levels of thought suppression were found to be significantly correlated with the faster recall of negative episodic memories as well as a reduced ability to retrieve personal semantic information, the purpose of the present study is to examine the causal nature of this relationship. Specifically the effects of thought suppression on ABM retrieval will be examined here, as opposed to the effects of negative ABM retrieval on levels of thought suppression. The motivations for this were twofold. Firstly, the prior research that has manipulated a ruminative thinking style has demonstrated that cognitive coping mechanisms can influence ABM recall patterns (see Section 1.5). Furthermore, while arguably everyone will have negative ABMs, not everyone will use thought suppression to cope with them. Therefore, it can be speculated that the enhanced retrieval of negative ABMs is less likely to lead to a suppressive coping style (by virtue of everyone experiencing these memories at times) than vice-versa.

To date, only one study has examined the effects of thought suppression on ABM retrieval in terms of valence effects (see Section 1.7). Dalgleish and Yiend (2006) conducted a suppression manipulation study in which a group of dysphoric adults and a non-dysphoric control group were

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<sup>3</sup> The study outlined in the present chapter was provisionally accepted to be published in Behaviour Research and Therapy pending minor alterations to the manuscript (11-12-2007)

asked to either suppress or not suppress a negative ABM which participants were asked to identify prior to the suppression manipulation. The results showed that dysphoric participants in the suppression group retrieved negative ABMs significantly faster on a subsequent cued ABM retrieval task (AMT) than dysphoric participants who were not suppressing a negative memory. According to Dalgleish and Yiend (2006) this effect of facilitated negative ABM retrieval observed in depressed participants in their ABM retrieval following the suppression of a negative memory is a result of these individuals activating other negatively valenced mental representations as distractors from the memory that is to be suppressed, thereby making other negative material relatively more accessible on the subsequent memory recall task. Furthermore, the results also showed that higher levels of depressed mood in the participants were also significantly related to more intrusions of the suppressed negative ABM. The authors argue that these results are due to the increased cognitive load that depressed individuals experience as a result of their depression (Dalgleish & Yiend, 2006). Because depressed mood in itself can be seen as a cognitive load, suppression is more likely to fail in these conditions, as suppression is more likely to result in paradoxical effects under cognitive load (see Section 1.6).

The present study seeks to expand on the previous research by Dalgleish and Yiend (2006) in numerous ways. Firstly, the present study will use a similar undergraduate student sample to that used in Chapter 3, as the main purpose is to further investigate those findings. Dalgleish and Yiend (2006) used a sample of dysphoric adults who were, on averaged, middle aged. However, by the time of testing the BDI scores for 10 out of the 31

dysphoric participants had dropped below the pre-experiment screening cut-off level. Though the participants in the dysphoric groups still had significantly higher BDI scores than those in the control groups, the classification of those participants as dysphoric could be questioned. Furthermore, and despite the small sample sizes in Dalgleish and Yiend (2006) where there were between 10 and 16 participants per group, there was a trend in the dysphoric suppression group to have higher IES scores than their non-suppression control group, which was approaching significance. It is therefore possible that these results were in part due to post-traumatic stress responses, which were not properly assessed or considered in this clinical sample. Replicating this study in a nonclinical student sample allows for the investigation of thought suppression as a coping mechanism on ABM retrieval irrespective of any psychopathology.

The methodology employed by the present study also differs from Dalgleish and Yiend (2006) in a number of ways. Firstly, a baseline measure of ABM retrieval was taken in the present study, something which was not done by Dalgleish and Yiend (2006). This is considered imperative in order to draw reliable inferences about the effect of thought suppression on ABM retrieval, especially when such small sample sizes are used as was the case with Dalgleish and Yiend (2006). Secondly, in the current study all participants were exposed to the same material (i.e. a negative video) for the thought suppression task, which is to ensure that the material is consistent for each participant. Dalgleish and Yiend (2006) asked participants to suppress a personal negative ABM, which meant that each participant was suppressing different material, resulting in less consistency. Crucially, the present study not

only seeks to assess the effects of thought suppression on episodic ABM retrieval, but also on personal semantic memory retrieval. This is rationalised in light of the correlations observed in Chapter 3, as well as the theoretical importance of thought suppression in PTSD, where both episodic ABM as well as personal semantic memory retrieval are affected (see Section 1.4). Finally, in order to assess the effects of thought suppression on general cognitive functioning, a semantic fluency task will also be included in the present study.

Though to date only two studies have investigated the effects of thought suppression on episodic ABM retrieval (Section 1.7), the effects of thought suppression on nonpersonal episodic memory have been studied in somewhat more detail. The negative video clip used as the material for suppression in the present study was previously used by Rassin, Merckelbach and Muris (1997) to assess the effects of thought suppression on memory for the suppressed material, which was subsequently assessed by a short-answer questionnaire. Though investigating non-personal episodic memory was not the primary purpose of the present study, in order to replicate Rassin et al. (1997), the same questionnaire was therefore also used in the present study. Rassin et al. (1997) found that thought suppression led to an increase of thoughts about the suppressed material in the 5 hours in which the participants were asked to suppress the video clip, but had no effect on the participants' ability to recall information regarding the facts or chronology of events from the video clip. Earlier research by Wegner, Quillian and Houston (1996) used a similar suppression task and found that participants who had suppressed a video clip subsequently made significantly more errors in

recalling the chronology of events in a free recall task when compared to participants who had not suppressed the video. It is important to note that the video used by Wegner et al. (1996) depicted a clash between union representatives and coal miners in West Virginia, and was not selected because of its negative content, but rather on the basis that few participants would have seen it before. The video used by Wegner et al. (1997) may have arguably been less negative and aversive than that used by Rassin et al. (1997). It is therefore possible that the discrepancies in the results of these two studies are a result of the different natures of the video clips used as material for suppression, as suppression of non-emotional and negative material seem to result in different levels of cognitive costs (Klein & Bratton, 2007).

However, the results of these two studies may have been discrepant due to the different ways in which the memory for the video was tested (the closed questionnaire used by Rassin et al. (1997) versus the free recall task employed by Wegner et al. (1996)). The present study therefore also employs a free recall task similar to the one used by Wegner et al. (1996) in addition to the closed questionnaire used by Rassin et al. (1997). Non-personal episodic memory retrieval is assessed in the present study to replicate the prior work in this area, but also in order to investigate whether suppression has a different effect on personal as opposed to non-personal memory retrieval. Though no personal ABMs are suppressed in the present study as this would relinquish too much experimental control over the crucial suppression manipulation task, previous research has demonstrated that, in terms of cognitive costs, personal negative memories are significantly harder to suppress than non-personal negative memories (Klein & Bratton, 2007).

In summary, the present study was set out primarily to establish a causality of the correlations observed in Chapter 3 between thought suppression and both episodic ABM personal semantic memory retrieval by engaging a similar nonclinical student sample in a thought suppression task and assessing their subsequent memory retrieval. Furthermore, the present study expands on previous work by Dalgleish and Yiend (2006) and Schönfeld et al. (2007) by including measures of personal semantic memory and semantic fluency, as well as conducting a suppression manipulation under better controlled conditions with more participants in each condition, where baseline measures of the dependent variables are taken, and the material to be suppressed is similar for all participants. Finally, the present study has a secondary aim of assessing non-personal episodic memory recall for the suppressed material, seeking to replicate either Rassin et al. (1997) or Wegner et al. (1996).

It is hypothesised that the induced thought suppression of the negative material (i.e. the video clip) would lead to the same recall patterns observed as correlations in Chapter 3, i.e. more accessible negative ABMs as well as the recall of fewer personal semantic memories and that no such effects would be observed in the control group of participants who would not suppress any thoughts of the video. Furthermore, if the discrepant prior findings in the literature regarding the effects of thought suppression on non-personal episodic memory retrieval were a result of the different assessments methods used by Rassin et al. (1997) and Wegner et al. (1996), it is predicted that thought suppression will affect the memory for the video only on the free recall task (Wegner et al., 1996). In other words, only those participants in the

suppression condition should make significantly more errors recalling the events in sequence, whereas no such differences would be expected on the closed questionnaire about the video (Rassin et al., 1997).

## *4.2 Method*

### *4.2.1 Design*

A 2 (time: before and after manipulation) x 2 (condition: suppression vs. no suppression) mixed model was used to assess the effects of thought suppression on ABM recall, with time as the repeated measure factor. For ABM retrieval on the AMT, an additional within subject factor was added for valence of the cue words (positive and negative). In the case of the memory for the video, which could only be assessed after the manipulation, a between subjects design was applied (suppression vs. no suppression conditions). Participants were randomly assigned to either the suppression or no suppression condition. The presentation of the different versions of the AMT, Student's Autobiographical Memory Interview and Semantic Fluency tasks before and after the suppression manipulation were completely counterbalanced throughout.

### *4.2.2 Participants*

Participants were sixty-four (51 female and 13 male) undergraduate students from the University of St. Andrews. Participation was voluntary and occurred in return for a small financial fee. The mean age of all participants was 20.94 years (s.d. = 2.97).

### 4.2.3 Materials

#### 4.2.3.1 Autobiographical Memory Test (AMT) (Williams & Broadbent, 1986)

See Section 2.2.1 for a general description of the AMT. In the present study, two different versions of the AMT were used to assess cued episodic memory recall before and after the manipulation. Each version of the AMT consisted 5 positive and 5 negative cue words; the words were matched for their emotional content as well as their frequency (see table 4.1). (Version A: proud, guilty, amazed, weak, lively, bored, eager, helpless, excited, upset) (Version B: friendly, rejected, faithful, bad, calm, awful, pleased, ashamed, hopeful, miserable).

Table 4.1: Means (s.d.) of the emotional content and frequency of the cue words for versions A and B of the AMT

AMT	Version A	Version B	t	p
Emotional content	5.14 (0.59)	5.04 (0.50)	0.44	0.66
Frequency	25.4 (14.53)	24.80 (17.73)	0.08	0.94

Furthermore, no differences were found between the positive and negative cue words on each AMT in terms of imageability, concreteness, and how readily raters felt that they may elicit a specific memory (see Section 2.2.1 and Appendix A.1.1). Inter-rater reliability regarding the coding of the nature of the first memory that was recalled for each cue word (overgeneral versus specific) was calculated for two independent raters on a sample of 20% of the participants' memories and was found to be high (Cohen's Kappa  $K = 0.92$ ).



#### *4.2.3.2 Students' Autobiographical Memory Interview (S-AMI)*

See Section 2.2.3 for a description of the Students' Autobiographical Memory Interview (S-AMI). In order to assess the personal semantic memory recall prior to and after the manipulation, two different but shortened versions of the Student's Autobiographical Memory Interview were used (see Appendices A.3.4 and A.3.5). Each shortened version of the S-AMI consisted of three sections covering early childhood, adolescence, and recent memories. Each section contained eight questions used to elicit personal semantic information, and inquire about one episodic event from that time period, which was scored on the three dimensions of time, place and specificity.

#### *4.2.3.3 Semantic Fluency Task*

In order to assess semantic fluency prior to and after the suppression manipulation, participants were asked to name as many vegetables or animals as they could in one minute.

#### *4.2.3.4 White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994)*

See Section 2.5 for a description of this questionnaire. The WBSI was used in the present study to obtain a measure of the participants' trait tendency to engage in thought suppression as a way of coping with unwanted thoughts and memories. This measure was used to rule out any differences in trait thought suppression in the participants between the different conditions, and also to replicate the correlations between thought suppression (as measured by the WBSI) and ABM retrieval reported in Chapter 3.

#### 4.2.3.5 *Video of a “Grizzly Bear Attack” (from “Faces of Death”)*

Participants were shown a 4 minute video clip showing a grizzly bear attack on a tourist. It was selected for the realistic nature of the film and its emotional and fairly aversive nature. The clip was taken from the “Faces of Death” video, and was also used by Rassin et al. (1997). Section 2.6 outlines a pilot study conducted to obtain an emotional rating for this video clip.

#### 4.2.3.6 *Memory for the Video Questionnaire*

This questionnaire consisted of a free recall task followed by 36 questions about the video. For the free recall task participants were asked to fill one page of ruled paper by writing about the video clip. The following instructions for this task were printed at the top of the page and taken from Wegner et al. (1996): “Write the story of the film, from the beginning to the end, on the lines provided. Write this summary of the film in as much detail as possible. Please fill the entire page with remarks about the film. If you can’t think of something to say just write “blah, blah, blah” until you come up with your next sentence. It is important that you fill this page.” In order to score the free recall task, a master list of events was first composed, and each participant’s free recall response was evaluated against this list. For each event that the participant mentioned that was on the list they received one point (number of events). For each incorrect piece of factual information recalled (e.g. confusing the male with the female tourist), the participant received one factual error point. Finally, for each event that was recalled in the wrong order compared to the events mentioned beforehand or afterwards, the participant received one point for a chronological error. The scoring was conducted by

two independent researchers, who were unaware of the different experimental conditions. Inter-rater consistency in the scores was high for the number of events recalled ( $r^2 = 0.99$ ,  $p < 0.001$ ), number of factual errors ( $r^2 = 0.97$ ,  $p < 0.001$ ), and number of errors in the chronological order of events ( $r^2 = 0.91$ ,  $p < 0.001$ ).

This free recall task was followed by a set of specific questions about the video which were closely modeled on those used by Rassin et al. (1997)<sup>4</sup>. The questionnaire was only altered to make it appropriate to the current study, meaning that only those questions that referred directly to the specific manipulation of the Rassin et al. (1997) study were excluded. There were eight questions about the nature of the film, e.g. “How vivid is your memory for the film?” and these questions were rated on 100mm visual analogue scales (VAS), ranging from 0 (“not at all”) to 100 (“extremely”). Of the remaining 28 questions, 17 were about details of the film (e.g. “Does the deer have horns?”) and 11 were about the chronological order of the film scenes (e.g. “Which of the following shots appears first: that of the landscape or that of the bear?”). All these questions were open-ended, and the each correct answer was scored as one point. Therefore, high scores on the questionnaire indicate good memory for the film. See Appendix A.3.6 for a full list of the questions.

#### *4.2.3.7 Suppression Questionnaire*

In order to ascertain the effectiveness of the suppression manipulation, all participants were asked to rate on a 100mm visual analogue scale (VAS) how much they tried to suppress their thoughts of the video

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<sup>4</sup>The questions were obtained by correspondence with the author.

during the subsequent thought monitoring/suppression tasks. The scale ranged from 0 (“not at all”) to 100 (“very much”).

#### 4.2.4 Procedure

Participants were tested individually and were first presented with a set of the AMT, Student’s AMI and Semantic Fluency Task. These tasks were followed by the viewing of the grizzly bear video on a TV screen. Following the viewing of the film, participants were given a five minute thought monitoring task, in which they were asked to press a button whenever they had a thought about the video that they had just seen. Instructions for this task differed according to the experimental condition; for the suppression condition participants were told to “*try as hard as they can to NOT think about the film they have just viewed*”, and in the no suppression (control) condition participants were told to “*think freely about anything they liked*”. After the five minute thought monitoring period was completed, participants were immediately given different versions of the AMT, Student’s Autobiographical Memory Interview, and Semantic Fluency Task again. Finally, the participants were given a set of questionnaires to complete, which included the Memory for the Video Questionnaire, the Suppression Manipulation Questionnaire, and the WBSI. After the testing the participants were fully debriefed and all received a small financial compensation for their participation. The information sheet (A.3.1), consent form (A.3.2) and debriefing form (A.3.3) for this study are included in the Appendix.

### 4.3 Results

#### 4.3.1 Replication of Correlations from Chapter 3

Linear Pearson product moment correlation coefficients were calculated between the “effective” WBSI scores as well as the ABM baseline measures taken before the participants were subjected to the suppression manipulation. The results were consistent and replicated those of Chapter 3 in that thought suppression was significantly and negatively correlated with the latency to recall negative ABMs ( $r = -.260, p < 0.05$ ) as well as personal semantic memory recall ( $r = -.249, p < 0.05$ ).

#### 4.3.2 Effectiveness of the Suppression Manipulation

Participants’ age and gender, as well as levels of thought suppression (both as a trait characteristic as measured by the WBSI as well as the reported levels of thought suppression during the experimental task are presented in table 4.2. There were no differences in the gender ratio between the two groups (Fisher’s exact,  $p > .5$ ), nor did the two groups differ significantly in age ( $t_{(62)} = 1.01, p > 0.31$ ). The two groups differed significantly in their self-reported levels of thought suppression as a result of the instructions given. The suppression group reported significantly higher levels of thought suppression during the thought monitoring tasks than the non-suppression group, indicating that the experimental instructions were followed ( $t_{(62)} = -2.90, p < 0.01$ ). The groups did not, however, differ in their reported levels of trait thought suppression as a general coping strategy as measured by the WBSI ( $t_{(62)} = 0.42, p > 0.67$ ) and the effective suppression items of the WBSI ( $t_{(62)} = -0.51, p > 0.27$ ). This lack of a difference between the groups indicates

that any effects of suppression occurred as a result of the manipulation, as opposed to the participants' general tendency to engage in thought suppression.

Table 4.2: Gender ratio, means (s.d.) for age, suppression (self-report), reported intrusions (i.e. button presses) and WBSI per suppression condition

	Groups		t
	Suppression (n = 32)	No Suppression (n = 32)	
Gender (m:f)	6:26	7:25	-
Age	20.65 (2.12)	21.31 (3.62)	1.010
Suppression (self report)	74.30 (23.00)	56.20 (26.70)	-2.903**
Button Press	13.44 (10.70)	15.59 (10.44)	0.816
WBSI	52.31 (8.95)	53.16 (7.00)	0.420
WBSI – E	21.34 (3.70)	20.88 (3.59)	-0.514

\*\*  $p < 0.01$ , two-tailed

#### 4.3.3 *Effects of Thought Suppression on the Memory for the Video*

The results for the measures of memory for the video clip by group (suppression vs. control) are presented in table 4.3. There were no significant differences between the two groups in their ability to recall information about the video, in terms of the factual events, factual errors as well as the chronology of the events (all  $p > 0.05$ ). This was the case for both the free recall task as well as the specific questions about the video. Furthermore, ratings of the quality of the memory for the video in terms of how vivid and fragmented it is did not differ significantly between the two groups (all  $p > 0.5$ ).

Table 4.3: Means (s.d.) for memory of the video per suppression condition

	Post Manipulation Groups		T
	Suppression (n = 32)	No Suppression (n = 32)	
<i>Free Recall Task:</i>			
Number of Events	19.97 (4.92)	19.29 (4.95)	.546
Chronological Errors	0.19 (0.47)	0.29 (0.59)	-.767
Factual Errors	1.22 (1.48)	1.10 (1.19)	.360
<i>Content Questionnaire:</i>			
Facts	6.97 (1.98)	6.09 (1.77)	1.868
Chronology	6.59 (1.81)	6.63 (1.34)	-.078
<i>Rating of the Memory:</i>			
Vivid	7.80 (1.48)	7.97 (1.26)	-.500
Clear	7.02 (2.69)	7.32 (1.90)	-.521
Likely	5.90 (2.92)	6.35 (2.95)	-.613
Snapshot-like	4.39 (2.33)	4.68 (2.53)	-.486

#### 4.3.4 Effects of Thought Suppression on ABM Recall

The results for the measures of ABM recall between the two groups taken before (baseline) as well as after the suppression manipulation are presented in table 4.4.

Table 4.4: Means (s.d.) of ABM measures pre and post manipulation per suppression condition

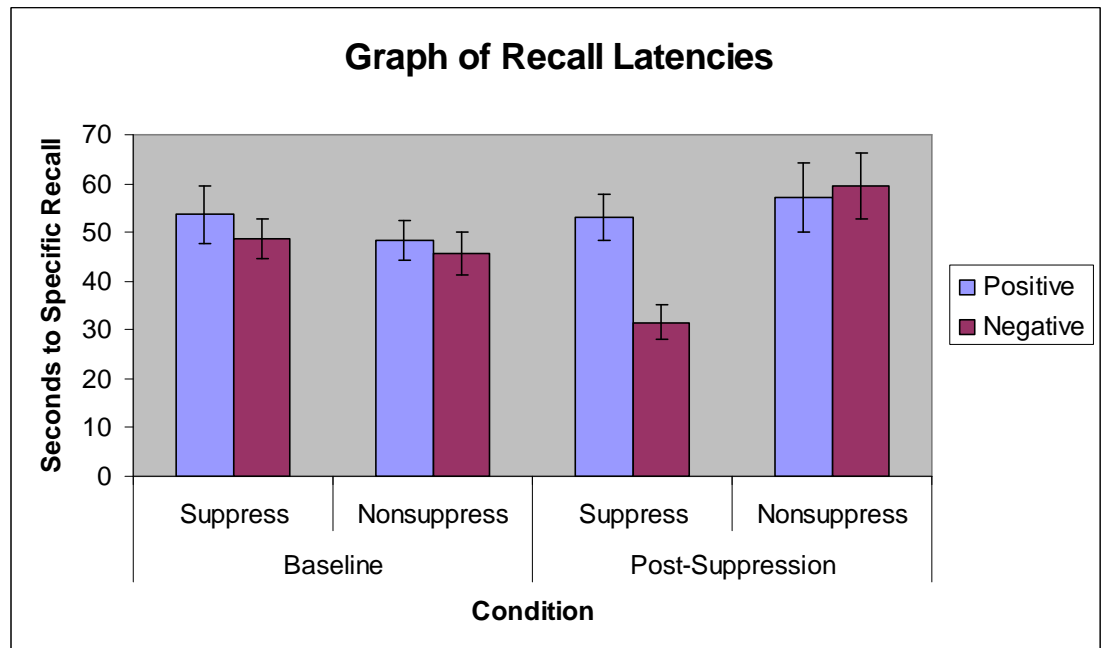
	Baseline		Post Manipulation	
	Suppression (n = 32)	No Suppression (n = 32)	Suppression (n = 32)	No Suppression (n = 32)
<i>Episodic Latency:</i>				
AMT – positive	53.72 (33.24)	48.28 (22.62)	53.19 (26.48)	57.31 (40.72)
AMT – negative	48.72 (22.26)	45.66 (24.22)	31.56 (20.00)	59.50 (37.42)
<i>Specific Episodic first response:</i>				
AMT – positive	4.69 (0.47)	4.81 (0.40)	4.66 (0.55)	4.66 (0.65)
AMT – negative	4.66 (0.48)	4.72 (0.68)	4.94 (0.25)	4.59 (0.56)
<i>ABM Interview:</i>				
S-AMI episodic total	8.56 (0.91)	8.22 (1.52)	8.13 (1.48)	8.41 (1.24)
S-AMI episodic childhood	2.81 (0.47)	2.69 (0.90)	2.53 (0.88)	2.88 (0.55)
S-AMI episodic adolescence	2.84 (0.57)	2.63 (1.01)	2.69 (0.82)	2.72 (0.81)
S-AMI episodic recent	2.91 (0.53)	2.91 (0.53)	2.91 (0.39)	2.81 (0.64)
S-AMI per. sem. total	22.13 (1.73)	22.22 (1.78)	20.91 (1.93)	22.25 (1.66)
S-AMI per. sem. childhood	6.36 (1.57)	6.41 (1.53)	5.52 (2.01)	6.72 (1.31)
S-AMI per. sem. adolescence	7.95 (0.20)	7.97 (0.18)	7.75 (0.67)	7.61 (0.97)
S-AMI per. sem. Recent	7.81 (0.73)	7.84 (0.63)	7.70 (0.63)	7.61 (1.10)
<i>Semantic Fluency:</i>				
Semantic Fluency	22.50 (8.63)	21.84 (7.90)	20.84 (7.20)	23.19 (7.93)

In order to investigate the main hypothesis that thought suppression would lead to more accessible negative memories, a 2 (condition: suppress vs. control) x 2 (time: baseline and post-manipulation) x 2 (cue valence: positive and negative) mixed model ANOVA was calculated for the recall latencies, with time and cue valence as the repeated measures factors. This analysis yielded a significant main effect of valence,  $F_{(1,62)} = 6.75$ ,  $p < 0.05$ , with negative memories being produced faster than positive memories, but no significant main effects of condition ( $F_{(1,62)} < 1$ ) or time ( $F_{(1,62)} < 1$ ). However, there were significant interactions for time x condition,  $F_{(1,62)} = 10.60$ ,  $p < 0.01$ , and cue valence x condition,  $F_{(1,62)} = 6.32$ ,  $p < 0.05$ . The hypothesised three-way interaction, condition x time x cue valence was approaching significance,  $F_{(1,62)} = 3.76$ ,  $p = 0.06$ .

To further investigate this three-way interaction, two separate time x condition mixed ANOVAs were performed for positive and negative cue words. For positive cue words, no significant time x condition interaction ( $F_{(1,62)} = 1.07$ ,  $p > 0.3$ ) was observed, indicating that there were no differences in recall latencies between the conditions for positive cue words at any time. For the negative cue words, however, there was a significant time x condition interaction,  $F_{(1,62)} = 18.01$ ,  $p < 0.001$ . Follow-up independent sample t-tests showed that there were no differences between the groups in the recall latencies for negative memories at baseline,  $t_{(62)} = 0.53$ ,  $p > 0.6$ . However, consistent with the hypothesis, after the suppression manipulation, suppression led to significantly faster recall of specific memories to negative cue words than no suppression,  $t_{(62)} = 3.73$ ,  $p < 0.001$ .



Figure 4.1: Means (s.e.) of recall latencies to cue words on the AMT pre and post manipulation per suppression condition



In order to examine the effects of thought suppression on the number of specific first responses, a 2 (condition: suppress vs. control) x 2 (time: baseline, post-manipulation) x 2 (cue valence: positive, negative) mixed model ANOVA was calculated, with time and cue valence as the repeated measures factors. This analysis yielded no significant main effects of condition ( $F_{(1,62)} < 1$ ), cue word valence ( $F_{(1,62)} < 1$ ) or time ( $F_{(1,62)} < 1$ ). There was a significant interaction of time x condition,  $F_{(1,62)} = 6.03$ ,  $p < 0.05$ , but the time x valence x condition three-way interaction was not significant  $F_{(1,62)} = 1.23$ ,  $p = 0.27$ ).

However, in light of the hypothesis, which predicted an effect of negative facilitation only, this model was nevertheless deconstructed based on cue word valence. As predicted, the time x condition interaction for positive cue words was not found to be significant ( $F_{(1,62)} < 1$ ). However, for negative cue words, the time x condition interaction was significant;  $F_{(1,62)} = 6.30$ ,  $p < 0.05$ . Follow-up independent sample t-tests showed that the suppression

group produced significantly more specific responses to negative cue words after the manipulation than the control group,  $t_{(62)} = 3.18, p < 0.01$ , but no such difference was found prior to the manipulation (i.e. at baseline)  $t_{(62)} = 0.42, p > 0.6$ .

For analysis of the results obtained by the S-AMI two separate 2 (condition: suppress vs. control) x 2 (time: baseline and post-manipulation) mixed model ANOVAs were calculated for episodic and personal semantic memory recall, with time as the repeated measures factor. For the S-AMI episodic recall there were no significant main effects of condition ( $F_{(1,62)} < 1$ ) or of time ( $F_{(1,62)} < 1$ ). There was also no significant interaction,  $F_{(1,62)} = 1.99, p > 0.1$ .

For the S-AMI personal semantic recall, however, there were significant main effects of condition,  $F_{(1,62)} = 4.46, p < 0.05$ , with fewer personal semantic memories being generated in the suppression condition, as well as a significant main effect of time,  $F_{(1,62)} = 4.33, p < 0.05$ , with participants recalling fewer personal semantic memories after the manipulation. However, these main effects were qualified by a significant condition x time interaction,  $F_{(1,62)} = 4.79, p < 0.05$ . A follow up independent sample t-test revealed that after the manipulation, the suppression group recalled significantly fewer personal semantic memories than the control group,  $t_{(62)} = 2.99, p < 0.01$ . No such differences were found at baseline,  $t_{(62)} = 0.21, p > 0.8$ .

Finally, a 2 (condition: suppress vs. control) x 2 (time: baseline, post-manipulation) mixed model ANOVA was calculated for the semantic fluency scores, with time as the repeated measures factor. There were no main effects

of condition ( $F_{(1,62)} < 1$ ), or of time ( $F_{(1,62)} < 1$ ), nor was there a significant interaction ( $F_{(1,62)} < 1$ ). This analysis shows that semantic fluency itself was not affected as a result of the suppression manipulation.

#### 4.3.5 Nature of the Specific ABM Recall

In a preliminary attempt to investigate how thought suppression might affect episodic ABM retrieval, a number of aspects of the specific memories that the participants retrieved on the AMT were retrospectively examined in more detail. Specifically, the number of times a memory was retrieved repeatedly to the same cue word, as well as the number of recent memories was recorded. Memories of events which occurred less than a week ago were counted as recent memories. Furthermore, in order to conduct a preliminary assessment of whether thought suppression affects generative or direct retrieval, memories that were recalled in less than two seconds were considered to be directly activated (see Haque & Conway, 2001). The descriptive statistics for the number of repeated memories, recent memories, and direct recalls are summarised in table 4.5 below.

Table 4.5: Means (s.d.) for number of repeated memories, recent memories and direct recalls pre and post manipulation per suppression condition

	Baseline		Post Manipulation	
	Suppression (n = 32)	No Suppression (n = 32)	Suppression (n = 32)	No Suppression (n = 32)
<i>Repeated Memories</i>				
positive	0.03 (0.18)	0.06 (0.25)	0.03 (0.18)	0.03 (0.18)
negative	0.16 (0.37)	0.13 (0.34)	0.13 (0.34)	0.12 (0.30)
positive from baseline	-	-	0.03 (0.18)	0.04 (0.17)
negative from baseline	-	-	0.34 (0.60)	0.28 (0.52)
<i>Recent Memories (&lt; 1 week ago)</i>				
Positive	1.66 (1.23)	1.65 (1.13)	1.69 (1.42)	1.59 (1.39)
Negative	1.72 (1.35)	1.69 (1.35)	1.78 (1.45)	1.78 (1.50)
<i>Direct Retrieval (&lt; 2 sec)</i>				
Positive	0.69 (0.90)	0.72 (0.85)	0.66 (0.83)	0.53 (0.67)
Negative	0.55 (0.80)	0.50 (0.84)	0.56 (0.80)	0.57 (0.81)

Nonparametric analysis using the Mann-Whitney U test revealed that there were no significant difference in the number of repeated memories, recent memories, and directly retrieved memories recalled of any valence between the suppression and no suppression condition (all  $p > 0.5$ ). Furthermore, the Wilcoxon test revealed that there were no differences between the number of repeated, recent, and directly retrieved memories as a result of the suppression manipulation (i.e. baseline vs. post-manipulation) for any valence (all  $p > 0.2$ ). These preliminary results indicate that thought suppression does not result in increased retrieval of recent memories, nor does it appear to result in an increase in the same memories to be recalled repeatedly to the same cue word. Furthermore, thought suppression did not appear to lead to an increase of negative memories that were recalled very quickly, which could have indicated that it affects direct rather than generative retrieval.

#### *4.4 Discussion*

Firstly, the present study replicated the correlations observed in Study 1 (Chapter 3), in that higher levels of thought suppression were significantly correlated with the faster recall of specific negative episodic ABMs as well as reduced recall of personal semantic memories. Furthermore, the present study showed that when thought suppression was induced in a laboratory setting, it directly led to the same recall patterns previously observed as correlations in this program of research. However, the ability to recall the information that was suppressed (i.e. the video clip) was not affected by the suppression manipulation, despite the fact that this was assessed using both a closed

questionnaire (Rassin et al., 1997) as well as a free recall task (Wegner et al., 1996).

Together with Dalgleish and Yiend (2006), the present research expands on previous research regarding the ironic and paradoxical effects of thought suppression (e.g. Wegner et al., 1987, Abramowitz et al., 2001) by demonstrating that not just the material that is to be suppressed, but also any negative ABM can be made more accessible by virtue of engaging in this coping mechanism. These results are consistent with Dalgleish and Yiend (2006), in that thought suppression resulted in the faster recall of specific episodic memories in response to negative cue words. However, Dalgleish and Yiend (2006) found that this facilitation was only the case for dysphoric participants. Because no baseline measures of ABM retrieval were taken in this prior work, the conclusions that can be drawn by Dalgleish and Yiend (2006) regarding the effects of thought suppression on ABM recall in the dysphoric group are limited to comparison with the non-dysphoric group following the manipulation, as opposed to the effects of thought suppression on ABM retrieval prior to and following the manipulation. To add to the findings of Dalgleish and Yiend (2006), the present study also demonstrated that thought suppression also had a detrimental effect on personal semantic memory retrieval, rather than just affecting episodic ABM recall.

Following the results that thought suppression resulted in enhanced negative episodic ABM retrieval, the nature of the specific ABMs retrieved was retrospectively further examined. Though these results are tentative, they suggest that thought suppression had no effect on the number of memories that were recalled repeatedly, the number of recent memories that were

recalled, nor on the number of memories that were recalled in less than two seconds. The finding that thought suppression does not appear to affect the number of memories that were recalled repeatedly may suggest that thought suppression does not appear to result in increased intrusions of previously accessed negative memories. Instead, it is possible that thought suppression results in a general facilitation of specific negative representations, which do not have to have been accessed beforehand. The result that thought suppression did not lead to an increase in memories that were recalled in less than two seconds may indicate that the enhanced retrieval of negative episodic ABMs as a result of thought suppression was not due to a higher number of directly activated representations following the suppression manipulation. While generative retrieval of episodic ABMs generally takes some time, direct retrieval tends to occur very quickly, and the speculation is that a participant is able to begin a verbal report of a directly retrieved memory within two seconds of being given the cue word (Haque & Conway, 2001). Therefore, these preliminary results may indicate that thought suppression affects generative episodic ABM retrieval rather than simply resulting in an increased activation of directly activated or intrusive representations.

The second key finding of the present study was that personal semantic memory retrieval was also affected by thought suppression demonstrates that this research is increasingly relevant to understanding the cognitive underpinnings of PTSD, where thought suppression is a common coping mechanism (e.g. Ehlers & Clark, 2000), and which is also the only emotional disorder where personal semantic memory retrieval is consistently

found to be affected (see Section 1.4). The present study also extends previous research by demonstrating that the retrieval of personal semantic memories can be affected by thought suppression. Previous theories regarding personal semantic memory retrieval in PTSD have proposed that these memories are not encoded well as a result of traumatic experiences (e.g. Hunter & Andrews, 2002). The present results, however, suggest that personal semantic memories, like episodic memories, may not be as stable as previously thought. The present study clearly demonstrates that the retrieval of personal semantic memories is susceptible to the effects of experimental manipulations. Taken together with the result of affected episodic ABM retrieval, these results also imply that thought suppression has a complex effect on cognitive systems; on the one hand it facilitates negative episodic ABM retrieval while at the same time debilitating the retrieval of personal semantic memories.

In the present study, there were no differences between the groups in the number of intrusions of the suppressed material (i.e. the video clip) between the conditions. This finding is inconsistent with prior research which has demonstrated that suppression resulted in increased intrusions of the suppressed material compared to a condition where the material was not suppressed (see Abramowitz et al., 2001). This finding may have been a result of a methodological limitation of the present study, as the number of intrusions of the suppressed material was only assessed *during* the suppression manipulation (by the number of times the participants pressed a mouse button during this task), and could not be assessed in the time thereafter. An analysis of intrusions after the manipulation may have been fruitful because

many studies have reported a delayed rebound effect of intrusive thoughts as a result of thought suppression, i.e. in the time period *following* the suppression task, rather than *during* the suppression task (Beck et al., 2006; Davies & Clark, 1998; Harvey & Bryant 1998a, 1998b; Wegner et al., 1987; Wenzlaff et al., 1988). Such an analysis was not done in the present study because it was crucial to re-assess ABM retrieval following the manipulation in the same way as was done prior to the manipulation.

Finally, the present study also set out to investigate the effects of thought suppression on memory for the suppressed material, in the case a non-personal but negative video clip. The results indicated no differences between the conditions in the present study in the memory on any of the dimensions. This finding is inconsistent with both Wegner et al. (1996) and Rassin et al. (1997), who found that memory for the suppressed material was affected as a result of the suppression manipulation. It is possible that this was a result of a second methodological limitation of the present study, namely that the five minute duration of the suppression manipulation was relatively short. Despite the fact that it was deemed successful by virtue of the participant's ratings of their levels of suppression, as well as the significant differences observed in the ABM retrieval patterns following the suppression, these effects may not have lasted long enough to affect all subsequent measures. In fact, significant differences between the groups were only observed in the two measures given immediately after the suppression manipulation (namely the AMT and the S-AMI), but not on any of the measures following this, including the memory for the video questionnaires, semantic fluency test and WBSI.



Despite the methodological limitations, the findings of the present study strengthen the previously mentioned implications for clinical psychology. The fact that PTSD-like recall patterns can be created in a nonclinical student sample by engaging the participants in thought suppression of negative material could help explain why some individuals develop PTSD symptoms following a traumatic event while others do not. One of the factors that could determine whether PTSD symptoms develop could be the trait coping style of the individual. The results of the present study suggest active thought suppression of negative material could directly lead to the PTSD-typical recall patterns.

While the decreased ability to retrieve personal semantic information is specifically relevant to PTSD, the facilitated recall of negative episodic information could be relevant both PTSD as well as self-harm (see Section 1.4). There are two possible reasons why this negative facilitation effect might occur as a result of thought suppression. The first explanation may be that this is a result of mood congruent recall. Numerous studies have demonstrated that memories are easier to recall if the valence of the memory is consistent with the current mood state (Lloyd & Lishman, 1975; Clark & Teasdale, 1982; Teasdale & Fogarty, 1979). In the present study, the negative video clip by itself could have functioned as a negative mood manipulation. However, because all participants watched the same negative video clip, this in itself can not explain the observed negative facilitation effect, as it would also have occurred in the no suppression group. Therefore, it is perhaps possible that the process of thought suppression of the negative material itself could have resulted in a more negative mood in the participants. Those

participants who were in the suppression group were continually reminded of their “failure” to adhere to the experimental instructions each time they experienced a thought or memory relating to the video. This could have led to frustrations and a decrease in mood, which could explain why subsequent ABM recall was affected. Further investigations should therefore examine the effects of thought suppression on mood using a similar experimental paradigm. This issues is addressed in Chapter 5 of this program of research.

The second way in which negative information could have become more accessible may be as a result of the thought suppression itself. Conscious thought suppression is thought to require two cognitive processes (Wegner, 1994). After the material is marked for suppression (which in itself requires accessing the material, thereby making it more likely to be recalled and adding to the paradoxical effects of thought suppression), both processes have to occur simultaneously in order to ensure successful thought suppression. The effortful operating process searches for material for distraction from the suppressed material, while the automatic monitoring process searches for indications that signal failure of the operating process, i.e. that the material has been accessed. As a result of having accessed the negative information and marking it for suppression, it is possible that the negative material that the participant thinks about during this time will be consistent in valence, but semantically unrelated to the suppressed material. Due to the adverse content of the video clip (and, indeed, any information that needs to be suppressed), it is therefore likely that the information used for distracting attention away from the suppressed material was also negative in valence, thereby enhancing the subsequent negative ABM recall.

## *Chapter 5*

### STUDY 3: THE EFFECTS OF INDUCED THOUGHT SUPPRESSION ON MOOD STATES

#### *5.1 Introduction*

Together, the previous two studies have demonstrated that thought suppression is correlated with the faster recall of specific negative episodic ABMs (Chapter 3). Furthermore, a suppression manipulation task revealed that thought suppression of negative material directly led to the faster retrieval of negative episodic ABMs and more initial specific responses to negative cue words (Chapter 4). Two possible explanations have been offered to explain this phenomenon of facilitated negative ABM retrieval as a result of thought suppression. Firstly, it is possible that in the thought suppression condition, the process of engaging in thought suppression itself acts as a cognitive load, thereby undermining the monitoring process of suppression and resulting in the hyperaccessibility of negative thoughts and memories. As a result of repeated intrusions of the negative material presented in the video, it is possible that the information which the participants used as distraction material (i.e. in order to avoid thinking about the suppressed thought) was triggered by, yet semantically unrelated to the suppressed material. Due to the adverse content of the video, it is therefore likely that the material that was used to distract from the suppressed material was also negative in valence, thereby enhancing subsequent negative ABM recall.

The second possible explanation for this negative facilitation effect is that it occurred as a result of mood congruent recall. If suppression of the

negative material resulted in a more negative mood state than simply watching the negative video, the subsequent ABM retrieval may have been more negatively biased because it was mood congruent. This explanation is further considered in the present chapter. Numerous studies have demonstrated that memories that are consistent in valence with a current mood state are easier to recall than those inconsistent with the mood state (Lloyd & Lishman, 1975; Clark & Teasdale, 1982; Teasdale & Fogarty, 1979). In the previous study (Chapter 4), it is possible that watching the negative and adverse video itself could have functioned as a negative mood manipulation, thereby enhancing subsequent negative ABM retrieval. However, because all participants were exposed to the same video clip, yet only those in the suppression condition exhibited the negative facilitation effect as a result, this explanation is not sufficient in explaining the results of Chapter 4. Therefore, what must be considered is whether the process of thought suppression of the negative material could have resulted in a more negative mood in the participants than simply watching the negative video without suppression. In the suppression condition, participants were continually reminded of their “failure” of adhering to the experimental instructions each time they experienced a thought or memory relating to the video. This could have resulted in frustrations and a decrease in mood (over and above that which may have been induced by simply watching the video), which in turn could explain why subsequent ABM recall became negatively biased. Indeed, during the suppression condition, participants frequently made utterances that suggested that they were frustrated over their failure (such as swearing as they pressed the button to indicate a video-related thought).

The purpose of the present study is to assess the effects of thought suppression on mood, in order to exclude or confirm it as a mechanism which could explain the previously observed negative facilitation effect following of thought suppression. To date, the literature examining the relationship between thought suppression and mood remains limited, and reliable conclusions regarding the effects of thought suppression on mood can not be drawn. While a number of studies of thought suppression have included some measure of mood (e.g. Dalgleish and Yiend, 2006), so far, only two studies have examined the direct effects of thought suppression on mood, with contradictory results. In one experiment by Purdon and Clark (2001), participants were either instructed to suppress or not to suppress a self-selected neutral, positive, or obsessive thought and it was found that thought suppression of the obsessive thought was associated with a more negative subsequent mood state than suppressing the positive or neutral thoughts. Furthermore, in the condition where participants were suppressing an obsessive thought, a higher frequency of intrusions of the suppressed target thought was significantly correlated with a more negative mood (Purdon & Clark, 2001). The authors argue that this was a result of the discomfort experienced as a result of thinking about the obsessive thought which participants were trying to suppress. Despite the fact that the number of overall intrusions was similar across all groups (suppression and no suppression of any type of thought), those participants who were suppressing an obsessive thought reported a significantly higher level of discomfort when experiencing an intrusion of the target thought than those who were not suppressing an obsessive thought. However, in a separate study it was found

that higher numbers of intrusions of personally relevant intrusive thoughts were significantly correlated with a more negative mood in both the suppression and control conditions (Brewin & Smart, 2005). This is generally consistent with earlier literature which demonstrated that in a negative mood it is more difficult to suppress a negative thought (Conway, Howell & Giannopoulos, 1991; Wenzlaff, Wegner & Klein, 1991; Wenzlaff, Wegner & Roper, 1988) and that thoughts are more difficult to dismiss during negative mood states (Edwards & Dickerson, 1987; Sutherland, Newman & Rachman, 1982). These studies appear to indicate that not only is suppression more likely to fail in negative mood states and lead to paradoxical effects, but also that intrusions of the material that is to be suppressed can lead to a decrease in mood.

However, a second study which directly assessed the effects of thought suppression on mood yielded contradictory results. In this study, participants were required to perform a written stream-of-consciousness task either while suppressing any negative thoughts, or without any such restrictions (Beevers & Scott, 2001). In contrast with the results obtained by Purdon & Clark (2001), it was found that suppression of all negative thoughts resulted in a more positive mood. This was thought to be the result of successful thought suppression (Beevers & Scott, 2001). However, this successful suppression also came at a cognitive cost, in that the participants in the suppression condition also showed fewer signs of causal reasoning and discrepancy seeking.

Because of the discrepant results of the two studies, it is not possible to draw any reliable conclusions about the effects of thought suppression on

mood. It is therefore important to note the methodological differences between these studies. The first major difference lies in the material that was to be suppressed; where Purdon and Clark (2001) asked participants to first identify a single thought and then suppress it, Beevers and Scott (2001) instructed participants to suppress any negative thought. This is an important difference, as recent research has provided evidence that the cognitive effort required in order to suppress may differ with the material to be suppressed, in that personally relevant negative material was found to be harder to suppress than non-personal negative experiences or non-emotional memories (Klein & Bratton, 2007). Suppressing any negative material, which includes non-personal negative thoughts (Beevers & Scott, 2001) should therefore be relatively easier and more successful than suppressing only a personally relevant obsessive thought (Purdon & Clark, 2001). This may contribute to explaining why the suppression of any negative thought was deemed to have been successful by Beevers and Scott (2001) while the suppression of a personally relevant obsessive thought was not found to be successful by Purdon and Clark (2001).

A second important methodological difference between the two studies lies in the way in which the number of intrusions of the suppressed material was assessed. In Purdon and Clark (2001), participants were asked to report any occurrences of the target thought during the suppression or thought monitoring conditions, but whether this was done verbally or in writing or as part of a computer task is unclear. However, Beevers and Scott (2001) used computer-based content analysis to examine the written text which participants had produced during the stream-of-consciousness writing

task (during which they were either suppressing or not suppressing any negative thought). The number of negative emotion words in the text was taken as an index of the number of intrusions. These differences make it difficult to directly compare the two studies on the number of intrusions, which could have been taken as an indication of how successful the participants were suppressing.

However, irrespective of the methodological issues, a possible explanation for the different results may be related to whether or not the suppression was successful. In one study (Purdon & Clark, 2001), it was found that suppression of an obsessive thought led to a decrease in mood, but also resulted in more distress over intrusions of the suppressed material, indicating that the participants may have felt that they have failed at the suppression task. In the study where suppression of any negative thought resulted in a more positive mood (Beavers & Scott, 2001), the indications are that the suppression was successful, because participants in the suppression condition used fewer negative emotion words than those who were not suppressing.

In the previous study of this program of research (Chapter 4), the suppression manipulation was deemed successful by virtue of the participants reporting significantly different levels of efforts to suppress between the conditions, which were consistent with the experimental instructions. That is, participants in the suppression condition reported significantly higher levels of thought suppression after watching the video than those who were instructed to simply monitor their thoughts. Furthermore, the subsequent differences which were observed in ABM retrieval patterns between the



conditions are also indicative of a successful suppression manipulation. However, there were no differences in the number of intrusive memories of the suppressed material between any of the conditions. Though this was not assessed, it is possible that as in Purdon and Clark (2001), those participants who were instructed to suppress experienced greater levels of distress as a result of intrusions of the material they were meant to suppress than those who were not instructed to suppress and could freely think about the material without a sense of failure.

In this present study, the effects of thought suppression on mood were examined in a similar paradigm as was used in Chapter 4, in order to evaluate the possibility that the enhanced negative ABM recall observed in the previous study was a result of a mood-congruent recall effect. It was therefore crucial to the present study that it replicated the same suppression manipulation procedure as was used in the previous study (Chapter 4). However, ABM recall was not re-assessed in the present study as there was ambiguity as to whether or not the effects of the relatively short suppression manipulation employed in Chapter 4 lasted long enough to affect all the subsequent measures. In the previous study, ABM recall was the primary dependent variable of interest, and hence this was assessed immediately after the suppression manipulation. Variables which were assessed thereafter, such as the memory for the video and the semantic fluency may not have yielded significant results, possibly because these measures were taken when the effects of the suppression manipulation had already worn off. In the present study, the participants' mood state is the primary dependent variable of interest, and will therefore be measured immediately after the suppression

manipulation. Because Purdon & Clark (2001) found that only suppression of the obsessive thoughts (which might arguably be negative in nature) led to a decrease in mood, as opposed to the suppression of positive and neutral thoughts, the present study also included a positive suppression condition. This was to function mainly as a control condition, to investigate whether the act of engaging in suppression itself has an adverse effect on mood, irrespective of the valence of the suppressed material. An alternative outcome would be that suppression merely leads to a mood state that is consistent with the suppressed material, i.e. that only suppression of negative material leads to a more negative mood state, while suppression of positive material has no effect or may even result in a more positive mood. Strong bonds between suppressed thoughts and mood states have previously been demonstrated by Wenzlaff, Wegner and Klein (1991), who found that a suppressed thought becomes bonded to the mood state that was experienced during the suppression task. Therefore, revisiting the mood state makes the previously suppressed thought more accessible. Similarly, recalling the suppressed thought re-instates the mood state experienced during the suppression condition (Wenzlaff et al., 1991).

Due to the inconsistencies in the previous literature, two sets of hypotheses are considered in the present study. These are that (a) thought suppression of negative material only would result in a significantly more negative mood as compared to the mood at baseline (consistent with Purdon & Clark, 2001). This would indicate that the enhanced negative ABM recall in Chapter 4 may have been the result of mood congruent recall. The second possibility is that (b) thought suppression would lead to a more positive mood

state (consistent with Beevers & Scott, 2001). If the latter is the case, an alternative explanation for the results of Chapter 4 must be sought, for instance an effect of cognitive load.

## *5.2 Method*

### *5.2.1 Design*

This study employed a 2 (condition: suppression vs. no suppression) x 2 (valence of video: positive vs. negative) x 2 (time: baseline and post-manipulation) mixed model design with time as the repeated measures factor. The dependent variables were the mood ratings and were taken prior to as well as following the suppression manipulation task. Participants were randomly assigned to one of the four conditions of suppression (positive or negative video) or no suppression (positive or negative video).

### *5.2.2 Participants*

Participants were sixty-four (45 female and 19 male) undergraduate students from the University of St. Andrews. Participation was voluntary and occurred in return for a small financial fee. The mean age of all participants was 20.48 years (s.d. = 3.44).

### *5.2.3 Materials*

#### *5.2.3.1 Profile of Mood States (POMS) (McNair, Lorr & Droppelman, 1971)*

See Section 2.3.3 for a description of this measure. The POMS was used in the present study as it is sensitive to changes in mood states, and was used to obtain an index of the mood state of participants baseline as well as after the suppression manipulation.

#### *5.2.3.2 Negative Video: “Grizzly Bear Attack” (from “Faces of Death”)*

This 4 minute video clip was selected for its realistic and aversive nature. See Section 2.6 for the content of this video, as well as a pilot study which was conducted to assess the suitability of this video clip and its negative content for the present study.

#### *5.2.3.3 Positive Video: “Gone Nutty” (from “Ice Age”)*

This 4 minute cartoon of a squirrel trying to gather acorn nuts was selected as a positive counterpart to the negative video of the grizzly bear attack. Section 2.6 describes the content of this video as well as a pilot study which was conducted to assess the suitability of this video clip and its positive content for the present study.

#### *5.2.3.4 Suppression Questionnaire*

This questionnaire consisted of a single question, asking participants to retrospectively rate how much they tried to suppress any thoughts of the video they had viewed during the suppression or thought monitoring task (see

Section 4.2.3.7). The responses were rated on a 100 mm Visual Analogue Scale (VAS) ranging from 0 (“not at all”) to 100 (“very much”). This was used to assess the effectiveness of the suppression manipulation, and to establish that the experimental instructions to suppress any thought of the video were adhered to in the suppression condition.

#### *5.2.3.5 White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994)*

See Section 2.5 for a description of this measure. The WBSI was used in the present study to get an index of the participants’ trait tendency to engage in thought suppression as a means of coping with unwanted thoughts and memories. This was done to rule out any differences in these predispositions between the conditions at baseline, to ensure that any subsequent effects of thought suppression on mood were a result of the experimental manipulation and not due to any individual differences.

#### *5.2.4 Procedure*

Participants were tested individually and were fully informed of the tasks prior to giving informed consent. Participants were randomly assigned to one of the four experimental conditions (positive video – suppression, positive video – no suppression, negative video – suppression, negative video – no suppression), and then received identical questionnaire packs. The experimental procedure began with a POMS questionnaire (baseline measure), followed by the presentation of a positive or negative video clip (via DVD and television). Instructions were then given for the five-minute thought

monitoring period. In the no suppression (control) condition, participants were instructed to: “*think freely about anything they liked*, but to press the mouse button for each thought they have about the video”. In the suppression condition participants were instructed to “*try as hard as they can to NOT think about the film they have just viewed*, but to press the mouse button for each thought they have about the video”. Participants then completed the remainder of the questionnaire pack: the POMS questionnaire (post-manipulation), suppression questionnaire and WBSI. At the end of the session all participants were fully debriefed. (see Appendix 4 for participant information (A.4.1), consent (A.4.2) and debriefing forms (A.4.3)).

### 5.3 Results

#### 5.3.1 Participant Characteristics

The participants’ gender ratio, age and trait suppression are summarised in table 5.1.

Table 5.1: Gender ratio, means (s.d.) for age and WBSI per suppression condition

	No Suppression		Suppression	
	Positive	Negative	Positive	Negative
Gender (f:m)	12:4	10:6	12:4	11:5
Age	19.88 (3.14)	20.50 (3.92)	20.81 (3.06)	20.75 (3.82)
WBSI total	50.31 (11.95)	47.75 (9.09)	52.56 (6.88)	51.69 (11.08)
WBSI effective	19.50 (5.18)	19.06 (4.95)	21.38 (3.28)	21.00 (5.18)

There was no significant difference in the gender ratio between the four conditions (Fisher’s exact  $p > 0.9$ , two-tailed). A 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects

ANOVA was calculated for age, and revealed that there were no significant differences in the ages of the participants between the groups ( $F_{(1,60)} < 1$ ).

Two further 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVAs were calculated to assess the participants' trait suppression, as measured by the WBSI scores ( $F_{(1,60)} < 1$ ) as well as scores from "effective" WBSI items ( $F_{(1,60)} < 1$ ), both of which yielded non-significant results. This suggests that there were no differences in levels of trait suppression between the participants in the four conditions, and therefore any effect of thought suppression on mood can be attributed to the suppression manipulation, rather than the participants' predispositions to suppress unwanted thoughts.

### 5.3.2 Effectiveness of the Suppression Manipulation

The means (and standard deviations) for levels of thought suppression and number of intrusions reported by the participants (as measured by the number of mouse button presses) during the thought monitoring task are summarised in table 5.2.

Table 5.2: Means (s.d.) for suppression (self-report) and reported intrusions (i.e. button presses) per suppression condition

	No Suppression		Suppression	
	Positive	Negative	Positive	Negative
Suppression	52.31 (29.29)		68.31 (23.04)	
Suppression	59.00 (23.80)	45.63 (33.33)	67.81 (27.97)	68.81 (17.34)
Button Press	12.44 (6.23)	11.81 (8.40)	8.00 (6.64)	13.63 (9.29)

In order to assess the effectiveness of the manipulation, a 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVA was calculated for the self-reported levels of thought

suppression. This analysis revealed a main effect of condition ( $F_{(1,60)} = 5.91, p < 0.05$ ), but no significant main effect of valence ( $F_{(1,60)} < 1$ ) or interaction ( $F_{(1,60)} = 1.19, p = 0.28$ ). A subsequent independent-samples t-test showed that those participants who were instructed to suppress reported significantly higher levels of thought suppression than those in the control condition ( $t_{(62)} = -2.43, p < 0.05$ ), indicating that the experimental instructions were adhered to.

A similar 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVA was calculated to examine any differences in the number of video-related intrusions reported during the thought monitoring task, but revealed no main effects of valence ( $F_{(1,60)} = 1.67, p = 0.20$ ), condition ( $F_{(1,60)} < 1$ ), and no significant interaction ( $F_{(1,60)} = 2.61, p = 0.11$ ).

### *5.3.3 Effects of Thought Suppression on Mood*

Exploratory analysis of the data using boxplots revealed three outlying scores (greater than 1.5 inter-quartile ranges from the mean) for total mood disturbance (TMD) scale of the POMS at baseline, such that these three participants showed a comparatively higher mood disturbance at the beginning of the experiment compared to the other participants. Because there was doubt as to how effective any mood manipulation would be on participants who were already in such a negative mood, the analysis was not only conducted for the full data set ( $n = 64$ ), but was repeated with the data of these three outlying participants retrospectively removed from the data set ( $n = 61$ ). However, the patterns in the results remained the same, and only the



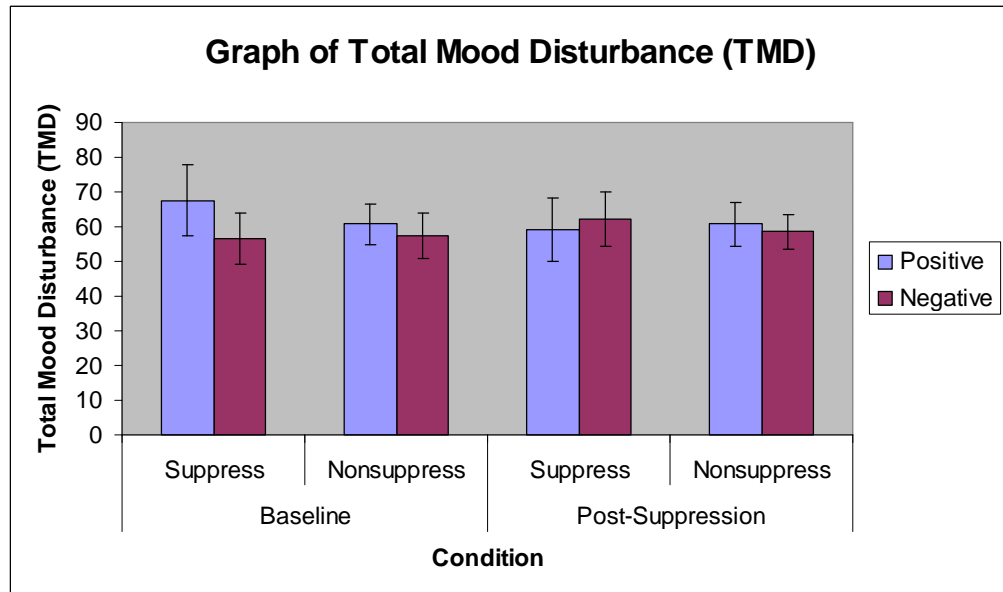
results of the full data set will be presented hereafter. (For the complete data analyses for the reduced data set see Appendix A.4.5).

The POMS scores for the four experimental conditions at baseline and post-manipulation are summarised in table 5.3 below, and the scores for total mood disturbance (TMD) are also displayed in figure 5.1 (as TMD reflects the mood state across all 6 subscales).

Table 5.3: Means (s.d.) for TMD and each POMS subscale pre and post manipulation per suppression condition

Video (n)	Baseline				Post-Manipulation			
	No Suppression		Suppression		No Suppression		Suppression	
	Positive n = 16	Negative n = 16	Positive n = 16	Negative n = 16	Positive n = 16	Negative n = 16	Positive n = 16	Negative n = 16
TMD	60.69 (23.40)	57.31 (26.32)	67.44 (40.90)	56.69 (29.51)	60.75 (25.49)	58.56 (20.27)	59.19 (36.26)	62.25 (31.84)
Tension	15.31 (5.49)	15.44 (5.25)	16.38 (6.50)	15.56 (5.99)	13.75 (4.14)	13.13 (2.96)	14.13 (5.78)	15.94 (6.96)
Depression	21.38 (5.81)	19.19 (6.35)	24.88 (14.25)	20.00 (9.19)	21.13 (8.28)	18.50 (5.25)	22.50 (12.94)	20.13 (8.91)
Anger	14.50 (2.99)	16.25 (5.86)	19.56 (9.10)	14.19 (2.97)	15.19 (4.58)	15.69 (4.69)	17.81 (8.53)	13.44 (2.78)
Vigour	22.00 (6.25)	21.63 (5.61)	24.38 (7.68)	23.19 (6.09)	19.31 (5.44)	17.94 (5.59)	23.63 (5.70)	19.81 (6.74)
Fatigue	16.06 (7.08)	14.25 (5.51)	14.38 (6.84)	16.06 (6.66)	15.38 (7.91)	14.88 (6.46)	12.63 (5.46)	16.44 (6.50)
Confusion	15.44 (4.27)	13.81 (2.23)	16.63 (4.24)	14.06 (4.52)	14.63 (3.48)	14.31 (3.00)	15.75 (4.49)	16.13 (5.71)

Figure 5.1: Means (s.e.) for TMD pre and post manipulation per suppression condition



In order to investigate the effects of thought suppression on mood, a series of 2 (time: baseline and post-manipulation) x 2 (condition: suppression vs. no suppression) x 2 (valence: positive vs. negative) mixed model ANOVAs were calculated for TMD as well as the 6 POMS subscales, with time as the repeated measures factor. For TMD, no significant main effects of time ( $F_{(1,60)} < 1$ ), valence ( $F_{(1,60)} < 1$ ) or suppression condition ( $F_{(1,60)} < 1$ ) were found, and no significant interaction occurred for time x condition x valence ( $F_{(1,60)} = 2.68, p = 0.11$ ). Thus, suppression of any material did not lead to significant changes in mood.

Similar patterns emerged for each of the POMS subscales. Critically, no significant 3-way interaction between time, condition, and valence were found on any of the POMS subscales: tension ( $F_{(1,60)} = 1.94, p = 0.18$ ); depression ( $F_{(1,60)} = 1.77, p = 0.19$ ); anger ( $F_{(1,60)} = 2.48, p = 0.12$ ); vigour ( $F_{(1,60)} < 1$ ); fatigue ( $F_{(1,60)} < 1$ ); and confusion ( $F_{(1,60)} = 1.08, p = 0.30$ ) (for full models please refer to Appendix A.4.4).

#### *5.3.4 Power Analyses*

In order to further validate the non-significant findings obtained in the three way interactions and to ensure that these results were not due to an inadequate sample size an a priori power analysis was performed. The effect size for the time x valence x condition interaction for TMD was relatively small (effect size = 0.212) and based on this effect size a sample of 292 participants would be required to obtain a significant three way interaction at  $p < 0.05$ .

However, the 64 participants in the pervious study (Chapter 4) only viewed the negative and not the positive video clip, and therefore the power analysis was repeated for those 32 participants in the present study who viewed the negative video. The size of this effect was 0.173 and the a priori power analyses revealed that a sample of 437 participants would be needed to observe a significant change in TMD (at  $p < 0.05$ ) as a result of the time x condition interaction. It therefore remains unlikely that the effects of thought suppression on ABM recall observed in Chapter 4 occurred as a result of changes in mood.

#### *5.4 Discussion*

The purpose of the present study was to investigate whether the enhanced recall of negative ABMs following thought suppression manipulation in Chapter 4 may have been a result of mood congruent recall. In order to achieve this, a similar participant sample was subjected to a similar suppression manipulation paradigm. However, the present results revealed no significant effect of thought suppression on mood. This non-significant

finding is inconsistent with previous research. Though contradictory in themselves, with one study reporting that thought suppression resulted in a more negative (Purdon & Clark, 2001) and another in more positive subsequent mood state (Beevers & Scott, 2001), both prior studies have yielded a significant effect of thought suppression on mood.

All three studies employed different methodologies, and one key difference between these studies lies in the nature of the material that was suppressed. As was demonstrated in a recent study by Klein and Bratton (2007), the cost of suppressing different types of thoughts may vary. Therefore, it is possible that the difficulty of suppression task was easiest when any negative thought was to be suppressed (as by Beevers & Scott, 2001), moderate in the present study where a non-personal negative event was suppressed, and hardest when a personally relevant obsessive, and arguably negative thought was suppressed (Purdon & Clark, 2001), which is consistent with the results by Klein and Bratton (2007). It is possible that suppression was most successful when suppressing the easier material (any negative thought) and most likely to fail and result in a paradoxical effect when suppressing personally relevant material, which should be the hardest to suppress. Furthermore, it is likely that the distress associated with experiencing intrusions of the suppressed material also varies according to the nature of the material. Accordingly, it is likely that there is more distress associated with intrusions of personally-relevant negative material than of non-personal negative material (such as the grizzly bear video). Therefore, whether or not effects of suppression on mood are observed may depend in the first instance on how successful the suppression was, and therefore the

number of intrusions experienced. Beevers and Scott (2001) found that suppression of any negative material (which may have been a relatively easy task) was successful in that it resulted in fewer negative intrusions, and an increase in mood as compared to controls. More important, however, may be the amount of distress associated with the experience of intrusions. It follows that the more distress is associated with the experience of intrusions of the suppressed material, the more likely it is that the suppression will result in a more negative mood. Purdon and Clark (2001) found that although suppression of a personal obsessive thought (which may have been a relatively difficult task) did not result in more intrusions, but nevertheless the intrusions were perceived as more distressing intrusions. Moreover, participants who experienced more intrusions of the obsessive thought also reported a more negative mood state. In the present study, a non-personal negative event was suppressed. This may mean that intrusions of the suppressed material (which also did not differ between the groups) may not have been as distressing as intrusions of personally-relevant negative thoughts and memories, which would explain why the suppression of the negative material in the present study did not result in a more negative mood state. Future suppression manipulation studies should therefore assess not only the number of intrusions, but also the amount of distress associated with having intrusions of the suppressed material. Furthermore, future studies aiming to investigate the effects of thought suppression on mood should focus on the suppression of personally relevant information, as this is arguably more ecologically valid.

A second finding of the present study was that the valence of the suppressed material also had no significant effect on subsequent mood states.

The trend in the means indicate that suppression of positive material resulted in a slight increase in mood, whereas suppression of negative material led to a slight decrease in mood (as captured by the TMD), but these effects were small and not approaching significance. While the videos have been rated as significantly different in valence, and also as sufficiently positive and negative (as opposed to neutral) (See Section 2.6), it does not appear that the videos were powerful enough to induce a certain mood state. The number of intrusions of video-related thoughts and memories reported by participants were similar across all conditions, meaning that those participants who were shown the negative video experienced a similar number of intrusions of that material as those who watched the positive video. If the valence of the intrusion itself had been a factor, then the positive video could have resulted in a more positive mood than watching the negative video. However, this was not found to be the case.

Due to the substantial differences in the methodologies employed by previous research (Prudon & Clark, 2001; Beevers & Scott, 2001) as well as the present study, no valid conclusions regarding the general effect of thought suppression on mood can be drawn. The existing research, including the present study, only allow for conclusions about the effects of thought suppression on mood as a result of the specific experimental paradigms used, and not about what effect thought suppression may have on mood outside of the laboratory.

Nevertheless, it was the purpose of this study to investigate the precise effects of thought suppression on mood within the suppression manipulation paradigm used in Chapter 4. By failing to demonstrate a

significant effect of this suppression manipulation on mood, the present results suggest that the possibility that the negative facilitation effect of ABM retrieval observed in Chapter 4 could have been a result of mood congruent recall should be ruled out.

To provide further evidence for this conclusion, an a-priori power analysis was conducted and revealed that a substantially larger sample size ( $n = 437$ ) than was used in Chapter 4 ( $n = 64$ ) would have been required to observe significant effects of thought suppression on mood in the present thought suppression manipulation paradigm. Based on the present results it can be speculated that if there were any mood changes in the participants following the manipulation then these would have been random differences and not responsible for the subsequent negative facilitation effect in ABM retrieval. It is therefore highly unlikely that the ABM recall patterns observed as a result of the suppression manipulation in Chapter 4 were an indirect result of mood congruent recall.

The present study was carefully designed to exactly replicate the suppression paradigm used in Chapter 4, and therefore shares similar methodological limitations. There were no differences in the number of video related intrusions across the conditions (as measured by the number of button presses), which is consistent with the results of Chapter 4, where there was a similar lack of significant differences. This is most likely a consequence of this paradigm resulting in a paradoxical rebound effect of thought suppression and these effects are likely to occur after, and not during the suppression task (see Section 4.4).

The results of the present study have demonstrated that mood congruent recall is an unlikely mechanism to explain the enhanced negative ABM recall observed in Chapter 4. Therefore, future research should focus on investigating other potential reasons for this effect, such as cognitive load, which will be further considered in the discussion of this program of research (Section 7.5).



## *Chapter 6*

### STUDY 4: EXAMINING THE ROLE OF THOUGHT SUPPRESSION AND ABM RECALL IN SELF-HARMING ADOLESCENTS

#### *6.1 Introduction*

The purpose of the present study is to investigate the importance of thought suppression in the retrieval of ABMs in a sample of self-harming adolescents with high levels of trauma. Firstly, the differences in the ABM retrieval patterns between the sample of self-harming adolescents versus a matched control group are compared. Furthermore, the role of thought suppression in explaining the ABM retrieval pattern, particularly in terms of negative episodic ABM retrieval and personal semantic memory retrieval is investigated.

So far, the theoretical emphasis of this program of research has been on the importance of thought suppression in explaining ABM retrieval patterns, with particular emphasis on the ABM retrieval patterns associated with post-traumatic stress reactions. However, this was only investigated in nonclinical student samples. The present study, therefore, aims to investigate the relationship between thought suppression and ABM retrieval patterns in a clinical sample of self-harming adolescents. This particular sample was targeted as, based on the previous literature (Section 1.4), the facilitated retrieval of negative episodic ABMs was generally found in self-harming individuals or those with post-traumatic stress responses, and may therefore be particularly likely to be observed in the present clinical sample. Multiple regression analysis will be used to investigate the degree to which thought

suppression explains variability in negative episodic ABM retrieval and personal semantic memory retrieval while simultaneously accounting for variability due to symptoms of depression and PTSD. The key prediction here is that thought suppression will remain an important predictor of both the faster latency to retrieve negative episodic ABMs and reduced personal semantic memory retrieval above and beyond the variability that is explained by symptoms of PTSD and depression.

Along with trauma, deliberate self-harm is theoretically important condition in which the role of thought suppression in the retrieval of ABMs should be examined. As with trauma, thought suppression is also an important coping mechanism for individuals who self-harm. Repeated, deliberate self-harm has been proposed to constitute an avoidant coping strategy by itself, whereby deliberate self harm is thought to reduce unwanted emotional arousal (Chapman, Gratz & Brown, 2006). Empirical evidence of the importance of thought suppression in self harm comes from a sample of female inmates with Borderline Personality Disorder (BPD). In this group, thought suppression was significantly and positively correlated with levels of deliberate self-harm (Chapman, Specht & Cellucci, 2005).

It must be noted that post-traumatic stress and self-harm are often comorbid conditions. Childhood trauma is a long-established vulnerability factor for deliberate self-harm (Low, Jones, MacLeod, Power & Duggan, 2000; van der Kolk, Perry & Herman, 1991; Wiederman, Sansone & Sansone, 1999). It can therefore be speculated that levels of trauma are likely to be high in a group of self-harmers.

As with depression and trauma, overgeneral ABM retrieval is also a well documented ABM retrieval pattern seen in parasuicidal individuals and self-harmers (Evans, Williams, O'Loughlin & Howells, 1992; Pollock & Williams, 2001; Sidley, Whitaker, Calam & Wells, 1997; Sinclair, Crane, Hawton & Williams, 2007; Williams & Broadbent, 1986; Williams, Ellis, Tyers, Healy, Rose & MacLeod, 1996). However, similar to trauma, there are indications in the literature that in some cases, negative ABMs are actually relatively easier to retrieve by self-harmers than controls (Williams & Dritschel, 1988; Swales, Wood & Williams, 2001). Investigating the role of thought suppression in the retrieval of ABMs is therefore particularly intriguing in the present sample of self-harming adolescents, as the negative facilitation effect of episodic memory retrieval may be particularly prevalent in this sample. As with Chapter 3, the predictions for episodic autobiographical memory retrieval in the present study must remain twofold. The most consistent finding in the literature is that of overgeneral ABM retrieval, both in self-harmers as well as in PTSD (Section 1.4). Therefore, it is possible that the self-harmers will retrieve significantly fewer specific memories as first responses to all cue words. The other possibility is that of a negative facilitation effect, especially if levels of thought suppression are high in the self-harmers. If this is the case, it is possible that the self-harmers will retrieve specific negative episodic ABMs significantly faster than the control group.

Personal semantic memory has, to date, not been investigated in a self-harm sample. However, because the ability to retrieve personal semantic information appears to be reduced in individuals with a history of trauma (Section 1.4), it is likely that if levels of trauma are high in the group of self-

harmers, personal semantic memory retrieval will also be affected in the self-harmers. The present study will explore the personal semantic memory retrieval patterns in self-harming adolescents, while controlling for the role of trauma.

The reason for choosing an adolescent sample in the present study is that adolescence is an important time for the development of a self-concept (Habermas & Bluck, 2000). An enhanced tendency to retrieve specific negative episodic memories during adolescence may be particularly damaging to the self-concept when it is still developing so intensively. Examining whether the previously observed negative facilitation effect of episodic ABMs is already present in this adolescent sample and whether this is associated with thought suppression is therefore of particular clinical relevance in an adolescent sample. A second motivation for using an adolescent sample in the present study arises from the results of a study conducted by Swales et al. (2001), where the authors investigated ABM retrieval in a sample of mood-disturbed adolescents. The results showed a positive correlation between hopelessness and specific ABM retrieval, which was a result of the increased specific negative memory retrieval of the self-harming adolescents. However, in retrospect the authors noted that this was a result of a number of the self-harming adolescents recalling the same traumatic memory repeatedly to different negative cue words. The present study will therefore also examine the number of specific episodic memories that are recalled repeatedly, to ensure that any differences between the self-harmers and control group are not a result of repeated retrieval of the same ABM.

In summary, the hypotheses for the present study are as follows: firstly, it is predicted that the self-harmers will have significantly higher levels of post-traumatic stress symptoms than the control group. Secondly it is predicted that the self-harmers will report significantly higher levels of thought suppression than the control group. In terms of ABM retrieval, the hypothesis remains two tailed. Based on the previous literature it is possible that the self-harmers will exhibit greater difficulty than the control participants in the retrieval of specific ABMs. If this is the case, it is predicted that the self-harmers will produce fewer specific first responses to all cue words than controls. However, in terms of the response latency to negative cue words, it is also predicted that the self-harmers may be faster than the control participants in their responses, especially if levels of post-traumatic stress symptoms and thought suppression are high. Furthermore, it is predicted that the self-harmers will retrieve significantly fewer personal semantic memories than the control group. Finally, it is predicted that thought suppression will remain a significant predictor of variability in both negative episodic ABM retrieval latencies as well as personal semantic memory retrieval in the self-harming participants, even when symptoms of post-traumatic stress and depression have been accounted for.

## *6.2 Method*

### *6.2.1 Design*

This study employed a between subjects design in which levels of thought suppression and ABM retrieval of a group of adolescent who self

harm were compared to those of a matched group of controls. Participants were matched for age, gender, and verbal fluency.

### *6.2.2 Participants*

Participants were 20 self-harming adolescents (mean age = 15.30, s.d. = 1.42) and 20 matched controls (mean age = 15.20, s.d. = 1.51). There was an equal number of females (n = 16) and males (n = 4) in each group. The self-harmers were recruited on the basis of having disclosed at least 3 separate acts of deliberate self-harm and no obvious history of drug abuse to their therapist. The therapist also conducted a clinical interview, the Suicide Ideation Interview (K-SADS-PL) with the clinical group to obtain a profile of the self-harming behaviours of these participants. The control participants were subsequently recruited to match the self-harmers for age, gender, and verbal fluency.

### *6.2.3 Materials*

#### *6.2.3.1 British Picture Vocabulary Scale (BPVS-II) (Dunn, Dunn, Whetton & Pintilie, 1982)*

The BPVS is a measure of verbal fluency where the participant is given a spoken word which then has to be matched to the correct one of four pictures, with the three other pictures acting as distractors. The BPVS was used in the present study to match the self-harmers and the control participants for verbal fluency. This matching was deemed to be especially important because the dependent measures of ABM retrieval were presented in a verbal interview, and therefore any differences in verbal fluency between

the two groups had to be ruled out. The BPVS has been found to be a reliable and valid measure of verbal fluency in British children and adolescents (Dunn et al., 1982).

#### *6.2.3.2 Autobiographical Memory Test (AMT) (Williams & Broadbent, 1986)*

See Section 2.2.1 for a general description of the AMT. The AMT was used in the present study to assess both positive and negative episodic ABM retrieval. For this study, the cue words that were used were: bored, lucky, hurt, proud, upset, relieved, guilty, interested, lonely and safe. The cue words were specifically selected to be different and of lower frequency than those used in the first study in order to avoid the ceiling effect of specific responses to all cue words. No differences were found between the positive and negative cue words in terms of imageability, concreteness, and how readily raters felt that they may elicit a specific memory (see Section 2.2.1 and Appendix A.1.1). Inter-rater reliability regarding the nature of the memories recalled (i.e. specific or overgeneral) was conducted for 20% of the memories recalled by the participants and was found to be high (Cohen's Kappa = 0.93).

#### *6.2.3.3 Children's Autobiographical Memory Interview (CAMI) (Bekerian et al., 2001)*

See Section 2.2.2 for a description of this measure. The CAMI was used in the present study to assess personal semantic memory retrieval. The CAMI was used as opposed to the S-AMI used in Chapters 3 and 4 because

this is the equivalent measure that is appropriate for use with the adolescent participants in the present study.

*6.2.3.4 Suicidal Ideation Interview (from K-SADS-PL) (Kaufman, Birmaher, Brent, Rao & Ryan, 1996)*

The Schedule for Affective Disorders and Schizophrenia for school-aged children (K-SADS-PL) assesses both lifetime and current psychiatric diagnoses. It is a semi-structured interview that needs to be administered by a trained clinician. The Suicide Ideation Interview of the K-SADS-PL (see Appendix A.5.7) contains 5 items inquiring about recurrent thoughts of death, suicidal ideation, seriousness of suicidal acts, medical lethality of suicidal acts, as well as non-suicidal self damaging acts. It does not assess symptom severity, but rather symptoms are rated as not present, subthreshold, or threshold (present). The Suicidal Ideations Interview was used in the present study to obtain an index of the self harming and suicidal behaviour of the self-harming participants only. Initial reliability data for the K-SADS-PL suggests that the measure generates reliable and valid diagnoses (Kaufman, Birmaher, Brent, Rao, Flynn, Moreci, Williamson & Ryan, 1997).

*6.2.3.5 When Bad Things Happen Scale (Fletcher, 1996)*

See Section 2.4.2 for a description of this measure. The When Bad Things Happen Scale was used in the present study to assess the participants' intrusions, avoidance, and hyperarousal experienced as a result of their most traumatic experience. The most traumatic experience was identified by each



participant on the trauma questionnaire (see Appendix A.1.4) prior to completing this measure.

#### *6.2.3.6 Children's Depression Inventory (CDI) (Kovacs & Beck, 1977)*

See Section 2.3.2 for a full description of this measure. The CDI was used in the present study to assess symptoms of depression in the participants.

#### *6.2.3.7 White Bear Suppression Inventory (Wegner & Zanakos, 1996)*

See Section 2.5 for a description of this questionnaire. The WBSI was used in the present study to assess the participants' trait thought suppression.

### *6.2.4 Procedure*

All participants were tested individually. The data from all the self-harmers was collected first, so that the control participants could be matched to the clinical group for age, gender, and verbal fluency. The self-harmers were recruited from the local Child and Adolescent Mental Health Services. Potential participants that fulfilled the criteria of having committed at least 3 separate acts of self-harm were identified by their therapist and were given the information sheets for the present study. After informed consent was obtained from the participants (and their parents/guardians if the participant was under 16 years of age), the participants were invited individually for a testing session. The researcher started by giving the AMT, CAMI, and the BPVS. Following this the participant's therapist completed the Suicidal Ideations Interview (K-SADS-PL) with the participant. The participant was then given a questionnaire booklet containing the above questionnaires in the

following order: Trauma Questionnaire and WBTHS, CDI, and WBSI.

Following this, the participants were fully debriefed and received a small financial compensation for their participation.

After all the clinical data was collected, control participants were recruited from a local school. Participants were approached on the basis of being of the same age and gender as the self-harming participants. Participants were given information sheets, and after informed consent was obtained from them (and their parents/guardians if applicable), they were invited for a formal testing session at their school. Control participants were first given the BPVS, to determine whether they matched a clinical participant on verbal fluency. The BPVS score was calculated and it was determined whether the participant was a suitable match for a clinical participant. Testing only continued if this was the case, otherwise the participant was thanked and fully debriefed. Suitable participants were then given the AMT and CAMI, followed by the questionnaires given in the same order as to the clinical participants. The only exception was that the control participants were not given the Suicidal Ideation Interview (K-SADS-PL), as this interview needs to be administered by a clinician, and it was not deemed ethical to ask participants in their schools about possible self-harming behaviour. Instead, the suicide ideation item from the CDI was used as an index of suicidal ideation in the control participants, and if they indicated any level of suicidal ideation their data was excluded from the study. Following the testing, the participants were debriefed. For participant information, parent information and consent forms for both clinical and control participants see Appendices A.5.1 – A.5.6.

### *6.3 Results*

Of the 20 clinical participants, one participant did not complete the set of questionnaires. This participant's data from the memory interviews (AMT and CAMI) and Suicidal Ideation Interview (K-SADS-PL) is nevertheless included in the present study. Another self-harmer only gave temporal responses to the cue words on the AMT, despite numerous attempts of prompting him to do otherwise. To all cue words this participant only gave responses such as "I felt happy last night" or "I was angry on Monday", without giving any information about an event. The AMT data from this participant was therefore discarded from the data set. However, the data from the CAMI, the Suicidal Ideations Interview and the questionnaires from this participant have been kept in the data set.

#### *6.3.1 Participant Characteristics*

The clinical and control participants were matched for gender, age and verbal fluency, and the descriptive statistics for these variables are reported in table 6.1 below. There were no differences in the gender ratio of the participants, and there was also no significant difference in the age ( $t_{(38)} = -0.10, p > 0.9$ ) between the two groups. While the self-harmers had a slightly lower verbal fluency than the control group, this difference was not significant ( $t_{(38)} = 1.31, p > 0.2$ ).

**Table 6.1** Gender ratio, means (s.d.) for age, BPVS, WBTHS, CDI and WBSI per participant group

	Groups		t
	Self-Harmers (n = 19)	Control (n = 20)	
Gender (m:f)	4:16	4:16	-
Age (months)	189.50 (16.57)	188.95 (18.94)	- 0.098
Verbal Fluency (BPVS)	125.05 (17.21)	131.40 (13.33)	1.305
Trauma Symptoms (WBTHS)	62.79 (10.99)	32.45 (16.26)	- 6.791**
Depression (CDI)	22.58 (9.36)	6.85 (4.51)	- 6.740**
WBSI	59.58 (7.44)	49.65 (10.09)	- 3.481**
WBSI – Effective	23.89 (2.90)	19.65 (4.82)	- 3.312**

\*  $p < 0.05$     \*\*  $p < 0.01$

Furthermore, table 6.1 also summarises the participants self-reported post-traumatic stress symptoms, depression, as well as levels of trait suppression. As expected, the self-harmers reported significantly higher levels of post-traumatic stress symptoms ( $t_{(37)} = -6.79$ ,  $p < 0.001$ ) and symptoms of depression ( $t_{(37)} = -6.74$ ,  $p < 0.001$ ) than the control group. Consistent with the hypothesis, the self-harmers were also significantly higher trait suppressors than the control participants, as measured by both the total scale of the WBSI ( $t_{(37)} = -3.41$ ,  $p < 0.001$ ), as well as the “effective” items of the WBSI ( $t_{(37)} = -3.29$ ,  $p < 0.01$ ).

### 6.3.2 Self-Harming Behaviour and Suicide Ideation

The Suicide Ideations Interview was only administered to the self-harmers. The responses are summarised in table 6.2 below.

**Table 6.2** Number (frequency) of responses to the Suicide Ideations Interview (self-harmers only, n = 20)

	Not Present	Subthreshold	Threshold
Recurrent thoughts of death	0 (0%)	17 (85%)	3 (15%)
Suicidal ideation	1 (5%)	13 (65%)	6 (30%)
Suicidal acts – seriousness	4 (20%)	13 (65%)	3 (15%)
Suicidal acts – medical lethality	5 (25%)	13 (65%)	2 (10%)
Non-suicidal physical self-damaging acts	0 (0%)	4 (65%)	16 (80%)

As indicated in the table above, the clinical participants were mostly serious and repeated self-harmers, but only a small minority had inflicted serious or even lethal damage on themselves. Serious suicide ideators were also in the minority.

The control participants were not given the Suicidal Ideation Interview (K-SADS-PL) as no clinician was involved in the testing of the control participants. The suicide ideation item on the Children's Depression Inventory (CDI) was flagged as an index of suicidal ideation in the control participants. If a participant indicated any level of suicidal thoughts or ideation their data was discarded and a new participant was recruited of the same age and gender. This was only the case for one control participant. Therefore, in the present sample all control participants indicated no suicide ideation on the CDI. On this item of the CDI, 8 of the self-harmers indicated no suicide ideation ("I do not think about killing myself"), 9 indicated suicidal thoughts ("I think about killing myself"), and 2 indicated suicide ideation ("I want to kill myself").

### *6.3.3 Traumatic Experiences*

The participants completed the Trauma Questionnaire to give an indication of which traumatic events they have experienced, as well as which events they considered to be their most traumatic event. Following this, the participants completed the WBTHS in reference to their most traumatic experience. The self-harmers reported significantly more post-traumatic stress symptoms than the control group (Section 6.3.1), and the traumatic events which the participants reported are listed in table 6.3 below.

Table 6.3: Number (frequency) of traumatic events and most traumatic experiences per participant group

Type of Traumatic Event	Self-Harmers (n = 19)		Controls (n = 20)	
	Occurred	Most	Occurred	Most
Accident	9 (47%)	2 (11%)	7 (35%)	2 (10%)
Serious Medical Condition/Injury	5 (26%)	0 (0%)	4 (20%)	1 (5%)
Medical Treatment/Procedure	6 (32%)	0 (0%)	7 (35%)	0 (0%)
Sexual Abuse	7 (37%)	6 (32%)	0 (0%)	0 (0%)
Physical Abuse	11 (58%)	4 (21%)	0 (0%)	0 (0%)
Divorce of Parents	6 (32%)	3 (16%)	5 (25%)	3 (15%)
Death of a loved one	18 (95%)	4 (21%)	15 (75%)	4 (20%)
Illness of a loved one	12 (63%)	0 (0%)	13 (65%)	2 (10%)
Other (e.g. witnessing violence, bad experiences with drugs, relationship break-ups, being bullied)	4 (21%)	0 (0%)	14 (70%)	8 (40%)

The most common most traumatic event for the self-harmers was sexual abuse. In fact, a history of both physical and sexual abuse was high among the self harmers. In contrast, not one of the control participants reported any history of physical or sexual abuse. For the control participants the most common most traumatic event was being bullied, which was coded as “other” on the questionnaire.

### 6.3.4 ABM Recall

The results of the measures of ABM retrieval for the two groups are presented in table 6.4 below.

Table 6.4: Means (s.d.) of the ABM measures per participant group

	Self-Harmers (n = 19 (AMT)) (n = 20 (CAMI))	Controls (n = 20)
<i>Episodic Latency:</i>		
AMT – total	130.95 (68.28)	142.55 (57.97)
AMT – positive	76.10 (44.28)	63.65 (31.20)
AMT – negative	54.85 (38.64)	78.40 (34.21)
<i>Specific Episodic first response:</i>		
AMT – total	8.45 (1.32)	8.90 (0.91)
AMT – positive	4.30 (0.80)	4.60 (0.50)
AMT – negative	4.15 (0.88)	4.30 (0.66)
<i>CAMI:</i>		
CAMI episodic total	31.45 (6.30)	35.30 (4.88)
CAMI personal semantic total	57.38 (7.62)	62.48 (3.46)

In order to investigate any differences between the two groups in the latencies to retrieve a specific memory to different cue words, a 2 (group: self-harm vs. control) x 2 (cue valence: positive and negative cue words) mixed model ANOVA was calculated for the recall latencies, with cue valence as the repeated measures factor. This analysis did not yield a significant main effect of group ( $F_{(1,37)} < 1$ ) or cue word valence ( $F_{(1,37)} < 1$ ) for recall latencies to produce a specific memory. However, the interaction for group x cue valence was found to be significant,  $F_{(1,37)} = 6.13$ ,  $p < 0.05$ .

To further investigate this significant interaction, two separate follow-up independent sample t-tests were conducted, comparing the two groups separately for each cue word valence. This analysis revealed that there were no significant differences between the two groups in the latencies to retrieve a specific memory in response to the positive cue words ( $t_{(37)} = 1.03$ ,  $p > 0.3$ ). However, in response to negative cue words only, the self-harmers were significantly faster than the controls to produce a specific episodic ABM,  $t_{(37)} = -2.04$ ,  $p < 0.05$ . The recall latencies for both positive and negative cue words of both groups are depicted in figure 6.1 below.

Figure 6.1: Means (s.e.) of recall latencies to cue words on the AMT per participant group



In terms of the number of specific first responses, the self-harmers overall gave fewer first specific responses to all cue words; however, these differences were not significant. There were no significant main effects of group ( $F_{(1,37)} = 1.58, p > 0.2$ ) or cue word valence ( $F_{(1,37)} = 2.50, p > 0.1$ ), and no significant group x cue valence interaction ( $F_{(1,37)} < 1$ ) for the number of specific first responses. The effect size for the main effect of the different number of specific ABMs retrieved as first responses was found to be small ( $\eta^2 = 0.04$ ). A follow up a-priori power analysis revealed that a sample of 61 participants would be needed for a significant difference (at  $p > 0.05$ ) in the overall number of specific first responses to cue words on the AMT between the self-harmers and control participants.

Finally, on the Children's Autobiographical Memory Interview (CAMI), the self-harmers produced significantly fewer personal semantic,  $t_{(38)}$



= -2.73,  $p < 0.01$ , and episodic memories,  $t_{(38)} = -2.37$ ,  $p < 0.05$ , than the control group.

### 6.3.5 Multiple Regression Analysis

The final prediction was that even when symptoms of post-traumatic stress and depression were accounted for, thought suppression would remain an important predictor of both the latency to retrieve a negative memory and the number of personal semantic memories recalled across the whole sample. The suicide ideation and self-harming behaviours could not be considered in this analysis, as the Suicide Ideations Interview (K-SADS-PL) was only given to the self-harmers. Therefore, only symptoms of depression (CDI), post-traumatic stress (WBTHS) and thought suppression (“effective” WBSI items) were used as predictor variables. The linear correlations between these independent variables are summarised in table 6.4 below.

Table 6.5: Linear correlations for the independent variables: CDI, WBTHS and WBSI-E

	Correlations		
	WBTHS	CDI	WBSI - E
WBTHS	---		
CDI	.770**	---	
WBSI - E	.647**	.453**	---

\*\*  $p < 0.01$

The three variables were all positively and significantly correlated with one another, which needs to be considered in the subsequent multiple regression models.

The latency to retrieve a specific negative memory was significantly predicted individually by post-traumatic stress symptoms (WBTHS),  $r = -.442$ ,  $p < 0.05$ , symptoms of depression (CDI),  $r = -.374$ ,  $p < 0.05$  as well as trait thought suppression (WBSI effective),  $r = -.459$ ,  $p < 0.01$ . However, when all

three are considered together in a multiple regression analysis, even when symptoms of depression and post-traumatic stress were taken into account, thought suppression remained an important predictor of variability in the latency to retrieve a specific negative episodic memory (table 6.6).

Table 6.6: Multiple regression model for latency to retrieve specific negative episodic memory (model  $r = .495$ ,  $p < 0.05$ )

	Unstandardised Coefficients		Standardised Coefficients	t	p
	B	Standard Error	$\beta$		
(CONSTANT)	130.303	26.757		4.870	0.000
WBTHS	- 0.444	0.468	- 0.253	- 0.949	0.349
CDI	- 0.249	0.778	- 0.074	- 0.320	0.751
WBSI-E	- 1.893	1.531	- 0.235	- 1.237	0.224

None of the independent variables were significant in the model when the other two had been accounted for, which is a result of the high correlations between the predictor variables (see table 6.5). Nevertheless, trait thought suppression explained most of the variability in the latency to retrieve negative episodic memories even when levels of depression and post-traumatic stress were accounted for. A subsequent stepwise regression analysis reduced the predictor variable to only thought suppression (WBSI-E) as the best and most significant predictor of negative latency ( $r = -0.459$ ,  $p < 0.01$ ). Because the independent variables were significantly correlated with each other (table 6.5), the possibility of mediation was considered. Mediation analysis (Baron & Kenny, 1986), using regression analysis did not reveal any significant mediational models. However, the mediational model that thought suppression (WBSI-E) mediates the relationship between depression (CDI) and latency to retrieve negative memories was approaching significance. That is, depression significantly predicted latency to retrieve a specific memory ( $r = .374$ ,  $p < 0.01$ ) and depression was significantly

correlated with suppression ( $r = .770, p < 0.01$ ). After controlling for depression, the relationship between thought suppression and latency to retrieve a negative memory was approaching significance ( $p = 0.054$ ), while the relationship between depression and latency to retrieve a negative memory was no longer significant after controlling for thought suppression ( $p = 0.17$ ).

Like the latency to retrieve specific memories, personal semantic memory retrieval was also individually significantly predicted by levels of trait thought suppression (WBSI effective),  $r = -.352, p < 0.05$ , but not by post-traumatic stress symptoms (WBTHS),  $r = -.214, p > 0.1$  or depression (CDI),  $r = -.089, p > 0.5$  (see table 6.7).

Table 6.7: Multiple regression model for personal semantic memory retrieval (model  $r = .374, p < 0.05$ )

	Unstandardised Coefficients		Standardised Coefficients	t	p
	B	Standard Error			
(CONSTANT)	69.487	4.127		16.836	0.000
WBTHS	-0.028	0.072	-0.112	-0.392	0.698
CDI	0.074	0.120	0.152	0.614	0.543
WBSI-E	-0.400	0.236	-0.346	-1.696	0.099

Once again, thought suppression remained the best predictor of variability in personal semantic memory retrieval even when levels of post-traumatic stress and symptoms of depression had been accounted for. This was confirmed by the subsequent stepwise regression analysis, which revealed that thought suppression alone was the best predictor of personal semantic memory retrieval ( $r = -0.325, p < 0.05$ ). As before, mediational analysis was considered because the independent variables were significantly inter-correlated (table 6.5). However, no mediational model was found to be significant.

A similar analysis was conducted for the other dimensions of ABM retrieval, but this did not reveal any consistent or noticeable pattern. The complete regression models and results of the stepwise regression analysis for all latency variables, specific responses and episodic and personal semantic memories on the CAMI are summarised in Appendix A.5.8.

### *6.3.6 Nature of the Specific ABM Recall*

Consistent with the analysis of Chapter 4, a number of different characterising features regarding the nature of the specific responses on the AMT were also examined in the present study to investigate if there were any significant differences between the self-harmers and control participants. Accordingly, the number of times a memory was recalled repeatedly in response to different cue words, as well as the number of recent memories was recorded. Memories that were of an event which occurred less than a week ago were counted as recent memories. Furthermore, the number of specific memories that were recalled in less than two seconds was also recorded as a preliminary index of memories that were recalled as a result of direct retrieval. The descriptive statistics for the number of repeated memories, recent memories, and direct recalls are summarised in table 6.7 below.

Table 6.8: Means (s.d.) for number of repeated memories, recent memories and direct recalls per participant group

	Self-Harmers (n = 19)	Controls (n = 20)
<i>Repeated Memories</i>		
Positive	0.11 (0.32)	0.05 (0.22)
Negative	0.26 (0.56)	0.10 (0.31)
<i>Recent Memories (&lt; 1 week ago)</i>		
Positive	0.84 (1.01)	1.30 (1.26)
Negative	1.00 (1.20)	1.10 (0.85)
<i>Direct Retrieval (&lt; 2 seconds)</i>		
Positive	0.53 (0.61)	0.40 (0.59)
Negative	0.47 (0.70)	0.60 (0.68)

Nonparametric analysis using the Mann-Whitney U test revealed that there were no significant differences between the self-harmers and controls for the number of repeated memories, recent memories, and specific memories that were retrieved in less than two seconds (all  $p > 0.5$ ). Furthermore, the Wilcoxon test revealed that there were no differences for the self-harmers between positive and negative memories for any of these aspects of specific memories, nor for the control participants (all  $p > 0.5$ ).

#### 6.4 Discussion

The overall aim of the present study was to examine the relationship between thought suppression and ABM retrieval patterns in a clinical group of participants where levels of thought suppression would be particularly high. Furthermore, the present study aimed to target a sample of participants which were most likely to exhibit facilitated retrieval of negative episodic memories. Therefore, a group of repeated self-harming adolescents were compared to a control group of adolescents who were successfully matched for age, gender and verbal fluency. In this sample of self-harming adolescents, it was deemed likely that levels of post-traumatic stress responses would also

be high. It was further speculated that thought suppression would be particularly high in this sample of self-harming adolescents with high levels of trauma, and that these participants would be a likely sample for showing enhanced negative episodic ABM retrieval. Together, these factors made this sample particularly suitable for examining the relationship between thought suppression and ABM retrieval.

Consistent with the hypothesis, the results showed that the self-harmers reported significantly more post-traumatic stress symptoms than the control participants. Furthermore, the self-harmers reported high levels of both physical and sexual abuse, which were not reported by a single control participant.

The self-harmers also reported significantly higher levels of trait thought suppression than the control participants. This finding indicated that consistent with predictions, thought suppression is an important coping mechanism for self-harmers. Furthermore these findings are consistent with previous research which has demonstrated that thought suppression is related to self-harming behaviours (Chapman, Specht & Cellucci, 2005).

The findings relating to ABM retrieval in the present study are particularly intriguing. The self-harmers were significantly faster than the control participants in their recall of negative, but not positive specific episodic ABMs. Contrary to Swales et al. (2004), this enhanced negative ABM retrieval was not found to be due to repeated retrieval of the same negative episodic ABM to different cue words on the AMT, as there were no significant differences in the number of repeated memories between the groups. In terms of the number of specific memories that were recalled in

response to all cue words of the AMT, the differences between the two groups were not significant. However, the trend in the data was that the self-harmers recalled fewer specific first responses to the cue words of the AMT than the control participants. A subsequent power analysis suggested that a sample size of 61 participants would be required in order to detect a significant difference between the groups in terms of overgeneral ABM retrieval.

Though not significant, this trend towards overgeneral ABM retrieval of the clinical group is consistent with the bulk of research revolving around overgeneral ABM retrieval in clinical adult samples, which consistently demonstrate that adults with depression and/or a history of trauma retrieve fewer specific or more overgeneral ABMs than controls (Section 1.4). In terms of studies that investigated overgeneral ABM retrieval in clinical adolescent samples, the present results are also consistent with Stokes et al. (2004), who found that a group of trauma-exposed adolescent burn victims recalled fewer specific memories to AMT cue words than controls. In a study designed to assess overgeneral ABM retrieval in depressed adolescents with and without a history of trauma, Kuyken, Howell and Dalgleish (2006) also found that overall, the clinical group retrieved more overgeneral and fewer specific ABMs than the control group, which is also consistent with the trends in the present results. However, interestingly Kuyken et al. (2006) also found that within the group of depressed adolescents, those who reported a history of trauma were in fact less overgeneral than those without a history of trauma, and that within the depressed participants levels of trauma-related symptoms were significantly and negatively correlated with overgeneral ABM

retrieval. This was not replicated in the present sample, where levels of post-traumatic stress symptoms were not significantly correlated with the number of specific first responses to the AMT cue words. This may be a result of the relatively different samples that were used, while depression, traumatic stress reactions and self-harm were prevalent in both clinical samples, Kuyken et al. (2006) recruited participants on the basis of being depressed, while the present study recruited participants on the basis of their self-harming behaviour. While the self-harming adolescents in the present sample had significantly higher levels of symptoms of depression than controls, it is uncertain how many actually met the criteria for a diagnosis of major depression. Kuyken et al. (2006) point out that the findings of increased memory specificity in depressed adolescent with a history of trauma are reminiscent of the ABM retrieval patterns of adults with borderline personality disorder (BPD) (e.g. Arntz et al. 2002). Kuyken et al. (2006) therefore speculate that their particular results may have been observed because their sample may have included a number of individuals who were vulnerable to develop BPD at a later point. While this was not assessed in either study, it is possible that the number of adolescents who may go on to develop BPD were different in both studies, which is particularly possibly when considering the relatively small sample sizes.

When considered together, the results of faster negative memory retrieval and a tendency towards overall overgeneral ABM retrieval within the present sample may hint at another interesting possibility, namely that specificity of recall and recall latencies may be somewhat independent of each other. In other words, it is possible for a group of participants (in this case the



self-harmers) to produce fewer specific memories overall, yet at the same time be faster in the retrieval of negative episodic memories than a control group. The present results also showed that this was not a result of repeatedly retrieving the same traumatic memories. So far, both overgeneral ABM retrieval and slower retrieval of ABMs have been treated to be indicators of less accessible ABMs. However, the present study provides unprecedented preliminary evidence that these two aspects may be independent of each other. Furthermore, these results once again highlight the importance of considering recall latencies in research investigating ABM retrieval patterns, and not merely focussing on the number of overgeneral or specific memories that a participant retrieves.

Both depression and PTSD symptoms significantly predicted variability in the latency to retrieve specific negative memories across the whole sample. However, the multiple regression analysis revealed that when depression, PTSD symptoms and trait thought suppression were considered together as predictors of negative ABM retrieval, thought suppression remained as the most important predictor of variability in negative ABM retrieval, over and above the variability explained by depression and PTSD symptoms. This highlights the theory proposed by this program of research that an avoidant coping mechanism may be particularly important in explaining the ABM retrieval patterns seen in clinical populations.

In terms of personal semantic memory retrieval, the self-harmers also showed a reduced ability to retrieve personal semantic memories when compared to the control participants. This result was consistent with the hypothesis. However, the correlational analysis revealed that variability in

personal semantic memory retrieval was best explained by thought suppression and not post-traumatic stress symptoms. It is therefore possible that deficits in personal semantic memory retrieval in trauma identified by the previous literature (Hunter & Andrews, 2002; Meesters, Merckelbach, Muris & Wessel, 2000; Stokes, Dritschel & Bekerian, 2004) were an indirect result of higher levels of thought suppression in these individuals, and not PTSD symptoms. This is an intriguing possibility that warrants further investigation.

One methodological limitation of the present study is that self-harming behaviour and suicide ideation were not assessed in the control participants. This was not possible in the present study as the Suicide Ideation Interview (K-SADS-PL) which was used to assess parasuicidal behaviour in the self-harmers had to be given by a trained clinician. It was not ethically acceptable for a researcher without any clinical training to interview adolescents in their schools about possible self-harming behaviours. To overcome this, the suicide ideation item on the CDI was consulted in an attempt to exclude suicide ideators from the control group. However, the lack of an index of parasuicidal behaviours in the control group meant that this important variable could not be considered in the multiple regression analysis to predict variability in ABM retrieval.

A further methodological consideration revolves around the possibility that the self-harming participants may have been likely to have or develop Borderline Personality Disorder (BPD). Due to this being an adolescent sample, it is unlikely that any diagnosis of a personality disorder would have been made for the participants. However, despite levels of depression, trauma and self-harm being high in BPD, the condition is

distinguished from the other disorders by virtue of their not being any noticeable ABM retrieval patterns in BPD (Arntz, Meeren & Wessel, 2002; Kremers, Spinhoven & Van der Does, 2004; Renneberg, Theobald, Nobs & Weisbrod, 2005). In fact, Kuyken et al. (2006) speculate that in adolescent samples, increased specificity in the retrieval of episodic ABMs may be an early indicator for developing BPD.

Overall, the present study further highlights the importance of thought suppression as a common coping mechanism in individuals who self-harm and/or with a history of trauma. Most importantly, however, the present study demonstrates that thought suppression, and not clinical symptoms of depression and PTSD, predicts variability in negative episodic ABM retrieval and personal semantic memory retrieval.

## *Chapter 7*

### DISCUSSION

#### *7.1 Introduction*

This thesis now turns to the discussion of the research presented in the previous empirical chapters. The key findings are summarised before the theoretical and clinical implications of these findings are discussed and a number of suggestions for future investigations which expand on the present research are proposed. Finally, a number of methodological limitations inherent within this program of research are discussed.

#### *7.2 The Role of Thought Suppression in ABM Recall*

The key finding of this program of research in terms of the role of thought suppression in the retrieval of ABMs was that thought suppression was related to the faster recall of negative episodic ABMs and fewer personal semantic memories (Chapter 3). Furthermore, a suppression manipulation provided evidence that this relationship was causal; that is, that thought suppression directly led to the enhanced retrieval of negative episodic ABMs and the reduced ability to retrieve personal semantic information.

The finding that thought suppression is related to enhanced negative episodic ABM retrieval could contribute to explaining the previously discrepant results in the literature concerning episodic ABM retrieval in PTSD and self-harm. The majority of these previous studies have identified overgeneral episodic ABM retrieval in PTSD and self-harm, but a number of

studies have also reported the enhanced retrieval of negative memories (Section 1.4). It is possible that in those samples which showed a negative facilitation effect, levels of thought suppression were particularly high.

The finding that thought suppression is also related to the reduced ability to retrieve personal semantic memories is unprecedented, as this is the first research that has investigated this relationship. It does, however, place further emphasis on the importance of thought suppression in PTSD, as reduced personal semantic memory retrieval has so far only been identified in participants with a history of trauma (Section 1.4).

### *7.3 The Effects of Thought Suppression on Mood*

In an attempt to investigate how thought suppression might lead to the enhanced retrieval of negative episodic ABMs, the impact of thought suppression on mood was investigated (Chapter 5). This study yielded no significant effects of thought suppression on mood. While this study did not allow for ecologically valid conclusions to be drawn about the effects of thought suppression on mood as it occurs naturally, it nevertheless excluded mood-congruent recall as an explanation of the effects of thought suppression on ABM retrieval following a suppression manipulation (Chapter 4).

### *7.4 ABM Recall and Thought Suppression in Emotional Disorders*

A key finding from the clinical study (Chapter 6) was that thought suppression appears to be an important coping mechanism not only in individuals coping with trauma, but also for those who self harm. More

importantly, however, the clinical study highlighted thought suppression as an important cognitive coping style for explaining variability in the ABM retrieval patterns of the participants. Even when clinical symptoms of depression and PTSD were considered, thought suppression remained as the most important predictor of variability in negative episodic latency, as well as personal semantic memory retrieval.

This latter finding is particularly intriguing, as it provides further evidence that the ABM patterns which are observed in emotional disorders may not just be related to the symptoms of the disorders themselves, but rather a result of other underlying cognitive mechanisms. Just like rumination appears to be at least in part responsible for the overgeneral ABM retrieval seen in depression (Section 1.5), thought suppression appears to be an underlying cognitive mechanism that explains the enhanced negative episodic ABM retrieval and reduced personal semantic memory retrieval in certain disorders.

### *7.5 Theoretical Implications*

The present program of research has raised important theoretical implications for the fields of both episodic and personal semantic ABM research, as well as research revolving around thought suppression. Furthermore, the present body of work has highlighted a number of interesting factors which are relevant to the different methodological approaches used to assess episodic ABM retrieval. These implications are discussed individually in the present section.

### *7.5.1 Thought Suppression and Negative Episodic ABM Retrieval*

One key finding of this program of research is that thought suppression leads to the enhanced retrieval of negative episodic ABMs. While the present program of research has established that thought suppression affects ABM retrieval, it remains unclear how this occurs. The only conclusion that can be drawn is that the enhanced negative ABM retrieval is not a result of mood congruent recall (Chapter 5).

A possible explanation that was not empirically considered in the present program of research, but nevertheless warrants future investigation, is that thought suppression affects ABM retrieval as a result of the cognitive demands of thought suppression. Thought suppression is a demanding task in itself, which in imposes a considerable cognitive load and reduces cognitive processing (e.g. Beevers & Scott, 2001). The way in which thought suppression may disrupt cognitive process can be considered in light of two cognitive models. According to the Williams et al. (2007) model of overgeneral ABM retrieval, reduced cognitive resources may result in overgeneral ABM retrieval (see Section 1.5). When cognitive resources are strained and limited, generative retrieval of ABMs may be truncated at the overgeneral level. If this is the case, the expectation would be that thought suppression would be related to more overgeneral ABM retrieval (see Schönfeld et al., 2007). This explanation may be particularly relevant in clinical samples where cognitive resources are strained to begin with, such as depression and PTSD. Also consistent with this explanation was the trend in the clinical study of this program of research (Chapter 6), where the clinical group tended to recall fewer specific memories than the control participants.

However, when considered within the predominant model of thought suppression (Wegner et al., 1994), the cognitive demands of thought suppression may instead result in the enhanced retrieval of negative ABMs. During the suppression process, the suppressed material is first marked for suppression, and then two cognitive processes act simultaneously to achieve suppression: a process that searches for distraction material, and a monitoring process which continuously monitors that the suppressed material is not accessed. The monitoring process is automatic and is thought to be the primary process behind the paradoxical effects of thought suppression (Wegner, 1994), by continuously accessing the suppressed material. The distracting process is effortful and is subject to being disrupted by increasing cognitive load. It is possible that when suppressing a certain thought or memory, the material that is used for distraction is mood-congruent with the suppressed thought, yet semantically unrelated to the suppressed material. In this case the subsequent ABM retrieval may be negatively biased because a series of negative thoughts and memories have just been accessed in order to inhibit one particular negative thought (e.g. Dagleish & Yiend, 2006). Inhibition of the other negative memories may not occur successfully because cognitive resources are limited due to the act of suppression itself. This hypothesis is, of course, subject to future investigation, the first step of which should be to determine whether the nature of the distracting material used during a suppression task is similar in valance than that of the suppressed material.



### *7.5.2 Thought Suppression and Personal Semantic Memory Retrieval*

This program of research is one of the few investigations of ABM that not only considers episodic but also personal semantic memory retrieval. To date, models of personal semantic memory remain very limited. However, prior research investigating personal semantic memory recall in survivors of trauma has speculated that survivors of childhood trauma most likely retrieve fewer personal semantic memories because these memories were never encoded properly during the traumatic times of their lives, and that this poor encoding may be due to damage to the hippocampus as a result of prolonged trauma (Hunter & Andrews, 2002). However, the present research has demonstrated that personal semantic memory retrieval can also be affected as a result of a short manipulation (Chapter 4). This implies that personal semantic memories may not be as solid as was previously assumed, and that the recall of these personal semantic memories can be disrupted just like episodic ABM retrieval.

The present program of research has only been able to establish that thought suppression appears to be related to personal semantic memory retrieval, but not how this occurs. One possible explanation could be that personal semantic memory retrieval is also subject to cognitive load. Based on the present program of research, personal semantic memory retrieval can vary over short periods of time, and may not be as easy to retrieve as previously assumed. Introducing a cognitive load may therefore reduce the ability to retrieve personal semantic memories. The cognitively demanding act of thought suppression (Beevers & Scott, 2001) may pose a sufficient cognitive load to disrupt personal semantic memory retrieval. One important future

direction is therefore to assess the impact of cognitive load on personal semantic memory retrieval.

Future research should generally increase the focus on personal semantic memory, which is especially important considering not only the present relative lack of understanding of this type of memory, but also the potential clinical implications of reduced personal semantic memory retrieval. For instance, seeing that personal semantic memories are factually self-defining, when these memories become less accessible it may imply that the person has a less stable concept of self, which is more vulnerable to change.

### *7.5.3 Thought Suppression, ABM Retrieval and the Self-Memory System*

When considered within the framework of the Self-Memory System (Conway & Pleydell-Pearce, 2000; Section 1.2.3), the results of the present research suggest that thought suppression may be a coping mechanism that may be particularly damaging to an individual's sense of self. The Self-Memory System holds that an individual's sense of self is based on their ABMs and guided by the present goals of the working self. This sense of self is not constant, but rather a dynamic concept that can change over time and based on different experiences and circumstance. Negative ESK poses a particular problem to the working self (Conway & Pleydell-Pearce, 2000), as by virtue of being negative this information is inconsistent with the current goals of the working self. According to the Self-Memory System, negative information needs to either be assimilated, which requires the adjustment the goals of the working self, or the material cannot be assimilated, in which case an individual may chose to engage in some form of avoidant coping. The

present research suggest that if thought suppression is used to cope with unwanted negative information, it may lead to a vicious loop in which the recall of more unrelated negative ABMs are triggered by the suppression. The retrieval of such memories should, in turn, only increase the strain on the working self.

Furthermore, as demonstrated by the present research, thought suppression appears to also result in the reduced ability to retrieve personal semantic information. Personal semantic memories are more general and may as such be self-defining on a different level than ESKs. If the accessibility of personal semantic memories is reduced, it may result in the sense of self being less stable and more likely to subject to change. The simultaneous increased recollection of negative memories may, over time, have a considerable negative impact on the individuals' sense of self.

#### *7.5.4 Individual Differences in Thought Suppression*

The present program of research has investigated thought suppression mostly as a single process which different individuals may engage in to various degrees. However, factors that are closely related to thought suppression and which can play a role in whether or not a thought is successfully suppressed have not been considered. Two such factors that certainly warrant consideration are working memory capacity and a repressive coping style.

In the past, research has demonstrated that working memory capacity is related to the ability to successfully suppress unwanted thoughts, (Brewin & Beaton, 2002; Brewin & Smart, 2002; Geraerts et al., 2007). In these studies, evidence for this notion was taken from the fact that a better working

memory was related to fewer intrusions of an unwanted thought during a suppression condition.

A second variable that has been related to superior suppression abilities is a repressive coping style (Barnier et al., 2004; Geraerts et al., 2006). In fact, Geraerts et al. (2006) found that the repressors' relatively greater ability to successfully suppress unwanted thought could be largely explained by their working memory capacity.

Even though the ability to successfully suppress an unwanted thought or memory has only been briefly considered in the present program of research (see Chapter 5), it is nevertheless of considerable importance. While the present research has not found a difference in the number of intrusions of the unwanted thought in the suppression versus monitoring conditions (Chapter 4 & Chapter 5), it is nevertheless possible that the observed effects of thought suppression and ABM retrieval are mediated by the ability to successfully suppress an unwanted thought. It is, for instance, possible that if suppression is successful it causes no disruption, and may therefore not result in altered ABM retrieval patterns. On the other hand, it could be argued that successful thought suppression is more demanding (see also Beevers & Scott, 2001), and may therefore exaggerate the effects on ABM retrieval as compared to failed suppression.

Therefore, future research in this field would benefit from considering the effects of failed versus successful thought suppression on ABM retrieval patterns, in which a repressive coping style and working memory capacity should be assessed.

### *7.5.5 Generative versus Direct ABM Retrieval*

The present findings relating to the effects of thought suppression on episodic ABM retrieval give rise to an important theoretical consideration, namely whether thought suppression affects the generative or direct retrieval of negative episodic memories. While overgeneral ABM retrieval is thought to be a phenomenon of generative retrieval that is truncated before the search is completed (e.g. Williams et al., 2007), it is possible that thought suppression instead simply results in more intrusions. Intrusive memories should, be directly accessed memories that are not a result of a generative retrieval search, by virtue of their spontaneous and involuntary nature (see Hauer et al., in press).

The present program of research attempted to preliminarily address this notion of generative versus direct retrieval by including a more detailed analysis of the episodic memories the participants retrieved following a suppression manipulation (Chapter 4). This analysis distinguished between memories that were retrieved very quickly (i.e. in less than two seconds), which could be an indication of direct retrieval, and memories which took longer to retrieve, indicating generative retrieval (Haque & Conway, 2001). However, this analysis was conducted post-hoc, and the cut-off point of two seconds to distinguish between direct and generative retrieval was set based on a prior study which had set this point somewhat arbitrarily. Nevertheless, this preliminary analysis suggests that thought suppression enhances the generative retrieval of negative episodic memories, instead of leading to the increased direct retrieval of negative memories (which would have been an indication of simply resulting in more negative intrusions). Future research

could be conducted to further address this issue; for example, participants could be asked for each memory whether they had to search for it, or if it was activated directly.

#### *7.5.6 Latency versus Specificity of Episodic ABM Retrieval*

A final important theoretical implication that arises from this program of research is how the accessibility of episodic ABMs is measured. As described in the introduction, the primary indicators for accessibility are latency to retrieve a specific memory and whether the first response is specific or overgeneral (Section 1.4). Recently, the literature has predominantly focused on the latter of these dimensions, with many studies neglecting to assess the latency to retrieval of a specific memory altogether (e.g. Hermans et al., 2005). However, the present research has highlighted the importance of assessing the latency to retrieve a specific memory. In two out of three studies which assessed ABM retrieval in the present program of research, significant effects were obtained in terms of latency, but not for the number of specific first responses (Chapter 3 & Chapter 6). These findings indicate that including latency as a measure of ABM accessibility may be particularly important when ceiling effects occur for the number of specific first responses, e.g. in nonclinical student samples. More intriguingly, however, the final study (Chapter 6) has highlighted yet another possibility, namely that latency and specificity may not be entirely reflective of the same concept, i.e. accessibility of an ABM. It could be argued that latency to retrieve a specific memory gives an index of the complexity of the search, with longer searches indicating that more irrelevant or inappropriately overgeneral activations had to be inhibited.

The specificity of the first response, on the other hand, gives an indication of whether or not the participant was able to inhibit overgeneral responses in the first place.

## *7.6 Clinical Implications*

The results of this program of research also provide the foundations for future work which could have important clinical implications, particularly for the treatment and prevention of PTSD, as well as the treatment of self-harmers.

### *7.6.1 Thought Suppression, ABM Retrieval and PTSD*

One of the key findings of this program of research was that thought suppression was a better predictor of enhanced negative ABM retrieval and reduced personal semantic memory retrieval than symptoms of depression and PTSD (Chapters 3 & 6). The retrieval of ABMs is crucial to shaping and maintaining the concept of the self, and as such recalling and processing ABMs forms an important part of all talk-based psychotherapies. If thought suppression, like rumination, is at least in part responsible for producing some of the ABM patterns observed in clinical populations, then addressing this coping style in therapies could aid in altering the cognitive symptoms of the disorders. A crucial future research study here should investigate whether altering coping mechanisms in high trait suppressors results in changes in ABM patterns. For instance, if high suppressors are encouraged to only suppress a thought or memory in situations when they cannot address them, but to address the issues as soon as the time to do so is appropriate, this may

break the cycle of perpetual suppression in order to cope with an unwanted thought or memory. In therapy, high suppressors could be encouraged to note any thought or memories they are actively suppressing, and to raise these thoughts during their next therapy session in order to process them. These thoughts, in return, may become less intrusive in the future and therefore reduce the need to suppress them. If this is the case, then this coping mechanism could be addressed in therapeutic settings in order to alter ABM retrieval patterns in patients.

A second potential clinical implication concerns the prevention of PTSD in high-risk groups. The research presented in Chapter 4 demonstrated that inducing thought suppression in a normal student group directly resulted in the faster retrieval of negative episodic ABMs, as well as reduced personal semantic memory retrieval; which are recall patterns also observed in individuals suffering from PTSD. Therefore, it is possible that a suppressive coping style may be one of the factors that influence whether or not an individual develops the cognitive symptoms of PTSD following the exposure of a traumatic event. A large-scale longitudinal study would be needed in order to test this hypothesis; however, the potential benefits of the results are considerable. If it is found that individuals with a higher tendency to engage in thought suppression are more likely to develop some of the cognitive symptoms of PTSD, then individuals at high risk of trauma exposure, such as firemen, police officers and soldiers could be screened for levels of thought suppression and be instructed in the benefits of using other, approach based coping mechanisms instead before deployment.



### *7.6.2 Thought Suppression, ABM Retrieval and Self-Harm*

A final clinical implication of this present program of research revolves around the role of thought suppression in the ABM patterns seen in individuals who self-harm. If the act of deliberate self-harm is viewed as an avoidant coping mechanism in itself (Chapman, Gratz & Brown, 2006) then a possible model for explaining the inter-relationship between ABM retrieval, thought suppression and self-harm is that both thought suppression and self-harm may occur in order to cope with unwanted negative thoughts and memories. Seeing that childhood trauma is a common predecessor of deliberate self-harm, potential self-harmers often have extremely negative experiences in their pasts. The results of the present program of research suggest that self-harmers are high trait thought suppressors (Chapter 4), which implies that as an initial attempt to cope with these unwanted memories potential self-harmers may engage in thought suppression. However, this engagement is likely to lead not only to the suppressed thought being more accessible (paradoxical effect of thought suppression), but also to increased retrieval of other negative memories and fewer personal semantic memories (Chapter 4). The increased negative memory retrieval would be a considerable strain on the working self. These negative memories would either have to be suppressed further, or become assimilated into the autobiographical memory knowledge base, which requires the adjustment of the goals of the working self. The reduced personal semantic memory retrieval may imply a less stable concept of the self, which is more vulnerable to changes. If thought suppression continues to fail, the individual may turn to other, more extreme coping mechanisms, such as self-harm. Self-harm may

become more acceptable to the Self-Memory System if the goals of the working self and the self-concept become too negatively biased. In short, the present theory holds that thought suppression may lead to ABM retrieval patterns that together with the failed suppression attempts may create a vicious loop in which deliberate self-harm becomes more likely. Naturally, more research is needed in order to evaluate this theoretical model of thought suppression, ABM retrieval and self-harm. However, if this is found to be the case then addressing a suppressive coping style in self-harmers in therapeutic settings could prove to be particularly effective in the treatment of self-harming behaviours.

### *7.7 Methodological Limitations of this Program of Research*

Those methodological limitations that were relevant only to individual studies have already been addressed in the discussions of the respective chapter. Therefore, the present section only discusses limitations that need to be considered for this program of research as a whole.

#### *7.7.1 Sample Selection*

There are two primary concerns about the sample selection in this program of research, both of which restrict the generalisability of the results to the wider population. The first limitation is that except for the clinical study (Chapter 6), all participants were undergraduate university students. Therefore, the participants were predominantly young, intelligent adults from a white European background, and the findings can not readily be generalised to the wider population. A further unfortunate consequence of the fact that

this program of research relied predominantly on undergraduate students is that there was very little variability in overgeneral ABM retrieval (Chapter 3 and Chapter 4), as this is generally a feature of clinical populations (Section 1.4). For future studies, it may prove more fruitful to sample larger number of undergraduate students in order to specifically select high and low specific individuals before attempting to investigate the role of thought suppression (e.g. Raes, Hermans, Williams & Eelen, 2006). It is possible that greater variability in ABM retrieval patterns with the sample would have highlighted the role of thought suppression in the retrieval of overgeneral ABMs more clearly.

The second problem with the samples used in the present program of research is that they are all highly skewed for gender, with the majority of participants in each study being female. This is an important consideration as gender differences in ABM retrieval have been documented (Davis, 1999). In particular, previous research has demonstrated that females tend to retrieve more emotional ABMs from childhood than males, and are also faster in their retrieval of episodic ABMs. Again, this may imply that the results of the present program of research apply predominantly to females, and cannot readily be generalised to males.

### *7.7.2 Measurement Issues*

A number of measurement issues about this program of research also need to be considered. The primary concern here is that the White Bear Suppression Inventory (WBSI – Wegner & Zanakos, 1996) was used to measure thought suppression. This measure was used in the present program

of research as it is the most widely used instrument to assess thought suppression, and means that this present work can be easily compared to prior research. However, the factor structure of the WBSI remains ambiguous and the WBSI may not only measure thought suppression, but may also measure the tendency to experience intrusive thoughts (see Section 2.5). For this reason a sub-scale of the items which previous research has shown to be a more discriminant and effective measure of thought suppression (Palm & Strong, 2007) was used in the research presented here to capture thought suppression. However, the WBSI remains a problematic measure in itself, because is not necessarily a pure measure of a suppressive coping style. However, with no feasible alternative to measure cognitive suppression, it was the only suitable measure that could be used in the present program of research. An important future objective should be to develop a more “pure” measure of a suppressive coping style, which is vital to research such as this which attempts to isolate a tendency to engage in thought suppression as a way of coping with unwanted thoughts and memories.

A second measurement issue that needs to be considered is that the measures of ABM retrieval varied across the studies. The cue words used on the AMT were different across all studies. The first study (Chapter 3) used 10 words which were deemed too emotional and of too high a frequency, thereby resulting in a ceiling effect for specific memories. Therefore, a different set of cue words was used in the clinical study (Chapter 6). And finally, two versions of the AMT were needed in the suppression manipulation study (Chapter 4) in order to obtain baseline and post-manipulation measures of ABM retrieval, which meant that yet another two

sets of different cue words had to be used. Similarly, for different measures had to be used for assessing personal semantic memory retrieval in the clinical and non-clinical studies, because the ages of the participants differed and memory for appropriate lifetime periods had to be assessed.

These variations between the measures of ABM retrieval between the studies mean that the results cannot necessarily be directly compared. On the other hand, however, this also means that the results are unlikely to be a result of possible idiosyncrasies in the measures used.

A further measurement issue of the present program of research is that clinical symptoms were assessed only by written self-report measures, with the exception of the Suicidal Ideation Interview (K-SADS-PL) used with the self-harmers in Chapter 6. This measurement issue is problematic because clinical symptoms are frequently over-reported by participants when using self-report measures (e.g. Frueh, Hamner, Cahill, Gold & Hamlin, 2000). While it was never attempted to make a diagnosis of any disorder based on these self-report measures in the present program of research, it is nevertheless likely that symptoms of depression and PTSD considered in the present work were somewhat exaggerated.

The final methodological limitation of this program of research is that the possibility of the participants suffering from Borderline Personality Disorder (BPD) was never assessed. The clinical symptoms of depression, PTSD, and self-harming behaviours in the case of the clinical study (Chapter 6) may all be indicative of the respective disorders. However, all of these symptoms can also occur as part of a Borderline Personality (APA, DSM-IV). This is particularly important because even though ABM differences are

consistently observed in depression, PTSD, and self-harm when compared to control participants, no such differences are reliably observed between individuals with BPD and controls (Section 1.4). However, the assessment of BPD is extensive, and in the nonclinical student samples used in the present studies it is unlikely that there were many participants who may have suffered from the disorder. The clinical study (Chapter 6) used adolescent participants, where because the personalities are still developing, a diagnosis of a Personality Disorders should only be made with great care and if symptoms are very severe and persistent. The DSM-IV warns that transient symptoms that may resemble those of Borderline Personality Disorder may be present in adolescents without indicating the presence of the disorder itself (APA, 1994).

### *7.8 Concluding Comments*

As stated in the introduction of this program of research, a key motivation for investigating ABM retrieval is because of its relevance to the emotional disorders, including the development and treatment of certain disorders (Section 1.3). However, after more than two decades of research revolving around establishing the ABM retrieval patterns in certain disorders, simply establishing *that* ABM retrieval is affected is no longer sufficient. While this knowledge is very important, it alone does not allow for the development of new methods of prevention, early intervention, and treatment of the very disorders in which ABM retrieval is altered. In order to advance this field of research, studies must turn to investigating *how* ABM patterns are altered. By understanding the mechanisms that underlie these altered ABM patterns, intervention strategies for addressing these mechanisms in therapeutic settings

can be developed. The present thesis has added to the advancing field of research by focussing on thought suppression and establishing that this coping mechanism plays an important role in the retrieval of both episodic and personal semantic ABMs.

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## APPENDICES

Appendix 1: Appendix to Chapter 2 (Methodology)

Appendix 2: Appendix to Chapter 3 (Study 1)

Appendix 3: Appendix to Chapter 4 (Study 2)

Appendix 4: Appendix to Chapter 5 (Study 3)

Appendix 5: Appendix to Chapter 6 (Study 4)



## Appendix 1: Appendix to Chapter 2 (Methodology)

A.1.1 Ratings of the Emotional Cue Words

A.1.2 Student's Autobiographical Memory Interview (S-AMI)

A.1.3 Trauma Questionnaire (Chapter 3)

A.1.4 Trauma Questionnaire (Chapter 6)

A.1.5 When Bad Things Happen Scale (PTSD items)

A.1.6 Participant Information Sheet (Pilot Study)

A.1.7 Participant Debriefing Form (Pilot Study)

### A.1.1 Ratings of the Emotional Cue Words:

27 undergraduate students were asked to rate each AMT cue word used in this research program for imageability, concreteness and how readily the word would elicit a specific memory. Ratings were given on a scale from 1 (not at all) to 9 (extremely). The means and standard deviations are reported in the table below:

Cue Word	Imageability	Concreteness	Elicits Specific Memory
Happy	7.41 (1.60)	6.93 (1.73)	7.67 (1.78)
Lonely	4.93 (2.29)	5.77 (2.37)	6.22 (2.15)
Safe	4.93 (2.15)	5.26 (2.33)	6.12 (2.37)
Hurt	5.67 (2.04)	6.33 (2.17)	6.59 (2.15)
Interested	4.88 (2.32)	4.78 (2.42)	5.85 (2.23)
Clumsy	5.70 (2.46)	5.58 (2.40)	5.63 (2.60)
Successful	6.11 (2.39)	4.81 (2.32)	6.59 (2.45)
Angry	7.48 (1.76)	7.04 (1.89)	7.22 (1.74)
Surprised	7.15 (1.49)	6.15 (1.79)	6.59 (1.74)
Sorry	4.96 (2.23)	4.52 (2.36)	6.15 (1.94)
Proud	5.63 (2.11)	4.59 (2.42)	6.74 (1.85)
Guilty	4.89 (2.33)	4.70 (1.88)	5.96 (1.89)
Amazed	5.37 (2.22)	5.26 (2.09)	5.22 (2.58)
Weak	4.01 (1.91)	3.44 (2.08)	4.33 (2.42)
Lively	6.04 (2.01)	5.63 (2.11)	4.74 (2.38)
Bored	6.44 (1.78)	5.56 (2.06)	5.04 (2.16)
Eager	5.15 (2.33)	4.50 (2.20)	4.58 (2.32)
Helpless	5.07 (2.11)	4.67 (1.73)	4.88 (2.44)
Excited	6.37 (2.13)	6.33 (2.00)	7.04 (1.51)
Upset	6.07 (1.59)	5.67 (1.92)	7.00 (1.52)
Friendly	5.70 (2.28)	5.74 (2.18)	5.46 (2.42)
Rejected	5.04 (2.03)	4.56 (2.26)	5.42 (2.45)
Faithful	4.00 (2.37)	3.81 (2.37)	4.62 (2.48)
Bad	4.67 (2.45)	4.78 (2.71)	5.46 (2.52)
Calm	6.22 (2.19)	5.70 (1.92)	4.54 (2.02)
Awful	3.96 (2.33)	3.96 (2.14)	4.38 (2.30)
Pleased	5.93 (2.09)	4.96 (1.99)	5.50 (2.28)
Ashamed	4.89 (2.14)	4.89 (1.63)	5.32 (1.93)
Hopeful	5.00 (1.96)	4.70 (2.09)	4.92 (2.45)
Miserable	5.93 (2.13)	6.00 (1.90)	5.62 (2.37)
Lucky	4.41 (2.32)	5.59 (1.67)	5.31 (2.07)
Relieved	6.19 (1.84)	5.26 (1.99)	5.69 (2.17)

One-sample t-tests were conducted to compare positive and negative cue words on each dimension for each AMT used in the present research program. The results, presented in the table below, indicate that positive and negative cue words did not differ significantly for any version of the AMT on any of the dimensions:

<u>Dimension</u>	<u>AMT</u>	<u>Positive</u>	<u>Negative</u>	<u>t<sub>(26)</sub></u>	<u>p</u>
Imageability	1 (Chapter 3)	30.30 (6.88)	28.74 (6.53)	1.141	0.26
	2a (Chapter 4)	28.56 (8.02)	26.89 (5.87)	1.243	0.23
	2b (Chapter 4)	26.85 (8.34)	24.48 (7.69)	1.639	0.11
	3 (Chapter 6)	25.85 (8.12)	28.00 (4.99)	-1.488	0.15
Concreteness	1	27.93 (6.82)	28.81 (8.11)	-0.840	0.41
	2a	26.15 (7.29)	24.04 (6.19)	1.493	0.15
	2b	24.93 (7.71)	24.19 (7.03)	0.526	0.60
	3	25.48 (7.13)	27.81 (6.55)	-1.721	0.10
Specific Memory	1	32.59 (7.34)	31.81 (7.01)	0.615	0.54
	2a	27.89 (7.77)	26.59 (7.05)	0.908	0.37
	2b	24.11 (9.96)	25.22 (9.30)	-0.691	0.50
	3	29.07 (8.29)	30.37 (6.55)	-1.112	0.28

A.1.2 Student's Autobiographical Memory Interview (S-AMI)

**Section A: Childhood**

*1. Prior to School Age:*

- 1.1 Participant's address before going to school (2 points)  
Street and Number: (½ point each)  
Town: (1 point)
- 1.2 Names of three friends or neighbours from the time before the participant went to school: (3 points)
- |             |              |                |
|-------------|--------------|----------------|
| First Name: | Family Name: | (½ point each) |
| First Name: | Family Name: | (½ point each) |
| First Name: | Family Name: | (½ point each) |

E.1 Recall of an incident before the participant went to school

- (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

*2. First School (~ 5-11 years):*

- 2.1 Name of the first school the participant attended (1 point)  
Name: (1 point)
- 2.2 Location of this school (1 point)  
Location: (1 point)
- 2.3 Participant's age when starting this school (1 point)  
Age: (1 point)
- 2.4 Participant's address when starting this school (2 points)  
Street and Number: (½ point each)  
Town: (1 point)
- 2.5 Names of three teachers from this school (3 points)
- |             |              |                |
|-------------|--------------|----------------|
| First Name: | Family Name: | (½ point each) |
| First Name: | Family Name: | (½ point each) |
| First Name: | Family Name: | (½ point each) |

E.2 Recall of an incident from the period at primary school (3 points)

- Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

3. *First/Earliest Birthday:*

- |  |                |
|--|----------------|
| 3.1 First birthday the participant can remember            | (1 point)      |
| Age:   | (1 point)      |
| 3.2 What the participant did for that birthday             | (1 point)      |
| Activity:  | (1 point)      |
| 3.3 What the participant was wearing                       | (1 point)      |
| Clothes:   | (1 point)      |
| 3.4 The participant's favourite present from that birthday | (1 point)      |
| Present:   | (1 point)      |
| 3.5 Person who gave the favourite present                  | (1 point)      |
| Person:  | (1 point)      |
| 3.6 Names of three friends who came to that birthday       | (3 points)     |
| First Name:           Family Name:                         | (½ point each) |
| First Name:           Family Name:                         | (½ point each) |
| First Name:           Family Name:                         | (½ point each) |
| E.3 Recall of an incident that happened on that birthday   | (3 points)     |
| Specific Incident:   | (1 point)      |
| Place:   | (1 point)      |
| Time:  | (1 point)      |

## Section B: Adolescence

### 4. Main Secondary or High School (~ 11-18 years):

- 4.1 Name of the secondary/high school (1 point)  
Name: (1 point)
- 4.2 Location of this school (1 point)  
Town: (1 point)
- 4.3 Year of graduation from secondary school (1 point)  
Year: (1 point)
- 4.4 Participant's address when starting this school (2 points)  
Street and Number: (½ point each)  
Town: (1 point)
- 4.5 Names of three teachers or friends from this school (3 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)
- 4.6 Three subjects the participant took in their last year (3 points)  
Subject: (1 point)  
Subject: (1 point)  
Subject: (1 point)
- E.4.1 Recall of the first day at secondary/high school (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)
- E.4.2 Recall of an incident from the period at this school (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)
5. Extracurricular Activities in Secondary/High School:
- 5.1 Extracurricular Activities (e.g. sports, music) (1 point)  
Activity: (1 point)
- 5.2 Location where this activity was carried out (1 point)  
Town: (1 point)
- 5.3 Participant's age at the time (1 point)  
Age: (1 point)

5.4 Name of the teacher/coach/leader of that activity (1 point)  
First Name: Family Name: (½ point each)

5.5 Name of a friend from that activity (1 point)  
First Name: Family Name: (½ point each)

E.5 Recall of an incident from the extracurricular activity (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

*6. Friends from adolescence:*

6.1 Name of two friends from adolescence (2 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)

6.2 Two places where they spent time together (not school) (2 points)  
Place: (1 point)  
Place: (1 point)

## Section C: Recent Events

### 7. *Last Christmas:*

- 7.1 Place where the participant spent the last Christmas (1 point)  
Place: (1 point)
- 7.2 Name of one person they spent Christmas with (1 point)  
First Name: Family Name: (½ point each)

### 8. *Last Vacation:*

- 8.1 Where the participant went for the last holiday (1 point)  
Place: (1 point)
- 8.2 When the participant went on that holiday (1 point)  
Month and Year: (1 point)
- 8.3 Who the participant went with (1 point)  
First Name: Family Name: (½ point each)
- E.8 Recall of an incident from that holiday (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

### 9. *Last Birthday:*

- 9.1 What the participant did for that birthday (1 point)  
Activity: (1 point)
- 9.2 The participant's favourite present from that birthday (1 point)  
Present: (1 point)
- 9.3 Person who gave the favourite present (1 point)  
Person: (1 point)
- 9.4 Names of three friends who came to that birthday (3 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)
- E.9 Recall of an incident that happened on that birthday (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)



*10. University/College*

- 10.1 Name of the first University the participant attended (1 point)  
Name: (1 point)
- 10.2 Location of this University (1 point)  
Town: (1 point)
- 10.3 Three courses the participant took in their first semester (3 points)  
Course: (1 point)  
Course: (1 point)  
Course: (1 point)
- 10.4 Names of two teachers from the first semester (2 points)  
Title: Family Name: (½ point each)  
Title: Family Name: (½ point each)
- 10.5 Names of three friends from the first semester (3 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)

*11. Yesterday:*

- E.11 Recall of an incident that happened yesterday (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

**Scoring of the S-AMI:**

<i>Section A</i>	<i>Personal Semantic</i>	<i>Episodic</i>
1. Prior to School Age	(max. = 5)	(max. = 3)
2. First School	(max. = 8)	(max. = 3)
3. Earliest Birthday	(max. = 8)	(max. = 3)
<i>Total</i>	<i>(max. = 21)</i>	<i>(max. = 9)</i>

<i>Section B</i>	<i>Personal Semantic</i>	<i>Episodic</i>
4. Secondary School	(max. = 12)	(max. = 6)
5. Extracurricular Act.	(max. = 5)	(max. = 3)
6. Friends	(max. = 4)	-----
<i>Total</i>	<i>(max. = 21)</i>	<i>(max. = 9)</i>

<i>Section C</i>	<i>Personal Semantic</i>	<i>Episodic</i>
7. Last Christmas	(max. = 2)	-----
8. Last Vacation	(max. = 3)	(max. = 3)
9. Last Birthday	(max. = 6)	(max. = 3)
10. University/College	(max. = 10)	-----
11. Yesterday	-----	(max. = 3)
<i>Total</i>	<i>(max. = 21)</i>	<i>(max. = 9)</i>

**Cumulative Totals:**

<i>Total Score Summary</i>	<i>Personal Semantic</i>	<i>Episodic</i>
A. Childhood	(max. = 21)	(max. = 9)
B. Adolescence	(max. = 21)	(max. = 9)
C. Recent Life	(max. = 21)	(max. = 9)
<i>Total</i>	<i>(max. = 63)</i>	<i>(max. = 27)</i>

A.1.3 Trauma Questionnaire (Chapter 3)

INSTRUCTIONS:

*I would now like you to think about what you consider to be your most traumatic experience. This can be something that actually happened to you (such as an accident or assault), or something that happened to someone else (such as death or illness of a loved one). Please indicate below which of these items best describes your most traumatic experience (if you have experienced more than one of the traumatic events listed below, please tick the one experience that you consider to be the most traumatic!)*

\_\_\_\_\_ Accident (such as a Car Accident)

\_\_\_\_\_ Divorce of Parents

\_\_\_\_\_ Serious Medical Condition/Injury

\_\_\_\_\_ Death of a Loved One

\_\_\_\_\_ Medical Treatment/Procedure

\_\_\_\_\_ Illness of a Loved One

\_\_\_\_\_ Sexual Assault/Abuse

\_\_\_\_\_ Other

\_\_\_\_\_ Physical Assault/Abuse

How old were you when this happened? \_\_\_\_\_ years

A.1.4 Trauma Questionnaire (Chapter 6)

INSTRUCTIONS:

*Many people have experienced or witnessed stressful and traumatic events in their lives. Please indicate on the list below which of these events have happened to you. Please tick all applicable items.*

- |  |   |
|--|---|
| <input type="checkbox"/> Accident (such as a Car Accident) | <input type="checkbox"/> Divorce of Parents     |
| <input type="checkbox"/> Serious Medical Condition/Injury  | <input type="checkbox"/> Death of a Loved One   |
| <input type="checkbox"/> Medical Treatment/Procedure       | <input type="checkbox"/> Illness of a Loved One |
| <input type="checkbox"/> Sexual Assault/Abuse              | <input type="checkbox"/> Other                  |
| <input type="checkbox"/> Physical Assault/Abuse            |   |

If you marked “Other”, please name the traumatic event below:

\_\_\_\_\_

*I would now like you to think about what you consider to be your most traumatic experience. Please indicate below which of these items best describes your most traumatic experience (if you have experienced more than one of the traumatic events listed below, please tick the one experience that you consider to be the most traumatic!)*

- |  |   |
|--|---|
| <input type="checkbox"/> Accident (such as a Car Accident) | <input type="checkbox"/> Divorce of Parents     |
| <input type="checkbox"/> Serious Medical Condition/Injury  | <input type="checkbox"/> Death of a Loved One   |
| <input type="checkbox"/> Medical Treatment/Procedure       | <input type="checkbox"/> Illness of a Loved One |
| <input type="checkbox"/> Sexual Assault/Abuse              | <input type="checkbox"/> Other                  |
| <input type="checkbox"/> Physical Assault/Abuse            |   |

How old were you when this happened? \_\_\_\_\_ years old

How long did the traumatic event last? \_\_\_\_\_

A.1.5 When Bad Things Happen Scale (PTSD items)

*The questions on the next pages will ask you about your most traumatic experience (= “the bad thing”). Your answers will help us understand how you feel about what happened. There are no right or wrong answers. Answer the questions by putting an X under NEVER, SOME, or LOTS. Be sure to answer every question.*

	Never	Some	Lots
1. Was the bad thing scary?			
2. Did you think you might get hurt?			
3. Were you afraid you might die?			
4. Did you think someone else might get hurt?			
5. Do you think about the bad thing now even when you do not want to?			
6. Do thoughts of the bad thing just pop into your head? Things like pictures or sounds or smells from the bad thing?			
7. Is there anything about the bad thing that you keep thinking about? Even when you do not want to?			
8. Do you have bad dreams or nightmares about the bad thing?			
9. Do you dream about scary things at night?			
10. Since the bad thing happened, do you dream at night that you die?			
11. Since the bad thing, do you have bad dreams, that later you can not remember what they were about?			
12. Do you daydream about the bad thing?			
13. Do pictures of what happened run over and over again in your head like a movie?			
14. Do you ever feel like the bad thing is still happening?			
15. Do you ever act like the bad thing is still happening?			
16. Does it bother you when things make you think of the bad thing?			
17. Does it bother you when you see someone who reminds you of the bad thing? Or when you go somewhere that reminds you?			
18. Does it bother you when it gets to be the same time as when the bad thing happened?			
19. Do you try to forget all about the bad thing?			
20. Do you try not to feel anything about the bad thing? Like you are a robot or machine, without any feelings?			
21. Do you ever feel like what happened was a bad dream and not real? Like it never happened?			
22. Do you wish you could turn off feelings that remind you of what happened?			
23. Do you try to push away thoughts about the bad thing and think about other things?			
24. Is it easy to be around people who make you think about the bad thing?			

	Never	Some	Lots
25. Is it hard to do things that make you think of the bad thing?			
26. Do you stay away from places or things that make you think of the bad thing?			
27. Do you forget parts of what happened?			
28. Do you remember everything that happened?			
29. Since the bad thing happened, do you do things that you used to think you were too old for?			
30. Are there games you used to play before the bad thing that you do not like to play now?			
31. Do you feel like you do not want to play with other kids since the bad thing happened?			
32. Do you feel different from other kids since the bad thing happened?			
33. Do you feel more alone since the bad thing happened?			
34. Do you sometimes feel like you cannot feel anything? Like you are made of stone?			
35. Are you good at hiding your feelings since the bad thing happened?			
36. Do you think you will live to be as old as most people get to be?			
37. Do you think you will get married when you grow up?			
38. Do you think you will have kids of your own when you grow up?			
39. Do you think you will grow up and have a job of your own?			
40. Is it hard for you to plan ahead for anything? Even for holidays or parties or special events?			
41. Do you try to live just one day at a time?			
42. Is it easy for you to sleep at night?			
43. Is it easy for you to go back to sleep if you wake up in the middle of the night?			
44. Do you get really mad about things since the bad thing happened?			
45. Do you get so mad that you really blow your top? Or you feel like hitting or kicking something?			
46. Do you lose your temper more now than you did before the bad thing happened?			
47. Is it easy for you to pay attention to things that you have to do at home or school?			
48. Is it easy for you to finish things you start? Like games or homework or TV shows?			
49. Is it easy for you to keep your mind on school work these days?			
50. Is it easy for you to remember things since the bad thing happened?			
51. Do you ever feel jumpy or nervous for no reason you can think of?			
52. Is it easy for you to sit still when you have to at school or home?			

	Never	Some	Lots
53. Do you keep your eyes open for trouble these days?			
54. Are you on the look out for something bad to happen?			
55. Do things ever catch you by surprise and make you jump these days?			
56. Do you jump when you hear a sudden noise?			
57. Does it make you feel sick in some way when you are reminded of the bad thing?			
58. Do you feel sicker these days then you did before the bad thing?			

### A.1.6 Participant Information Sheet (Pilot Study)

Dear participant,

Thank you for taking an interest in the current research.

We are interested in the emotional content of two short video clips. The video clips differ greatly in their content.

You will be asked to watch one video at a time, and then rate the content on a short questionnaire.

Please note that one of the clips is potentially quite gory and may be found unpleasant. However, if at any point during any stage of the experiment you wish to withdraw, you may do so with no explanation necessary.

The experiment will take about 15 minutes to complete and you will be paid £1 for your participation. All information will be kept strictly confidential, the data will be stored in a secure (locked) location and we are the only people who have access to it. Further to this, your name or any other means of identification will NOT be on any of the forms you complete.

Please ask any questions you have regarding the study at any time, and your participation in this study is greatly appreciated.

Thank you very much,

Julia Neufeind  
School of Psychology  
University of St Andrews  
Fife, KY16 9JU  
Email: jn20@st-and.ac.uk



A.1.7 Participant Debriefing Form (Pilot Study)

Dear Participant,

Thank you very much for your participation in the current study. I appreciate your time and contribution to the present research into the emotional content of these two video clips.

We are hoping to use these two video clips in a manipulation experiment, which requires establishing the emotional content of each video. For the main study we require one positive and one negative video clip. This study was to ascertain that the videos are suitable for the above purpose.

Thank you very much for your participation in the study and please do not hesitate to contact us with any questions.

Yours sincerely

Julia Neufeind  
School of Psychology  
University of St Andrews  
Fife, KY16 9JU  
Email: jn20@st-and.ac.uk

## Appendix 2: Appendix to Chapter 3 (Study 1)

A.2.1 Participant Information Sheets

A.2.2 Participant Consent Forms

A.2.3 Participant Debriefing Forms

A.2.4 Further Statistical Analyses: Complete Multiple Regression Models

### A.2.1 Participant Information Sheets (Study 1)

Dear Participant,

Thank you for your interest in my research. The purpose of this form is to explain the entire study to you, and you can then decide whether or not you want to participate.

I am interested in the effects of traumatic life experiences on our normal memory function. We know that the experience of a traumatic life event has the potential for changing the way we retrieve normal memories, even if they have nothing to do with the event itself. The purpose of this study is to examine this link further in a typical student population.

The truth is that almost everybody has experienced a potentially traumatic life event. This could have been an accident, a painful medical procedure, a personal illness, as well as the death or illness of a loved one. This is why I feel that everybody can participate in this study.

However, two people who have suffered the exact same event may afterwards end up feeling very differently about it. We think that this may be due to the ways in which different people attempt to deal with distressing experiences and thoughts.

This study will include two general memory interviews, in which you will be asked to retrieve a memory relating to a word, such as “friendly”. In addition you will be asked to tell me facts about your life, such as whether or not you can remember the names of your teachers in primary school.

After this part, I will give you a number of questionnaires to complete. These will be mostly concerned with what strategies you employ when dealing with unwanted memories and what you do when you feel sad. I will be in the room while you complete the questionnaires, in case you have any questions about them.

I want you to be aware that one of the questionnaires will ask you to think about what you consider to be your most traumatic experience, defining which broad category it belongs to (such as accident, illness, etc.) as well as asking you to answer a number of questions on what effect memories of that event have on you. I will not require you to identify any details about that event.

The entire experiment will take about 45 minutes to complete, and you will be paid £4 for your participation. All information will be kept strictly confidential, the data will be kept in a secure (locked) place and I will be the only one who has access to it. Furthermore, your name or any other identification will NOT be on any of the forms you complete.

Please feel free to ask me any questions. I would greatly appreciate your contribution to this study.

Thank you very much,

Julia Neufeind  
School of Psychology  
University of St. Andrews  
Fife, KY16 9JU  
e-mail: jn20@st-and.ac.uk

A.2.2 Participant Consent Forms (Study 1)

To be completed by the participant:

*Please answer the following questions by circling the relevant answer:*

I have read and understood the information sheet: Yes    No

I have been given the opportunity to ask questions about this study, and know that I can do so at any time. Yes    No

I understand that I can withdraw from the study at any time (without needing to give reason). Yes    No

I..... (print name) give my consent to take part in this study.

Signed:..... Date:.....

### A.2.3 Participant Debriefing Form (Study 1)

Dear Participant,

Thank you for your participation in my study. I appreciate your contribution to my research very much.

As already explained in the Information Sheet, the purpose of this research was to examine the potential effects that traumatic life experiences can have on our autobiographical memory (that is a person's memory of their own life/experiences). We think that our coping strategies might be an important factor that could help us explain which people will show a certain memory pattern after experiencing a traumatic event while others do not.

I am aware that you may have potentially suffered a distressing life experience, and that this may be hard to talk about. However, if you do find that you want to talk about it, the University's Student Support Counselling Service is a professional, free and confidential service for students. The service is located on the first floor of the Student's Association:

Students' Association,  
9 St Mary's Place,  
St Andrews,  
Fife KY16 9UZ

Monday to Friday 09:00 – 17:00:  
Tel: 01334 462720  
:  
Out of Hour Service (24/7)  
Tel: 01334 476161

You can make appointments to be seen by a professional counsellor during the daytime hours. In urgent cases, if you feel very upset right now, they will see you right away.

Again, thank you very much for your participation, and please feel free to contact me with any questions.

Yours sincerely,

Julia Neufeind  
School of Psychology  
University of St. Andrews  
Fife, KY16 9JU  
e-mail: jn20@st-and.ac.uk

### A.2.4 Complete Multiple Regression Models (Study 1)

Below are the complete multiple regression models for the 5 dimensions of ABM retrieval investigated in Chapter 3 of this program of research.

Dependent Variable: AMT Total Latency r = .348, p = 0.446

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u><math>\beta</math></u>	<u>t</u>	<u>p</u>
(CONSTANT)	142.575	23.377		6.099	0.000
WBSI- E	- 2.538	1.391	- 0.328	- 1.825	0.075
IES-I	- 0.177	1.085	- 0.052	- 0.163	0.871
IES-A	- 0.100	1.055	- 0.027	- 0.095	0.925
IES-H	0.718	0.946	0.186	0.758	0.452
HADS-D	- 2..236	2.599	- 0.176	- 0.861	0.394
HADS-A	1.485	1.888	0.165	0.786	0.436

Dependent Variable: AMT Positive Latency r = .215, p = 0.907

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u><math>\beta</math></u>	<u>t</u>	<u>p</u>
(CONSTANT)	63.301	16.811		3.765	0.000
WBSI- E	- 0.647	1.000	- 0.121	- 0.647	0.521
IES-I	- 0.494	0.781	- 0.209	- 0.633	0.530
IES-A	0.357	0.759	0.139	0.470	0.641
IES-H	0.670	0.681	0.251	0.985	0.330
HADS-D	- 0.747	1.869	- 0.085	- 0.400	0.691
HADS-A	- 0.058	1.358	- 0.009	- 0.042	0.966

Dependent Variable: AMT Negative Latency r = .428, p = 0.169

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u><math>\beta</math></u>	<u>t</u>	<u>p</u>
(CONSTANT)	78.081	13.706		5.697	0.000
WBSI- E	- 1.793	0.815	- 0.381	- 2.199	0.033
IES-I	0.353	0.636	0.169	0.555	0.582
IES-A	- 0.437	0.619	- 0.194	- 0.707	0.483
IES-H	0.003	0.555	0.001	0.005	0.996
HADS-D	- 1.464	1.524	- 0.189	- 0.961	0.342
HADS-A	1.437	1.107	0.263	1.298	0.201

Dependent Variable: S-AMI Personal Semantic Recall r = .493, p = 0.052

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u><math>\beta</math></u>	<u>t</u>	<u>p</u>
(CONSTANT)	66.706	2.121		31.453	0.000
WBSI- E	- 0.347	0.126	- 0.460	- 2.753	0.009
IES-I	- 0.160	0.098	- 0.477	- 1.625	0.111
IES-A	0.067	0.096	0.184	0.697	0.490
IES-H	0.141	0.086	0.374	1.646	0.107
HADS-D	0.249	0.236	0.200	1.058	0.296
HADS-A	- 0.090	0.171	- 0.103	- 0.525	0.602

Dependent Variable: S-AMI Episodic Memory Recall

$r = .296, p = 0.661$

	Unstandardised Coefficients		Standardised Coefficients		t	p
	B	Standard Error	$\beta$			
(CONSTANT)	27.318	1.792			15.243	0.000
WBSI- E	- 0.159	0.107	- 0.274		- 1.494	0.142
IES-I	- 0.020	0.083	- 0.078		- 0.243	0.809
IES-A	0.094	0.081	0.336		1.160	0.253
IES-H	- 0.069	0.073	- 0.239		- 0.957	0.344
HADS-D	0.096	0.199	0.100		0.482	0.632
HADS-A	- 0.014	0.145	- 0.020		- 0.094	0.925

## Appendix 3: Appendix to Chapter 4 (Study 2)

A.3.1 Participant Information Sheets

A.3.2 Participant Consent Forms

A.3.3. Participant Debriefing Forms

A.3.4 Student's AMI – Version A

A.3.5 Student's AMI – Version B

A.3.6 Memory for the Video Questionnaire



### A.3.1 Participant Information Sheets (Study2)

Dear Participant,

Thank you for your interest in my research. The purpose of this form is to explain the present study to you, and you can then decide whether or not you want to participate.

I am interested in memory recall. By that I mean both personal memories, as well as new memories for events.

In this study, I will first give you some memory interviews. For one of them you will be asked to retrieve a memory relating to a word that I give you, such as “friendly”. In the second interview I will ask you to recall facts from your life, such as names of your neighbours when you were a child. Another memory task involves you recalling as many things as you can that fit a certain category.

After this part, I will show you a video of a grizzly bear attack. I must let you know that the video is realistic and quite “gory”.

After that video, I will give you a set of similar memory tasks that you have done before watching the video. I will also give you a questionnaire to complete, which will ask you about the video, and a general questionnaire about how you deal with unpleasant thoughts.

The entire experiment will take about one hour to complete, and you will be paid £4 for your participation. All information will be kept strictly confidential, the data will be kept in a secure (locked) place and I will be the only one who has access to it. Furthermore, your name or any other identification will NOT be on any of the forms you complete.

Please feel free to ask me any questions. I would greatly appreciate your contribution to this study.

Thank you very much,

Julia Neufeind  
School of Psychology  
University of St. Andrews  
Fife, KY16 9JU  
e-mail: jn20@st-and.ac.uk

A.3.2 Participant Consent Forms (Study 2)

To be completed by the participant:

*Please answer the following questions by circling the relevant answer:*

I have read and understood the information sheet: Yes    No

I have been given the opportunity to ask questions about this study, and know that I can do so at any time. Yes    No

I understand that I can withdraw from the study at any time (without needing to give reason). Yes    No

I..... (print name) give my consent to take part in this study.

Signed:..... Date:.....

### A.3.3 Participant Debriefing Forms (Study 2)

Dear Participant,

Thank you for your participation in my study. I appreciate your contribution to my research very much.

As already explained in the Information Sheet, the purpose of this research was to examine personal memory recall.

Past research has shown that thought suppression is related to personal memory recall. However, this relationship is not yet clearly understood. In this experiment you were either asked to suppress the information for the video straight away, or you were free to think about anything. This way we manipulated thought suppression, as we believe that it influences the way you recall personal memories afterwards compared to beforehand.

Furthermore, as part of my research, I am interested in how people deal with traumatic experiences. Before watching the video, you were either told to empathise with the people in the video, or you were not. The purpose of the empathy condition is to make the video more “trauma-like”, i.e. as if it actually happened to you, rather than just watching a video. We believe that this variable can also influence how you recall memories afterwards.

Again, thank you very much for your participation, and please feel free to contact me with any questions.

Yours sincerely,

Julia Neufeind  
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e-mail: jn20@st-and.ac.

A.3.4 Student's AMI – Version A (Study 2)

**Section A: Childhood**

*1. First School (~ 5-11 years):*

- 1.1 Name of the first school the participant attended (1 point)  
Name: (1 point)
- 1.2 Location of this school (1 point)  
Location: (1 point)
- 1.3 Participant's age when starting this school (1 point)  
Age: (1 point)
- 1.4 Participant's address when starting this school (2 points)  
Street and Number: (½ point each)  
Town: (1 point)
- 1.5 Names of three teachers from this school (3 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)
- E.1 Recall of an incident from the period at primary school (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

**Section B: Adolescence**

*2. Extracurricular Activities in Secondary/High School:*

- 2.1 Extracurricular Activities (e.g. sports, music) (1 point)  
Activity: (1 point)
- 2.2 Location where this activity was carried out (1 point)  
Town: (1 point)
- 2.3 Participant's age at the time (1 point)  
Age: (1 point)
- 2.4 Name of the teacher/coach/leader of that activity (1 point)  
First Name: Family Name: (½ point each)
- E.2 Recall of an incident from the extracurricular activity (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

3. *Friends from adolescence:*

- 3.1 Name of two friends from adolescence (2 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)
- 3.2 Two places where they spent time together (not school) (2 points)  
Place: (1 point)  
Place: (1 point)

**Section C: Recent Events**

4. *Last Christmas:*

- 4.1 Place where the participant spent the last Christmas (1 point)  
Place: (1 point)
- 4.2 Name of one person they spent Christmas with (1 point)  
First Name: Family Name: (½ point each)

5. *Last Birthday:*

- 5.1 What the participant did for that birthday (1 point)  
Activity: (1 point)
- 5.2 The participant's favourite present from that birthday (1 point)  
Present: (1 point)
- 5.3 Person who gave the favourite present (1 point)  
Person: (1 point)
- 5.4 Names of three friends who came to that birthday (3 points)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)  
First Name: Family Name: (½ point each)
- E.5 Recall of an incident that happened on that birthday (3 points)  
Specific Incident: (1 point)  
Place: (1 point)  
Time: (1 point)

**Scoring of the S-AMI Version A:**

<i>Section A</i>	<i>Personal Semantic</i>	<i>Episodic</i>
1. First School	(max. = 8)	(max. = 3)
<i>Total</i>	(max. = 8)	(max. = 3)

<i>Section B</i>	<i>Personal Semantic</i>	<i>Episodic</i>
2. Extracurricular Act.	(max. = 4)	(max. = 3)
3. Friends	(max. = 4)	-----
<i>Total</i>	(max. = 8)	(max. = 3)

<i>Section C</i>	<i>Personal Semantic</i>	<i>Episodic</i>
4. Last Christmas	(max. = 2)	-----
5. Last Birthday	(max. = 6)	(max. = 3)
<i>Total</i>	(max. = 8)	(max. = 3)

**Cumulative Totals:**

<i>Total Score Summary</i>	<i>Personal Semantic</i>	<i>Episodic</i>
A. Childhood	(max. = 8)	(max. = 3)
B. Adolescence	(max. = 8)	(max. = 3)
C. Recent Life	(max. = 8)	(max. = 3)
<i>Total</i>	(max. = 24)	(max. = 9)

A.3.5 Student's AMI – Version B (Study 2)

**Section A: Childhood**

*3. First/Earliest Birthday:*

- |  |                |
|--|----------------|
| 1.1 First birthday the participant can remember            | (1 point)      |
| Age:   | (1 point)      |
| 1.2 What the participant did for that birthday             | (1 point)      |
| Activity:  | (1 point)      |
| 1.3 What the participant was wearing                       | (1 point)      |
| Clothes:   | (1 point)      |
| 1.4 The participant's favourite present from that birthday | (1 point)      |
| Present:   | (1 point)      |
| 1.5 Person who gave the favourite present                  | (1 point)      |
| Person:  | (1 point)      |
| 1.6 Names of three friends who came to that birthday       | (3 points)     |
| First Name:           Family Name:                         | (½ point each) |
| First Name:           Family Name:                         | (½ point each) |
| First Name:           Family Name:                         | (½ point each) |
| E.1 Recall of an incident that happened on that birthday   | (3 points)     |
| Specific Incident:   | (1 point)      |
| Place:   | (1 point)      |
| Time:  | (1 point)      |

**Section B: Adolescence**

*2. Main Secondary or High School (~ 11-18 years):*

- |   |                |
|---|----------------|
| 2.1 Name of the secondary/high school               | (1 point)      |
| Name:   | (1 point)      |
| 2.2 Location of this school                         | (1 point)      |
| Town:   | (1 point)      |
| 2.3 Year of graduation from secondary school        | (1 point)      |
| Year:   | (1 point)      |
| 2.4 Participant's address when starting this school | (2 points)     |
| Street and Number:                                  | (½ point each) |
| Town:   | (1 point)      |

- 4.5 Names of three teachers or friends from this school (3 points)  
 First Name: Family Name: (½ point each)  
 First Name: Family Name: (½ point each)  
 First Name: Family Name: (½ point each)

- E.4 Recall of the first day at secondary/high school (3 points)  
 Specific Incident: (1 point)  
 Place: (1 point)  
 Time: (1 point)

**Section C: Recent Events**

*3. University/ College*

- 3.1 Name of the first University the participant attended (1 point)  
 Name: (1 point)

- 3.2 Location of this University (1 point)  
 Town: (1 point)

- 3.3 Two courses the participant took in their first semester (2 points)  
 Course: (1 point)  
 Course: (1 point)

- 3.4 Names of two teachers from the first semester (2 points)  
 Title: Family Name: (½ point each)  
 Title: Family Name: (½ point each)

- 3.5 Names of two friends from the first semester (2 points)  
 First Name: Family Name: (½ point each)  
 First Name: Family Name: (½ point each)

*4. Yesterday:*

- E.4 Recall of an incident that happened yesterday (3 points)  
 Specific Incident: (1 point)  
 Place: (1 point)  
 Time: (1 point)



**Scoring of the S-AMI Version B:**

<i>Section A</i>	<i>Personal Semantic</i>	<i>Episodic</i>
1. Earliest Birthday	(max. = 8)	(max. = 3)
<i>Total</i>	(max. = 8)	(max. = 3)

<i>Section B</i>	<i>Personal Semantic</i>	<i>Episodic</i>
2. Secondary School	(max. = 8)	(max. = 3)
<i>Total</i>	(max. = 8)	(max. = 3)

<i>Section C</i>	<i>Personal Semantic</i>	<i>Episodic</i>
3. University/College	(max. = 8)	-----
4. Yesterday	-----	(max. = 3)
<i>Total</i>	(max. = 8)	(max. = 3)

**Cumulative Totals:**

<i>Total Score Summary</i>	<i>Personal Semantic</i>	<i>Episodic</i>
A. Childhood	(max. = 8)	(max. = 3)
B. Adolescence	(max. = 8)	(max. = 3)
C. Recent Life	(max. = 8)	(max. = 3)
<i>Total</i>	(max. = 24)	(max. = 9)

### A.3.6 Memory for the Video Questionnaire (Study 2)

Please answer all of the following questions. For sections 1 and 2, dissect the line with a vertical dash to reflect your answer.

#### **Section 1:**

1. How vivid is your memory for the film?

Not at all |-----| Very much

2. My memory for the place where the event took place is:

Vague |-----| Clear

3. I find the story:

Very unlikely |-----| Very likely

#### **Section 2:**

1. Do your memories of the film look more like snapshots, or a rolling film?

Snapshots |-----| Rolling Film

2. When you think about the film, do you see brief flashes of a scene or a whole scene played out?

Brief Flashes |-----| Whole Scene

3. When recollecting the film, do you see still images of the film or progressing and moving images?

Still Images |-----| Moving Images

4. Are your memories of the film frozen frames of the film or advancing frames of the film?

Frozen |-----| Advancing

5. Are your memories of the film broken into segments or do they run together?

Segments |-----| Coherent

### Section 3:

1. Why does the narrator leave for the mountains?
2. Does he provide this reason at the end or at the beginning of the clip?
3. Why, according to the narrator, do the tourists visit the mountains?
4. Does the first shot of the landscape contain mountains in the background?
5. Which of the following shots appears first: that of the landscape or that of the deer?
6. Which animal appears first, the deer or the bear?
7. Does the bear walk from left to right or vice versa through the screen?
8. Does the deer have horns?
9. Is the first shot of the bear taken while standing or driving?
10. Is the first shot taken by the narrator or the tourist?
11. Which animal is the bear eating: a deer or another animal?
12. Whose voice do you hear first: the man's or the woman's?
13. How many pieces of bread does the woman throw at the bear?
14. Does she do this with her left or right hand?
15. In which hand does the man hold his camera initially?
16. Does the man walk in front or behind his car?
17. How many cars are there in the clip?
18. What colours are the cars?
19. How often does the woman warn her husband to keep away from the bear?
20. Which words does she initially use: "watch out, Bob", or "... hunny"?
21. Which trees appear most in the clip: leaf or needle trees?
22. Who waves at the bear: the man or the woman?
23. When lying on the ground, is the man before or behind a tree?
24. What colour is the man's shirt?
25. What colour is the woman's sweater?

26. The narrator wonders whether men in general are as wise as we think. Does he wonder about this before or after than man has been attacked?

27. Why does the bear attack, according to the narrator: hunger or anxiety?

28. Is this reason provided before or after the man has been attacked?

## Appendix 4: Appendix to Chapter 5 (Study 3)

A.4.1 Participant Information Sheets

A.4.2 Participant Consent Forms

A.4.3 Participant Debriefing Forms

A.4.4 Complete Statistical Analyses (n = 64)

A.4.5 Complete Statistical Analyses (n = 61)

### A.4.1 Participant Information Sheet (Study 3)

Dear Participant,

Thank you for taking an interest in the current research. The purpose of this form is to explain the study to you and allow you to decide whether or not you would like to participate in the experiment.

The study will involve completing a mood questionnaire prior to viewing a short video clip. This video clip potentially contains material that is quite 'gory' and may be found unpleasant. The video clip runs for only a few minutes; however, if at any point during any stage of the experiment you wish to withdraw, you may do so with no explanation necessary.

Following the short video clips we will ask you to complete a second set of questionnaires.

The experiment will take about 30 minutes to complete and you will be paid £2 for your participation. All information will be kept strictly confidential, the data will be stored in a secure (locked) location and we are the only people who have access to it. Further to this, your name or any other means of identification will NOT be on any of the forms you complete.

Please ask any questions you have regarding the study at any time, and your participation in this study is greatly appreciated.

Thank you very much,

Julia Neufeind  
School of Psychology  
University of St Andrews  
Fife, KY16 9JU  
Email: jn20@st-and.ac.uk

A.4.2 Participant Consent Form (Study 3)

To be completed by the participant:

*Please answer the following questions by circling the relevant answer:*

I have read and understood the information sheet: Yes    No

I have been given the opportunity to ask questions about this study, and know that I can do so at any time. Yes    No

I understand that I can withdraw from the study at any time (without needing to give reason). Yes    No

I..... (print name) give my consent to take part in this study.

Signed:..... Date:.....

### A.4.3 Participant Debriefing Form (Study 3)

Dear Participant,

Thank you very much for your participation in the current study. I appreciate your time and contribution to the present research into thought suppression and mood.

Previous studies have shown that thought suppression is related to personal memory recall. The purpose of the current investigation is to establish whether suppression of negative material has a *direct* effect on mood, and may therefore affect the recall of personal memories.

Thank you very much for your participation in the study and please do not hesitate to contact us with any questions.

Yours sincerely,

Julia Neufeind  
School of Psychology  
University of St Andrews  
Fife, KY16 9JU  
Email: jn20@st-and.ac.uk



#### A.4.4 Complete Statistical Analyses (n = 64) (Study 3)

The tables below summarise the complete 2 (time: baseline and post manipulation) x 2 (condition: suppression vs. no suppression) x 2 (valence: positive vs. negative) three way mixed ANOVA models used to investigate the effects of thought suppression on mood (see Section 5.3.3). Condition and Valence were the between subjects factors and time was the within subjects factor. The dependent variables were the mood states as measured by the Profile of Mood States (POMS), and separate models were calculated for the 6 subscales of tension, depression, anger, vigour, fatigue and confusion, as well as the total mood disturbance (TMD).

##### a) TMD

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	3.781	1	3.781	0.032	0.859
Time * Valence	450.00	1	450.00	3.782	0.057
Time * Suppression	32.00	1	32.00	0.269	0.606
Time * Valence * Suppression	318.781	1	318.781	2.679	0.107
Error (within)	7139.437	60	118.991		
Valence	351.125	1	351.125	0.210	0.649
Suppression	136.125	1	136.125	0.081	0.777
Valence * Suppression	9.031	1	9.031	0.005	0.942
Error (between)	100455.188	60	1674.253		

##### b) Tension

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	66.125	1	66.125	5.354	0.024
Time * Valence	7.031	1	7.031	0.569	0.453
Time * Suppression	8.000	1	8.000	0.648	0.424
Time * Valence * Suppression	22.781	1	22.781	1.844	0.180
Error (within)	741.062	60	12.351		
Valence	0.500	1	0.500	0.010	0.920
Suppression	38.281	1	38.281	0.788	0.378
Valence * Suppression	4.500	1	4.500	0.93	0.762
Error (between)	2913.437	60	48.557		

##### c) Depression

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	20.320	1	20.320	2.088	0.154
Time * Valence	8.508	1	8.508	0.874	0.354
Time * Suppression	3.445	1	3.445	0.354	0.554
Time * Valence * Suppression	17.258	1	17.258	1.773	0.188
Error (within)	583.969	60	9.733		
Valence	291.008	1	291.008	1.749	0.191
Suppression	106.945	1	106.945	0.643	0.426
Valence * Suppression	11.883	1	11.883	0.071	0.790
Error (between)	9983.469	60	166.391		

d) Anger

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	11.281	1	11.281	2.766	0.101
Time * Valence	0.125	1	0.125	0.031	0.862
Time * Suppression	13.781	1	13.781	3.379	0.071
Time * Valence * Suppression	10.125	1	10.125	2.483	0.120
Error (within)	244.688	60	4.078		
Valence	112.500	1	112.500	1.859	0.178
Suppression	22.781	1	22.781	0.376	0.542
Valence * Suppression	288.000	1	288.000	4.759	0.033
Error (between)	3630.937	60	60.516		

e) Vigour

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	220.500	1	220.500	21.107	0.000
Time * Valence	26.281	1	26.281	2.516	0.118
Time * Suppression	10.125	1	10.125	0.969	0.329
Time * Valence * Suppression	5.281	1	5.281	0.506	0.480
Error (within)	626.812	60	10.447		
Valence	91.125	1	91.125	1.384	0.244
Suppression	205.031	1	205.031	3.113	0.083
Valence * Suppression	21.125	1	21.125	0.321	0.573
Error (between)	3951.687	60	65.861		

f) Fatigue

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	4.133	1	4.133	0.785	0.379
Time * Valence	23.633	1	23.633	4.488	0.038
Time * Suppression	3.445	1	3.445	0.654	0.422
Time * Valence * Suppression	1.320	1	1.320	0.251	0.618
Error (within)	315.969	60	5.266		
Valence	20.320	1	20.320	0.249	0.620
Suppression	2.258	1	2.258	0.028	0.869
Valence * Suppression	122.070	1	122.070	1.494	0.226
Error (between)	4903.844	60	81.731		

g) Confusion

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	1.531	1	1.531	0.314	0.577
Time * Valence	36.125	1	36.125	7.409	0.008
Time * Suppression	4.500	1	4.500	0.923	0.341
Time * Valence * Suppression	5.281	1	5.281	1.083	0.302
Error (within)	292.563	60	4.876		
Valence	34.031	1	34.031	1.172	0.283
Suppression	38.281	1	38.281	1.318	0.255
Valence * Suppression	0.125	1	0.125	0.004	0.948
Error (between)	1742.437	60	29.041		

### A.4.5 Complete Statistical Analyses (n = 61) (Study 3)

Because the exploratory data analysis using boxplots revealed three outlying scores total mood disturbance (TMD) on the Profile of Mood States (POMS) at baseline, the entire data analysis for Study 3 (Chapter 5) was repeated with these three participants removed to ensure that these outlying scores did not have a significantly altering impact on the data set (see Section 5.3.3). This repeated data analysis is reported below, and most importantly the results and conclusions do not differ from those reported in Chapter 5.

#### A.4.5.1 Participant Characteristics:

The participants' gender ratio, age, and trait suppression scores (as measured by the WBSI) are summarised in the table below:

Participant Characteristics: gender ration, mean age (s.d.), and mean trait suppression (s.d.) per condition

	<u>Positive No Suppression</u>	<u>Negative No Suppression</u>	<u>Positive Suppression</u>	<u>Negative Suppression</u>
Gender (f:m)	12:4	10:6	11:4	9:5
Age	19.88 (3.14)	20.50 (3.92)	20.93 (3.13)	20.86 (4.07)
WBSI total	50.31 (11.95)	47.75 (9.09)	51.87 (6.51)	50.14 (10.70)
WBSI effective	19.50 (5.17)	19.06 (4.95)	21.00 (3.02)	20.21 (5.03)

There was no significant difference in the gender ratio between the four conditions (Fisher's exact  $p > 0.6$ , two-tailed). A 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVA was calculated on age, and revealed that there were no significant differences in the ages of the participants between the groups ( $F_{(1,60)} < 1$ ).

Two further 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVAs were calculated to assess the participants' trait suppression, as measured by the WBSI scores ( $F_{(1,60)} < 1$ ) as well as scores from "effective" WBSI items ( $F_{(1,60)} < 1$ ). This suggests that there were no differences in levels of trait suppression between the participants in the four conditions.

#### A.4.5.2 Suppression Manipulation:

The means (and standard deviations) for levels of thought suppression and number of intrusions reported by the participants (as measured by the number of mouse button presses) during the thought monitoring task are summarized in the table below:

Mean level of thought suppression (and standard deviations) and intrusions (s.d.) reported by the participants during the thought monitoring task

	<u>Positive No Suppression</u>	<u>Negative No Suppression</u>	<u>Positive Suppression</u>	<u>Negative Suppression</u>
Suppression	52.31 (29.29)		69.03 (22.65)	
Suppression	59.00 (23.80)	45.63 (33.33)	66.27 (28.23)	72.00 (15.11)
Intrusions	12.44 (6.23)	11.81 (8.40)	8.27 (6.79)	13.71 (9.47)

In order to assess the effectiveness of the manipulation, a 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVA was calculated on the self-reported levels of thought suppression. This revealed a main effect of condition ( $F_{(1,60)} = 6.24$ ,  $p < 0.05$ ), but no significant main effect of valence ( $F_{(1,60)} < 1$ ) or interaction ( $F_{(1,60)} = 2.01$ ,  $p = 0.16$ ). A subsequent independent-samples t-test showed that those participants who were instructed to suppress reported significantly higher levels of thought suppression than those in the control condition ( $t_{(62)} = -2.48$ ,  $p < 0.05$ ), indicating that the experimental instructions were adhered to.

A similar 2 (valence: positive vs. negative) x 2 (condition: suppression vs. no suppression) between subjects ANOVA was calculated to examine any differences in the number of video-related intrusions reported during the thought monitoring task, but revealed no main effects of valence ( $F_{(1,60)} = 1.46, p = 0.23$ ), condition ( $F_{(1,60)} < 1$ ), and no significant interaction ( $F_{(1,60)} = 2.32, p = 0.13$ ).

#### A.4.5.3 Effects of Thought Suppression on Mood:

The POMS scores for the four between subjects conditions at baseline and post-manipulation are summarized in table the table below.

Means (and standard deviations) for total mood disturbance (TMD) and each of the POMS subscales for all condition, excluding outliers (n = 61)

	Baseline				Post-Manipulation			
	No Suppression		Suppression		No Suppression		Suppression	
Video	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
(n)	n = 16	n = 16	n = 15	n = 14	n = 16	n = 16	n = 15	n = 14
TMD	60.69 (23.39)	57.31 (26.32)	59.47 (26.52)	47.36 (13.42)	60.75 (25.49)	58.56 (20.27)	51.93 (22.51)	52.79 (19.13)
Tension	15.31 (5.49)	15.44 (5.25)	15.20 (4.65)	13.93 (3.99)	13.75 (4.14)	13.13 (2.96)	12.93 (3.39)	14.14 (4.85)
Depression	21.38 (5.81)	19.19 (6.35)	21.87 (7.90)	16.93 (2.23)	21.13 (8.28)	18.50 (5.25)	19.67 (6.47)	17.07 (3.08)
Anger	14.50 (2.99)	16.25 (5.86)	17.73 (5.60)	13.29 (1.77)	15.19 (4.58)	15.69 (4.69)	16.00 (4.66)	12.64 (1.01)
Vigour	22.00 (6.25)	21.63 (5.61)	25.07 (7.41)	24.64 (4.89)	19.31 (5.44)	17.94 (5.59)	24.07 (5.61)	21.14 (6.06)
Fatigue	16.06 (7.08)	14.25 (5.51)	13.73 (6.56)	14.86 (6.06)	15.38 (7.91)	14.88 (6.46)	12.40 (5.58)	15.29 (5.85)
Confusion	15.54 (4.27)	13.81 (2.23)	16.00 (3.55)	13.00 (3.28)	14.63 (3.48)	14.31 (3.00)	15.00 (3.46)	14.79 (4.51)

In order to investigate the effects of thought suppression on mood, a series of 2 (time: baseline and post-manipulation) x 2 (condition: suppression vs. no suppression) x 2 (valence: positive vs. negative) mixed model ANOVAs were calculated for TMD as well as the 6 POMS subscales, with time as the repeated measures factor. For TMD, no significant main effects of time ( $F_{(1,60)} < 1$ ), valence ( $F_{(1,60)} < 1$ ) or suppression condition ( $F_{(1,60)} = 1.40, p = 0.24$ ) were found, and there was no significant interaction occurred for time x condition x valence ( $F_{(1,60)} = 2.14, p = 0.15$ ). Thus, suppression of negative material did not lead to significant changes in mood.

Similar patterns emerged for each of the POMS subscales. Critically, no significant 3-way interaction between time, condition, and valence were found on any of the POMS subscales: tension ( $F_{(1,60)} = 1.53, p = 0.22$ ); depression ( $F_{(1,60)} = 1.51, p = 0.22$ ); anger ( $F_{(1,60)} = 2.56, p = 0.12$ ); vigour ( $F_{(1,60)} < 1$ ); fatigue ( $F_{(1,60)} < 1$ ); and confusion ( $F_{(1,60)} < 1$ ).

The tables below summarise the complete 2 (time: baseline and post manipulation) x 2 (condition: suppression vs. no suppression) x 2 (valence: positive vs. negative) three way mixed ANOVA models used to investigate the effects of thought suppression on mood (see Section 5.3.3). Condition and Valence were the between subjects factors and time was the within subjects factor. The dependent variables were the mood states as measured by the Profile of Mood States (POMS), and separate models were calculated for the 6 subscales of tension, depression, anger, vigour, fatigue and confusion, as well as the total mood disturbance (TMD).

a) TMD

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	1.193	1	1.193	0.010	0.922
Time * Valence	380.481	1	380.481	3.089	0.084
Time * Suppression	22.193	1	22.193	0.180	0.673
Time * Valence * Suppression	263.472	1	263.472	2.139	0.149
Error (within)	7020.550	57	123.168		
Valence	537.639	1	537.639	0.595	0.444
Suppression	1262.042	1	1262.042	1.396	0.242
Valence * Suppression	61.630	1	61.630	0.068	0.795
Error (between)	51525.501	57	903.956		

b) Tension

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	66.770	1	66.770	5.162	0.027
Time * Valence	5.694	1	5.694	0.440	0.510
Time * Suppression	6.313	1	6.313	0.488	0.488
Time * Valence * Suppression	19.839	1	19.839	1.534	0.221
Error (within)	737.333	57	12.936		
Valence	0.600	1	0.600	0.023	0.880
Suppression	3.833	1	3.833	0.146	0.703
Valence * Suppression	0.365	1	0.365	0.014	0.906
Error (between)	1492.768	57	26.189		

c) Depression

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	17.043	1	17.043	1.749	0.191
Time * Valence	6.899	1	6.899	0.708	0.404
Time * Suppression	2.382	1	2.382	0.245	0.623
Time * Valence * Suppression	14.691	1	14.691	1.508	0.224
Error (within)	555.276	57	9.742		
Valence	289.666	1	289.666	4.532	0.038
Suppression	41.166	1	41.166	0.644	0.426
Valence * Suppression	14.069	1	14.069	0.220	0.641
Error (between)	3643.585	57	63.923		

d) Anger

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Time	9.631	1	9.631	2.369	0.129
Time * Valence	0.048	1	0.048	0.012	0.914
Time * Suppression	11.889	1	11.889	2.924	0.093
Time * Valence * Suppression	10.410	1	10.410	2.560	0.115
Error (within)	231.761	57	4.066		
Valence	58.639	1	58.639	1.799	0.185
Suppression	7.324	1	7.324	0.225	0.637
Valence * Suppression	192.132	1	192.132	5.894	0.018
Error (between)	1858.118	57	32.599		

e) Vigour

Source	SS	df	MS	F	p
Time	224.758	1	224.758	20.724	0.000
Time * Valence	23.281	1	23.281	2.147	0.148
Time * Suppression	6.681	1	6.681	0.616	0.436
Time * Valence * Suppression	4.276	1	4.276	0.394	0.533
Error (within)	618.187	57	10.845		
Valence	49.385	1	49.385	0.840	0.363
Suppression	374.836	1	374.836	6.376	0.014
Valence * Suppression	4.851	1	4.851	0.083	0.775
Error (between)	3350.733	57	58.785		

f) Fatigue

Source	SS	df	MS	F	p
Time	1.778	1	1.778	0.345	0.559
Time * Valence	17.963	1	17.963	3.483	0.067
Time * Suppression	1.348	1	1.348	0.261	0.611
Time * Valence * Suppression	0.348	1	1.348	0.261	0.611
Error (within)	293.975	57	5.157		
Valence	5.473	1	5.473	0.070	0.792
Suppression	34.916	1	34.916	0.448	0.506
Valence * Suppression	75.957	1	75.957	0.975	0.328
Error (between)	4438.568	57	77.870		

g) Confusion

Source	SS	df	MS	F	p
Time	0.426	1	0.426	0.085	0.772
Time * Valence	31.919	1	31.919	6.375	0.014
Time * Suppression	2.292	1	2.292	0.458	0.501
Time * Valence * Suppression	4.125	1	4.125	0.824	0.368
Error (within)	285.397	57	5.007		
Valence	50.440	1	50.440	2.548	0.116
Suppression	0.680	1	0.680	0.034	0.854
Valence * Suppression	3.098	1	3.098	0.156	0.694
Error (between)	1128.522	57	19.799		

A.4.5.4 Power Analyses:

In order to further validate the non-significant findings obtained in the three way interactions and to ensure that these results were not due to an inadequate sample size an a priori power analysis was performed. The effect size for the time X valence X condition interaction for TMD was relatively small (effect size = 0.193) and based on this effect size a sample of 351 participants would be required to obtain a significant three way interaction at  $p < 0.05$ .

However, the 64 participants in the pervious study (Chapter 4) only viewed the negative and not the positive video clip, and therefore the power analysis was repeated for those 32 participants in the present study who viewed the negative video. The size of this effect was 0.163 and the a priori power analyses revealed that a sample of 492 participants would be needed to observe a significant change in TMD (at  $p < 0.05$ ) as a result of the time X condition interaction. It therefore remains unlikely that the effects of thought suppression on ABM recall observed in Chapter 4 occurred as a result of changed in mood.

## Appendix 5: Appendix to Chapter 6 (Study 4)

- A.5.1 Participant Information Sheets (Clinical)
- A.5.2 Participant Information Sheets (Control)
- A.5.3 Parent Information Sheets (Clinical)
- A.5.4 Parent Information Sheets (Control)
- A.5.5 Participant Consent Forms (over 16 years)
- A.5.6 Participant/Parent Consent Forms (under 16 years)
- A.5.7 Suicide Ideation Interview (K-SADS-PL)
- A.5.8 Further Statistical Analyses: Complete Multiple Regression Models

### A.5.1 Participant Information Sheet (Clinical)

#### **Personal Memory, Problem Solving Skills and Stress Reactions in Young People who Self-Harm.**

Hello,

My name is Julia Neufeind, and I am a researcher at the University of St. Andrews. I am interested in people's personal memories. I hope that you would like to take part in my research project. However, before you decide, it is important that you understand what I will ask of you, and what I want you to do. It is completely up to you to decide whether or not you want to take part in my research, and even if you agree now, you can still decide at any point that you don't want to continue, without having to tell me why. Please ask me about anything that you don't understand or are not sure about.

#### **What will happen during the session?**

First of all, this is not a test, and there are no right or wrong answers. If you want to participate, then I want you to just give me the answers that are right for you.

Chris Ward will help me with this study. I will do most of the interviews and questionnaires with you, but in the end Chris Ward will also ask you a few questions and give you two questionnaires.

At the start of the session you will be given a number that is on all the questionnaires instead of your name, so that nobody can tell who gave these answers and recognise you from them.

I will start out by asking you to recall memories from your childhood, such as people you went to school with and events that happened when you were with these people. I will also ask you to recall memories that come to mind when I say a certain word.

I will then show you some pictures and ask you which one best describes a word that I say. After that I will give you a problem solving test, in which I make up some possible problems that you may be faced with, and ask you to tell me how you would solve them. In between those tasks I will give you a short questionnaire about unwanted thoughts.

Finally, Chris will ask you a few questions about your self-harming behaviours and intentions in the past. Also, he will give you two more questionnaires to answer for me, and these questionnaires are about how you've felt over the past two weeks, and also about bad things that may have happened to you in your past.

#### **What will happen next?**

If you decide to take part in this study, and your parent(s)/guardian(s) agree that it is OK for you to take part, you will be given a consent form to sign.

Remember that it is up to you to decide whether or not you want to participate.

After the testing, I will give you £6 for your participation.

Please ask me any questions about this that you may have about this research!



## A.5.2 Participant Information Sheet (Control)

### **Personal Memory and Problem Solving Skills in Young People**

Hello,

My name is Julia Neufeind, and I am a researcher at the University of St. Andrews. I am interested in people's personal memories. I hope that you would like to take part in my research project. However, before you decide, it is important that you understand what I will ask of you, and what I want you to do. It is completely up to you to decide whether or not you want to take part in my research, and even if you agree now, you can still decide at any point that you don't want to continue, without having to tell me why. Please ask me about anything that you don't understand or are not sure about.

#### **What will happen during the session?**

First of all, this is not a test, and there are no right or wrong answers. If you want to participate, then I want you to just give me the answers that are right for you.

Either Abigail Stephenson or I will do all of the interviews and questionnaires with you in this study, and only the two of us and my supervisor will have access to the answers that you are giving in the study.

At the start of the session you will be given a number that is on all the questionnaires instead of your name, so that nobody can tell who gave these answers and recognise you from them.

I will start out by showing you some pictures and ask you which one best describes a word that I say to you. This will take about 15 minutes. After that we'll decide together if you want to continue and we will arrange another session.

In the next session, I will be asking you to recall memories from your childhood, such as people you went to school with and events that happened when you were with these people. I will also ask you to recall memories that come to mind when I say a certain word. After that I will give you a problem solving test, in which I make up some possible problems that you may be faced with, and ask you to tell me how you would solve them.

Finally, I will give you three questionnaires to answer for me, and these questionnaires are about unwanted thoughts, how you've felt over the past two weeks, and also about bad things that may have happened to you in your past.

If there are any questions that you don't want to answer then it's okay to leave them out.

#### **What will happen next?**

If you decide to take part in this study, and your parent(s)/guardian(s) agree that it is OK for you to take part, you will be given a consent form to sign.

Remember that it is up to you to decide whether or not you want to participate.

Please ask me any questions about this that you may have about this research!

### A.5.3 Parent Information Sheet (Clinical)

#### **Personal Memory, Problem Solving Skills and Stress Reactions in Young People who Self-Harm.**

##### **Dear Parent/Guardian,**

Please consider allowing your son/daughter to participate in this research study. However, before you decide, it is important that you understand why this research is carried out and what it involves. Please read the following information carefully, and don't hesitate to ask any questions about it.

##### **Who is carrying out this study, and what is it about?**

My name is Julia Neufeind, and I am a researcher based at the University of St. Andrews. I am interested primarily in researching personal memories. I will conduct most of the interviews with your son/daughter, and will also give him/her a questionnaire to complete. Chris Ward will also ask your son/daughter a few questions, and will give him/her two questionnaires.

##### **What does this study involve?**

I will ask your son/daughter to recall general memories from his/her childhood, such as people from their pasts (e.g. friends, teachers) and events throughout his/her childhood (e.g. the first day at school). I will also ask him/her to recall memories of events from his/her past that come to mind when I say a particular word. Together, these two tasks will take about 30 minutes.

Additionally, I will also give your son/daughter a standard measure of verbal fluency and a problem solving task, in which your child will be given four problem situation scenarios that I will ask them to solve. Together, these tasks should take another 30 minutes. In between those tasks I will give your child a very short questionnaire about unwanted thoughts.

As part of this research, Chris Ward will ask your son/daughter a few questions to assess previous self-harming and suicidal acts and intentions. Additionally, Chris Ward will also give your son/daughter two questionnaires to complete. The questionnaires inquire about your son's/daughter's mood over the past 14 days, and a survey of negative events that may have happened to him/her.

##### **What will happen next?**

It is entirely up to you and your son/daughter to decide whether or not you are happy to let him/her participate in this research. If you do decide to agree to your son/daughter participating, you will be asked to sign a consent form. Even if you do decide that your son/daughter may participate in this study, you can withdraw him/her, or he/she can withdraw him/herself from the study at any point without needing to give reason. Any material gathered is kept confidential, and all forms, questionnaires and tapes of the interview will only be identified by a number, and hence your son/daughter can not be recognised from it. Finally, this is not a test and there are no right or wrong answers on any of these tasks. Whatever answer is given is the correct one for your son/daughter.

Your son/daughter will be paid £6 for his/her participation in this study, which is the standard rate of pay for participants in research projects employed by the University of St. Andrews.

If you require further information, please contact:  
Miss Julia Neufeind, BA, School of Psychology, University of St. Andrews, KY16 9JU  
jn20@st-andrews.ac.uk

## A.5.4 Parent Information Sheet (Control)

### **Personal Memory and Problem Solving Skills in Young People**

#### **Dear Parent/Guardian,**

Please consider allowing your son/daughter to participate in this research study. However, before you decide, it is important that you understand why this research is carried out and what it involves. Please read the following information carefully, and don't hesitate to ask any questions about it.

#### **Who is carrying out this study, and what is it about?**

My name is Julia Neufeind, and I am a researcher based at the University of St. Andrews. I am interested primarily in researching personal memories. Either Abigail Stephenson or I will conduct all of the interviews with your son/daughter, and will also give him/her a few questionnaires to complete. Abigail Stephenson will help me with this research. Both of us have gone through the Enhanced Disclosure Scotland procedure to be able to carry out this project. Only Dr. Barbara Dritschel, my project supervisor, Abigail Stephenson and myself will have access to the information collected. Approval for this research has been obtained from Inverkeithing High School, the Local Education Authority and the Ethics Committee of the School of Psychology at the University of St Andrews. At no point will any information be written or published that could identify your child.

#### **What does this study involve?**

I will first give your son/daughter a standard measure of verbal fluency, which will take about 15 minutes to complete. This will conclude the first session. If we find that based on age, gender and verbal fluency your child is suitable for this study, we will ask him/her to return for another session.

In the second session I will ask your son/daughter to recall general memories from his/her childhood, such as people from their pasts (e.g. friends, teachers) and events throughout his/her childhood (e.g. the first day at school). I will also ask him/her to recall memories of events from his/her past that come to mind when I say a particular word. Additionally, I will also give your son/daughter a problem solving task, in which your child will be given four problem situation scenarios that I will ask them to solve.

Finally, I will ask him/her to complete three questionnaires about unwanted thoughts, his/her mood over the past 14 days, and a survey of negative events that may have happened to him/her. Overall the second session will take about 40 minutes to complete.

#### **What will happen next?**

It is entirely up to you and your son/daughter to decide whether or not you are happy to let him/her participate in this research. If you do decide to agree to your son/daughter participating, could you please sign the attached consent form and have your child return it to their school. Even if you do decide that your son/daughter may participate in this study, you can withdraw him/her, or he/she can withdraw him/herself from the study at any point without needing to give reason. Finally, this is not a test and there are no right or wrong answers on any of these tasks. Whatever answer is given is the correct one for your son/daughter.

If you require further information, please contact:

Miss Julia Neufeind, BA, School of Psychology, University of St. Andrews, KY16 9JU  
jn20@st-andrews.ac.uk

A.5.5 Participant Consent Form (over 16 years)

Title of Project: **Personal Memory and Problem Solving Skills in Young People**

Researcher: Julia Neufeind

**Section for the participant:**

- I have read and understood the information sheet provided for the above study.
- I have been given the opportunity to ask questions about this research, and know that I can do so at any time.
- I understand that my participation is voluntary and that I can withdraw at any time.
- I agree to take part in this study.

-----  
SIGNATURE

NAME

DATE

A.5.6 Participant/Parent Consent Form (under 16 years)

Title of Project: **Personal Memory and Problem Solving Skills in Young People**

Researcher: Julia Neufeind

**Section for the participant:**

- I have read and understood the information sheet provided for the above study.
- I have been given the opportunity to ask questions about this research, and know that I can do so at any time.
- I understand that my participation is voluntary and that I can withdraw at any time.
- I agree to take part in this study.

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SIGNATURE	NAME	DATE
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**Section for the parent/guardian:**

- I have read and understood the information sheet provided for the above study.
- I have been given the opportunity to ask questions about this research, and know that I can do so at any time.
- I understand that my child's participation is voluntary and that I am free to withdraw my child, and that he's she is free to withdraw at any time without giving any reason.
- I agree to .....taking part in this study.

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SIGNATURE	NAME	DATE
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A.5.7 Suicide Ideation Interview (K-SADS-PL)

**Recurrent Thoughts of Death**

*“Sometimes children who get upset or feel bad, wish they were dead or feel they’d be better off dead.”*

*Have you ever had these type of thoughts? When?*

*Do you feel that way now?*

*Was there ever another time you felt that way?*

- 0 No Information
- 1 Not present
- 2 Subthreshold: Transient thoughts of death
- 3 Threshold: Recurrent thoughts of death, “I would be better off dead” or “I wish I were dead”

**Suicidal Ideation**

(This includes preoccupation with thoughts of death or suicide and auditory command hallucinations where the child hears a voice telling him to kill himself or even suggesting a method. **Do not include mere fears of dying.**)

*“Sometimes children who get upset or feel bad think about dying or even killing themselves.”*

*Have you ever had such thoughts? How would you do it?*

*Did you have a plan?*

- 0 No Information
- 1 Not at all
- 2 Subthreshold: Occasional thoughts of suicide but has not thought of a specific method
- 3 Threshold: Often thinks of suicide and had thought of a specific method

**Suicidal Acts – Seriousness**

(Judge the seriousness of suicidal intent as expressed in his suicidal act like: Likelihood of being rescued; precautions against discovery; actions to gain help during or after attempt; degree of planning; apparent purpose of the attempt; manipulative or truly suicidal intent)

*Have you ever actually tried to kill yourself? When?*

*What did you do? Any other things?*

*Did you really want to die? How close did you come to doing it?*

*Was anybody in the room? In the apartment?*

*Did you tell them in advance? How were you found?*

*Did you ask for any help after you did it?*

- 0 No Information
- 1 No attempt or gesture with no intent to die
- 2 Subthreshold: Present, but very ambivalent
- 3 Threshold: Definite suicidal intent

### Suicidal Acts – Medical Lethality

(Actual medical threat to life or physical condition following the most serious suicidal act. Take into account the method, impaired consciousness at time of being rescued, seriousness of physical injury, toxicity of ingested material, reversibility, amount of time needed for complete recovery and how much medical treatment needed.)

*How close were you to dying after your most serious suicidal act?*

*What did you do when you tried to kill yourself?*

*What happened to you after you tried to kill yourself?*

- 0 No Information
- 1 No attempt or gesture with no intent to die
- 2 Subthreshold: e.g. mild gastritis
- 3 Threshold: e.g. brief unconsciousness

### Non-Suicidal Physical Self-Damaging Acts

(Refers to self-mutilation, or other acts done **without intent** of killing himself)

*Did you ever try to hurt yourself?*

*Have you ever burned yourself with matches/ candles?*

*Or scratched yourself with needles/ a knife? Your nails?*

*Or put hot pennies on your skin? Anything else?*

*Why did you do it?*

*How often?*

*Do you have many accidents?*

*What kind?*

*How often?*

*Some kids do these type of things because they want to kill themselves, and other kids do them because it makes them feel a little bit better afterwards. Why do you do these things?*

- 0 No Information
- 1 Not present.
- 2 Subthreshold: infrequent (1-3 times a year). Has never caused serious injury to self
- 3 Threshold: frequent (more than 4 times a year) or has caused serious injury to self

### A.5.8 Complete Multiple Regression Models (Study 4)

Below are the complete multiple regression models for the 8 dimensions of ABM retrieval investigated in Chapter 6 of this program of research.

Dependent Variable: Total latency (AMT):  $r = 0.365, p = 0.166$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	202.422	42.674		4.743	0.000
WBTHS	- 0.963	0.476	- 0.396	- 1.291	0.205
CDI	0.910	1.242	0.181	0.733	0.468
WBSI-E	- 1.781	2.441	- 0.149	- 0.729	0.471

After stepwise multiple regression only PTSD symptoms (WBTHS) remained to significantly predict variability in the overall latency to retrieve episodic ABMs,  $r = -0.32, p < 0.05$ .

Dependent Variable: Positive Latency (AMT):  $r = 0.247, p = 0.526$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	70.163	27.009		2.598	0.014
WBTHS	- 0.535	0.472	- 0.337	- 1.133	0.265
CDI	1.179	0.786	0.387	1.501	0.142
WBSI-E	0.212	1.545	0.029	0.137	0.892

After stepwise multiple regression none of the variables remained to significantly predict variability in the positive latency.

Dependent Variable: Negative Latency (AMT):  $r = 0.495, p = 0.019$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	130.303	26.757		4.870	0.000
WBTHS	- 0.444	0.468	- 0.253	- 0.949	0.349
CDI	- 0.249	0.778	- 0.074	- 0.320	0.751
WBSI-E	- 1.893	1.531	- 0.235	- 1.237	0.224

After stepwise multiple regression only thought suppression (WBSI) remained to significantly predict variability in the latency to retrieve episodic ABMs to negative cue words,  $r = -0.46, p < 0.01$ .

Dependent Variable: Total specific memories on first recall (AMT):  $r = 0.116, p = 0.923$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	8.400	0.34		10.077	0.000
WBTHS	-0.006	0.015	-0.121	-0.398	0.693
CDI	0.012	0.024	0.131	0.495	0.624
WBSI-E	0.022	0.048	0.098	0.452	0.654



After stepwise multiple regression none of the variables remained to significantly predict variability in the number of specific memories recalled as first responses to all cue words.

Dependent Variable: Specific memories on first recall on positive cues (AMT):  
 $r = 0.284, p = 0.393$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	4.356	0.454		9.598	0.000
WBTHS	0.009	0.008	0.336	1.140	0.262
CDI	-0.023	0.013	-0.442	-1.735	0.092
WBSI-E	0.003	0.026	0.023	0.111	0.913

After stepwise multiple regression none of the variables remained to significantly predict variability in the number of specific memories recalled as first responses to positive cue words.

Dependent Variable: Specific memories on first recall on negative cues (AMT):  
 $r = 0.326, p = 0.262$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	4.045	0.605		6.691	0.000
WBTHS	-0.015	0.011	-0.408	-1.404	0.169
CDI	0.035	0.018	0.499	1.985	0.055
WBSI-E	0.019	0.035	0.112	0.541	0.592

After stepwise multiple regression none of the variables remained to significantly predict variability in the number of specific memories recalled as first responses to negative cue words.

Dependent Variable: Personal Semantic Memory Retrieval (CAMI):  $r = 0.362, p = 0.172$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	69.487	4.127		16.836	0.000
WBTHS	-0.028	0.072	-0.112	-0.392	0.698
CDI	0.074	0.120	0.152	0.614	0.543
WBSI-E	-0.400	0.236	-0.346	-1.696	0.099

After stepwise multiple regression only thought suppression (WBSI-effective) remained to significantly predict variability in personal semantic memory retrieval,  $r = -0.35, p < 0.05$ .

Dependent Variable: Episodic Memory Retrieval (CAMI):  $r = 0.284, p = 0.392$

	Unstandardised Coefficients		Standardised Coefficients		
	<u>B</u>	<u>Standard Error</u>	<u>B</u>	<u>t</u>	<u>p</u>
(CONSTANT)	40.846	4.282		9.539	0.000
WBTHS	0.044	0.075	0.174	0.592	0.558
CDI	-0.054	0.125	-0.109	-0.430	0.670
WBSI-E	-0.384	0.245	-0.329	-1.568	0.126

After stepwise multiple regression none of the variables remained to significantly predict variability in the episodic memory retrieval on the CAMI.