

Autobiographical memory and symptoms of PTSD

Specificity of episodic and semantic aspects of autobiographical memory in relation to  
symptoms of Posttraumatic Stress Disorder (PTSD)

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### Abstract

Two studies examined the relationship between the ability to access specific autobiographical material in memory and presence/symptoms of posttraumatic stress. In Study 1, a sample of refugees with a diagnosis of posttraumatic stress disorder (PTSD) completed the autobiographical memory test (AMT) in which they had to generate specific *episodic* autobiographical memories in response to emotion-related cue words. Results showed that reduced specificity of memories on the AMT was associated with an increased frequency of trauma-related flashbacks but with reduced use of effortful avoidance to deal with trauma-related intrusions in the day-to-day. Study 2 examined retrieval of *semantic* autobiographical information from previous lifetime periods in groups of cancer survivors with posttraumatic stress and healthy controls. The cancer survivors were able to generate fewer specific semantic details about the personal past compared to the controls. The more symptomatic survivors showed the greatest memory impairment. The data from both studies are discussed in terms of compromised access to specific autobiographical material in distressed trauma survivors reflecting a process of affect regulation.

## INTRODUCTION

One of the dominant psychological processes implicated in posttraumatic stress disorder (PTSD) is autobiographical memory (Brewin, 2007). A key symptom of the condition is intrusive recollection of the trauma itself (APA, 1994). Furthermore, such intrusions often take the form of sensory-laden, highly emotive flashbacks and reliving experiences (Brewin, Dalgleish & Joseph, 1996). Intriguingly, despite such vivid remembering of the trauma in all of its detail, exposed individuals experiencing such symptoms often find it relatively difficult to access the specific details of non-trauma related aspects of their autobiography. For example, their autobiographical recall of past episodes in response to cue words in laboratory tasks tends to be relatively generic, rather than focusing on individual events (see Moore & Zoellner, 2007; Williams et al., 2007, for reviews). This article reports two studies that investigate aspects of this phenomenon of reduced autobiographical specificity in trauma survivors. The first study uses the aforementioned cue word methodology (the Autobiographical Memory Test [AMT]; Williams & Broadbent, 1986) and examines, for the first time to our knowledge, how performance on this episodic memory task relates to *individual* symptoms of PTSD. The aim is to test specific theoretical hypotheses about the genesis of the over-generality effect in the disorder. The second study examines whether this difficulty in accessing specific episodic autobiographical material in those with significant post-traumatic stress is evident in memory for *semantic* information about one's autobiographical past as assessed by the Autobiographical Memory Interview (AMI; Kopelman, Wilson & Baddeley, 1989;1990) in groups of cancer survivors with posttraumatic stress, and healthy controls.

STUDY 1: THE RELATIONSHIP BETWEEN SPECIFICITY OF AUTOBIOGRAPHICAL MEMORIES AND INDIVIDUAL SYMPTOMS OF PTSD IN REFUGEES

In the prototypical study using the AMT, Williams and Broadbent (1986) asked parasuicidal and non-parasuicidal participants to generate autobiographical memories to a series of positive and negative words. The intriguing aspect of their results was the finding that parasuicidal individuals found it relatively more difficult to generate specific personal memories (i.e. memories of events that happened at a given time on a given day). Instead, they tended to produce generic summaries that conflated several events from their past. So, for example, to a cue word such as 'party' the parasuicidal patients were more likely to respond generically - "I never enjoy parties" - than with a specific memory - "I went to a terrible party last Friday".

Since this initial research, the finding of reduced autobiographical memory specificity (reduced AMS) on the AMT has been replicated many times with a variety of different forms of psychopathology including depression (e.g. Brittlebank, Scott, Williams, & Ferrier, 1993), Borderline Personality Disorder (e.g. Startup et al., 2001, though see Kremers, Spinhoven & van der Does, 2004), and Eating Disorder (e.g. Dagleish et al., 2003).

As noted in the Introduction, an important and consistent finding in this literature has been of a significant relationship between reduced AMS and a history of psychological trauma (see Moore & Zoellner, 2007, for a review). For example, individuals with clinical depression or an eating disorder, who report a history of abuse, are more likely to find it difficult to retrieve specific autobiographical memories than those without an abuse history (e.g., Dagleish et al., 2003; Kuyken & Brewin, 1995; though see Kuyken, Howell & Dagleish, 2006). Similarly, in mixed diagnosis and community samples, a history of trauma (including non-abuse trauma) is associated with reduced AMS (e.g. de Decker, Hermans, Raes, & Eelen, 2003; Henderson, Hargreaves, Gregory, & Williams, 2002).

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This relationship between trauma history and reduced AMS has inspired the theoretical hypothesis that AMS represents a cognitive strategy to block or disrupt access to the details of distressing autobiographical events such as traumas. This 'affect regulation hypothesis' (e.g. Williams et al., 2007; Williams, Stiles & Shapiro, 1999) therefore provides an account of why individuals with a history of trauma will show reduced AMS compared to those without such a history. A further prediction of the affect regulation hypothesis is that, among traumatized individuals, those who are more troubled by their memories of trauma will exhibit relatively reduced AMS. Although this prediction is not without some controversy (see below), it has generally been supported by the existing research data which indicate: first, that higher levels of post-traumatic stress in response to a trauma are associated with reduced AMS (e.g. Kuyken & Brewin, 1995; see Hermans et al., 2004, for a discussion); and, second, that traumatized individuals with either PTSD or Acute Stress Disorder (ASD) show reduced AMS compared to traumatized controls who do not meet criteria for these diagnoses (e.g. Harvey, Bryant & Dang, 1998; McNally, Lasko, Macklin & Pitman, 1995, though see Kangas, Henry & Bryant, 2005).

However, to date there has been relatively little research on exactly which aspects of the post-traumatic stress response are most closely linked to AMS. The best data we have are from studies (e.g. Kuyken & Brewin, 1995) that have looked at more global constructs such as self-reported intrusiveness or avoidance of trauma memories, using the relevant subscales of the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979). To our knowledge no study has examined the relationship between reduced AMS and *individual* PTSD symptoms, in a sample of participants diagnosed with the disorder. This seems important as understanding exactly which PTSD symptoms relate to AMS will help to clarify the role of AMS in terms of affect regulation. The aim of Study 1, to recap, was therefore to examine for the first time the relationship between individual PTSD symptoms and AMS in a group of

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individuals meeting criteria for a DSM-IV diagnosis of PTSD (American Psychiatric Association [APA], 1994).

The fact that *higher* levels of post-traumatic stress symptoms are associated with reduced AMS (e.g. Kuyken & Brewin, 1995) might be viewed as somewhat paradoxical. If reduced AMS is effective as a form of affect regulation then one might have expected *reduced* levels of symptomatology in those with reduced AMS as for these participants there should be compromised access to specific memories of distressing events. However, it is important to remember that reduced AMS is a function of effortful retrieval of autobiographical memories to word cues in an experimental task - the AMT. Contemporary models of autobiographical memory (e.g. Conway & Pleydell-Pearce, 2000) propose that such effortful (and hierarchical) memory retrieval processes are supplemented by a direct, automatic route to specific memories in response to pertinent cues. It may therefore be the case that reduced AMS indexes a resistance to accessing specific memories via effortful hierarchical search, while having little or no impact on automatic and intrusive recollection of distressing events via this second retrieval route (Dalgleish, et al., 2007; Golden, Dalgleish & Mackintosh, in press; Hauer, Wessel, Geraerts, Merckelbach & Dalgleish, 2006; Williams et al., 2007). If it is the case that reducing distress to traumatic memories of trauma is what drives reduced AMS, and that those most troubled by distressing trauma memories will exhibit the greater reductions in AMS, but that AMS has minimal impact on automatic, intrusive recollections of the trauma, then one would predict that in individuals with symptoms of posttraumatic stress, greater automatic and intrusive reexperiencing of the trauma should be particularly associated with reduced AMS.

To date, this specific prediction has not been empirically examined in individuals with PTSD as the existing studies have focused on the broader constructs of reexperiencing and

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avoidance symptomatology (e.g. as on the Impact of Event Scale), which do not delineate broadly automatic from non-automatic processes (e.g. Kuyken & Brewin, 1995).

A further prediction of the affect regulation hypothesis might be that reduced AMS reflects just one of a repertoire of avoidance or defensive strategies that distressed trauma survivors may seek to employ (Hermans, DeFranc, Raes, Williams & Eelen, 2005). This analysis would predict that reduced AMS would also be positively correlated with those symptoms of PTSD reflecting controlled avoidance of the trauma and its sequelae.

We therefore predicted negative correlations in the present preliminary study between AMS and those DSM-IV PTSD symptoms (APA, 1994) that index automatic and intrusive recollection of the trauma - namely, symptoms B1 (intrusive thoughts and images of the trauma) and B3 (flashbacks of the trauma) - and those symptoms reflecting the exertion of controlled avoidance - namely symptoms C1 (efforts to avoid thoughts, feelings, and conversations) and C2 (efforts to avoid activities, places or people) - in our sample of traumatized individuals with PTSD. As we were particularly interested in the effects of PTSD symptoms on AMS, and because AMS is known to be strongly influenced by depressed mood (Williams et al., 2007), we partialled out level of depressed mood for each analysis.

### *Method*

#### *Participants*

The participants were a community sample of 24 Kosovan Albanians and 13 Bosnians, all of whom had been granted leave to remain in the United Kingdom under the United Nations High Commission for Refugees group programs, meaning that none of the participants had given or would have to give accounts of his/her experiences to gain refugee status. Nineteen were men and 18 were women; the mean age was 38.5 years (SD 14.72; range 18 - 64). PTSD diagnosis was determined using a non-structured clinical interview

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supplemented by versions of the Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox & Perry, 1997), see below.

### *Materials and Measures*

#### *Autobiographical Memory Test (AMT).*

The AMT was administered with the assistance of an interpreter, who had been instructed in the purpose and nature of the task, using cards with cues written in Bosnian or Kosovan Albanian. Five positive and five negative cue words from Brittlebank et al. (1993), matched for frequency and emotionality in English, were translated into Bosnian and then back-translated to English. Only words which back-translated unambiguously to the original English word were used. The same ten words were subsequently translated into Kosovan Albanian. The five positive cues were: *happy, proud, faithful, tender, friendly* (Bosnian translations: *sretan, ponosan, vijeran, njezan, prijateijski*; Kosovan Albanian translations: *gezuar, kremar, besnik, tendosun, shogrueshen*). The five negative cues were: *tired, ashamed, hopeless, sad, weakness* (Bosnian translations: *umoran, posramljen, beznadni, tuzan, slabost*; Kosovan Albanian translation: *lodhur, turperuan, pashpresi, pikellim, lige*).

Participants were instructed that they would be read ten words and that the researcher was interested in specific memories. They were told that the memories could be recent or distant, interesting or trivial. The need for specificity was repeated, and an example given. The test did not proceed until the participant had given a specific memory for at least two practice items. Participants were given 30 seconds to retrieve a specific memory. If the first memory was not specific, a standard prompt was given - "can you remember a specific event?".

The first retrieved memories were coded as to whether or not they were specific. Two raters completed this task for all participants. Intraclass correlation estimates ranged from 0.83 to 0.92 for scoring of specific memories. Non-specific memories were coded as either

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categoric, extended, semantic associates or omissions in line with existing studies in this area (e.g. Dalgleish et al., 2003). Only specific memory data are reported here. However, the pattern of results was the same if numbers of overgeneral memories (categoric plus extended plus associates) were substituted into the analyses.

*The Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox & Perry, 1997).*

The PDS, provides a questionnaire-derived diagnosis of PTSD and also a severity/frequency score (0-3, with zero indicating that the symptom is not present) for each of the 17 DSM-IV PTSD symptoms (APA, 1994), giving a total score from 0-51. However, as the present sample all had PTSD according to the PDS (minimum of 6 symptoms endorsed with a particular spread across the PTSD criteria), the resultant range was from 6-51. The PDS has good internal consistency and test-retest reliability, and good agreement with the Structured Clinical Interview for DSM-IV (SCID) PTSD diagnosis in 230 participants with a wide variety of trauma, with good specificity and sensitivity (Foa et al., 1997). Versions of the PDS that had been translated into Bosnian (Weine et al., 1998) and Kosovan Albanian (Turner, Bowie, Shapo, & Yule, 2003) using standard back translation procedures, were used.

### *Procedure*

Participants were interviewed twice with an interpreter by JH. The time between interviews ranged from 3-32 weeks. At the first interview the PDS and non-structured clinical interview were administered. At the second interview participants were given the AMT and asked to complete a translated form (Perrin, 2000; Turner et al., 2003) of the Beck Depression Inventory (BDI; Beck, Mendelson, Mock & Erbaugh, 1961) – also translated using standard translation and back translation techniques - to assess current level of depressive symptoms.

### *Results*

The demographic characteristics, PTSD symptom scores on the PDS, BDI scores, and

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AMS variables for the sample are presented in Table 1.

### *Symptoms of PTSD and the AMT*

Our hypotheses were for there to be negative partial correlations between AMS and number and severity of those Criterion B symptoms indexing intrusive thoughts and images (B1) and flashbacks (B3), and those Criterion C symptoms reflecting effortful avoidance (C1 and C2), with depressed mood partialled out. The relevant correlations are reported in Table 2. We also report correlations between the three symptom clusters of PTSD on the PDS (reexperiencing, avoidance, and hyperarousal) and AMT performance, as these clusters map most closely onto the previous literature that has looked at correlations between the avoidance and intrusion subscales of the IES and AMT performance (Williams et al., 2007). However, given the significant differences in composition between the IES subscales and the respective PTSD symptom clusters (see Discussion) we had no strong hypotheses regarding these 3 analyses which must therefore be regarded as exploratory. Consequently, we used a Bonferroni corrected level of  $\alpha = .017$ .

As can be seen from the table, intensity/frequency of flashbacks was negatively associated with AMS, as predicted, with higher intensity and frequency of flashbacks related to lower levels of specificity on the AMT (with depression partialled out), in line with our hypothesis. However, there was no significant relationship between AMS and symptom B1 (intrusive thoughts and images). Contrary to our expectations, symptoms C1 and C2 (effortful avoidance) were *positively* associated with AMS, with greater self-reported effortful avoidance being associated with greater specificity on the AMT. There were no significant correlations between the Criteria B, C or D symptom clusters.

### *Discussion*

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The aim of Study 1 was to examine the relationship between particular PTSD symptoms and reduced autobiographical memory specificity (reduced AMS) on the Autobiographical Memory Test (AMT). The results showed, first, that frequency/severity of flashbacks of the trauma (PTSD symptom B3; APA, 1994) was significantly negatively associated with AMS with more flashbacks being associated with reduced AMS and, second, that effortful avoidance (PTSD symptoms C1 and C2; APA, 1994) was positively associated with AMS with more avoidance relating to greater specificity, these effects were present after partialling out current levels of depression as assessed by the BDI. There were no other significant correlations.

This finding of a significant association between flashback frequency and reduced AMS is in line with both the affect regulation hypothesis and executive functioning accounts of performance on the AMT as outlined in the Introduction. However, the failure to find support for our hypothesized association between symptom B1 (intrusive thoughts and images) in PTSD and AMS is puzzling. It is possible that the failure to obtain significant results in the present study is due to the use of a PTSD-only sample (rather than a trauma-exposed sample) where the range of symptom levels is narrower and/or a function of limited power due to the relatively restricted sample size. Another possibility is that the individual items of the PDS may vary considerably in their psychometric properties (to our knowledge, there are no data available on this issue) and it may be that item B1 has differential validity in some way relative to other items. This is a limitation of the present methodological approach.

Another alternative is that the gap between assessment of PTSD symptomatology and completion of the AMT (which was often several months) obscured a significant relationship. This seems less probable as all but 3 of the present sample had PTSD for more than three years, indicating that any major change in levels of symptomatology over the relatively short interval between testing sessions was unlikely (the PDS has a strong test-retest reliability, in

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chronic samples; Foa et al., 1997). Furthermore, partialling out time between testing sessions did not substantially change the pattern of results (for example, the three originally significant findings remained significant or very near-significant with time partialled out:  $p$ 's  $> .28$ ,  $P$ 's  $< .06$ ). Nevertheless, the study would have been considerably improved if the PDS and the AMT had been completed in the same session and the results must therefore be taken as preliminary.

It is also interesting to consider the present data in the context of previous findings of significant negative relationships between AMS and the broader constructs of intrusion and avoidance (as usually measured by the respective subscales of the Impact of Event Scale [IES]) in traumatized samples (e.g. Kuyken & Brewin, 1995). Two questions need addressing: a) why were there no significant relationships between AMS and the re-experiencing symptoms cluster (Criterion B symptoms) and the avoidance symptom cluster (Criterion C symptoms) in the present dataset? b) How can we account for the finding of a significant *positive* relationship between symptoms C1 and C2 and AMS in the present data, given the finding of a negative relationship when the IES avoidance subscale has been used in prior studies? There are a number of possible factors that speak to these questions.

First, the content of the questions included in the intrusion and avoidance subscales of the IES does not map directly onto the respective symptom clusters in PTSD that were used here. In particular, the intrusion subscale of the IES is very heavily weighted towards automatic intrusive experiences, including questions tapping phenomena that are not in the DSM-IV e.g. "I had trouble falling asleep because of pictures or thoughts that came into my mind". If it is the case that AMS only relates to automatically-generated intrusions of the trauma and not other aspects of reexperiencing, it may be that this preponderance of items assessing automatic intrusions on the IES accounts for the significant associations between

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the intrusion subscale and AMS in previous studies, despite the non significant relationship between the DSM-IV re-experiencing symptoms taken together and AMS in the present data. Similarly, the IES avoidance subscale does not map closely onto the DSM-IV Criterion C symptoms that were used here. Again, there are IES items that assess experiences not in the PTSD diagnosis in DSM-IV e.g. "I felt as if it hadn't happened or it wasn't real". It may be that this discrepancy could account for the different patterns of data across studies. Secondly, the IES is a measure of frequency of symptoms and experiences whereas the PDS used in the present study assesses frequency and severity and this may have affected the results. Finally, the gap between testing sessions (as already noted) may have washed out some putatively positive findings although, when the number of days between testing sessions was partialled out of the analyses, the results were unaffected.

Although the current findings with the PTSD symptoms of controlled avoidance are not readily explained by the affect regulation hypothesis, they may be partially consistent with an executive account of AMT performance (e.g. Dalgleish et al., 2007). The proposal here is that individuals with depression or a history of trauma have difficulty inhibiting unwanted, automatically-generated distracting information (e.g. Barrett, Tugade & Engle, 2004; Hasher & Zacks, 1979). This difficulty accounts, to some extent, for the fact that such individuals are troubled by intrusive thoughts and memories of past distressing events. But can also potentially explain reduced AMS on the AMT.

Specifically, the suggestion is that effortful hierarchical search of the autobiographical memory database for specific memories to word cues on the AMT will inevitably automatically activate other (non-specific) autobiographical mental representations (e.g. categorical and extended memories, semantic associates of the cue word, and so on). These 'distracters' therefore need to be inhibited in order for the search for a specific memory to proceed. However, if there is difficulty with inhibiting automatically-generated distracting

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information (as there is in depression and those with a history of trauma; see Barrett et al, 2004) then there is a greater likelihood that these distracters generated on the AMT will be proffered as memory responses on the task, thus leading to fewer specific memories overall; in other words, depressed and traumatized individuals will exhibit reduced AMS (Dalgleish et al., 2007). This view of AMT performance, as with the affect regulation hypothesis, would also predict a significant association between reduced AMS and higher levels of automatic and intrusive recollection of the trauma in individuals with PTSD.

However, the executive approach would also indicate that individuals who were very effective at exercising cognitive control, for example in the execution of controlled avoidance, would also perform well on the AMT, generating a higher proportion of specific memories. It may therefore be the case that the greater endorsement of the avoidance symptoms of PTSD assessed here actually reflects greater success at exerting controlled avoidance to deal with distressing trauma-related information and hence one might anticipate that it would be related to higher specificity on the AMT.

In sum, to the best of our knowledge, the current study is the first to consider individual symptoms of posttraumatic stress/PTSD in relation to AMS. Given that theoretical analysis of the AMS suggests that the effect may relate more strongly to some PTSD symptoms than others, and give the differential profile across symptoms in the present data, one can conclude that this symptom-level approach is a potentially fertile one. In terms of specifics, the present study also provided the first evidence that we know of to suggest that frequency/severity of flashbacks to the trauma and controlled avoidance of the trauma in individuals with PTSD are significantly related to AMS. However, this was a preliminary study with some methodological limitations (as noted above) and future research would benefit from seeking to replicate these effects with more focus on comprehensive measures of

automatic and effortful recollection and control of the trauma and on how these two separate processes relate to AMS.

STUDY 2: MEMORY FOR SEMANTIC FACTS FROM CHILDHOOD AND ITS  
RELATIONSHIP TO PTSD SYMPTOMS IN SURVIVORS OF CANCER

*Introduction*

Study 2 sought to build on the work on autobiographical memory specificity and trauma and investigate whether there were difficulties accessing semantic facts about the past in trauma-survivors with posttraumatic stress and the degree to which any such difficulty relates to levels of posttraumatic symptomatology.

Theoretical conceptualisations of the relationship between self and memory propose close relationships between autobiographical memory and the “conceptual self” (Conway, 2005; Conway, Meares, & Standart, 2004), which includes semantic information about the self. According to such models, if a current goal of the ‘working self’ involves avoiding access to specific personal information from the past of a distressing nature and this manifests itself as a more generic form of avoidance (Williams et al., 2007), then one might expect any resultant reduced specificity to be evident when examining access to semantic self-related information from the past.

There have been surprisingly few studies investigating this issue in the literature, given the plethora of studies examining the over-generality effect in episodic recall that is the focus of Study 1 (Williams et al., 2007). In an initial study in this area, Melchert and Parker (1997) asked 429 adults meta-autobiographical questions about their childhood - for example, questions about whether they had been abused and about the quality of their memories from childhood. The authors found no significant association between exposure to trauma and vaguer childhood memories.

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However, although this study gives us some insight into trauma-exposed individuals' perceptions of their memory for childhood, it does not directly assess the accuracy or specificity of such memories. The one study that we are aware of that did attempt to address this issue examined memory for autobiographical facts in a small sample of adolescents with a history of trauma ( $n= 10$ ), compared with non-trauma-exposed controls ( $n= 17$ ), using a bespoke memory test (Meesters, Merckelbach, Muris & Wessel, 2000). The results revealed that the trauma-exposed group indeed possessed poorer semantic memory for childhood than the controls, despite showing comparable performance on a measure of story recall. These data provide preliminary support for the view that reduced specificity of autobiographical memory extends beyond the episodic domain to include semantic facts about the personal past, thus validating anecdotal reports of 'amnesic gaps' about childhood in trauma-exposed individuals (e.g. Courtois, 1988). The present study sought to replicate this finding, this time with adult survivors, accessing memories from the remote past as well as relatively recent memories (as childhood memories would have been for the young adolescents in the Meesters et al. study), using a standardised memory measure - the Autobiographical Memory Interview (AMI; Kopelman et al., 1989), and examining the relationship between memory performance and symptoms of posttraumatic stress.

The study recruited a sample of cancer survivors as the trauma-exposed group. A large number of studies has indicated a significant incidence of PTSD in adults who suffer from cancer (see Kangas, Henry & Bryant, 2002, for a review) and, even for cancer sufferers who do not meet criteria for a formal diagnosis of PTSD, studies using the Impact of Event Scale (IES), have shown a high incidence of intrusive and avoidance symptoms (e.g. Belicker et al. 2000; Hampton & Frombach, 2000). Furthermore, cancer survivors suffering from posttraumatic stress have been found to exhibit reduced specificity in episodic autobiographical memory using the AMT, as used in the present Study 1 (Kangas, Henry &

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Bryant, 2005). For these reasons, cancer survivors were deemed to be a suitable group with whom to study the effects of trauma on semantic aspects of autobiographical memory (although it must be noted that the present sample was not a PTSD sample).

### *Method*

#### *Participants*

The patient group consisted of 28 adult women cancer survivors between 25 to 45 years of age who had been treated for cancer and were at least two years post-therapy. Patients were recruited in Tehran, Iran. This group was matched by age, IQ and socioeconomic status with a sample consisting of 28 healthy women as the control group. All participants completed self-report questionnaires and participated in interviews assessing diagnostic status and autobiographical memory. Patients could not be recruited from hospitals due to the absence of a sufficient follow-up program within the Iranian healthcare system. Moreover, inclusion criteria could not be limited to a single diagnosis since identification through registries was not possible. Therefore, an opportunistic sample of patients with various types of cancer such as leukaemia, lymphoma and breast cancer, was recruited through oncologists who were in contact with their former patients. Members of the control group were recruited from the same socioeconomic strata as the patient group. Control participants had no known history of psychiatric or physical problems.

#### *Measures*

*Impact of Event Scale-Revised (IES-R; Weiss & Mannar, 1997).*

The IES-R is a 22 item self-report questionnaire measuring frequency of symptoms of posttraumatic intrusion, avoidance and hyperarousal (on separate subscales) in the previous week. Internal consistency is high (Cronbach's Alpha 0.79 - 0.92) and test-retest reliability

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good. The IES-R possesses good validity as a measure of posttraumatic distress, though it should be emphasized that it is not a measure of PTSD. A Farsi version of the IES-R, developed using standard translation and back-translation techniques, was used in the present study. THE IES-R was completed with respect to the experience of cancer.

*Autobiographical Memory Interview (AMI, Kopelman, et al. 1989; 1990).*

The AMI provides an assessment of the participant's personal remote (retrograde) memory. The semantic portion of the AMI was used in the present study. The AMI assesses semantic autobiographical memory through a structured interview concerning autobiographical facts (e.g., where one lived during childhood or adolescence). The semantic component of the AMI examines three time periods: childhood (e.g. names of schools or teachers or friends), early adult life (e.g. name of first employer), and more recent facts (e.g. holidays). Scores are give based on the level of accurate detail in the responses. For example, Question 3.5 asks for the names of 3 teachers or friends from secondary or high school. One point is given for a correct surname with only ½ point if all that can be remembered is the first name. The range of scores for each lifetime period is 0-21. The AMI was translated into Farsi using standard translation and back-translation techniques.

In the present study we did not include the autobiographical memory sections of the AMI as piloting with this population revealed that participants performed at ceiling on these questions as one might expect in a neurologically intact group (Kopelman et al., 1990).

### *Procedure*

Participants completed the AMI followed by translated versions of the BDI to assess depression, the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983) to assess anxiety, and The Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) as a measure of IQ.

### *Results*

Means and standard deviations for the various self report measures for the patient and control groups are presented in Table 3. As might be expected, the groups differed significantly on the BDI,  $t(52) = 6.88, P < 0.01$ , and state,  $t(52) = 10.98, P < 0.01$ , and trait anxiety,  $t(52) = 9.05, P < 0.0001$ . Cancer patients obtained scores on the IES-R consistent with other studies of adult trauma survivors in Iran (Farahani & Moradi, 1999).

#### *AMI data*

Standardized profile scores for the 3 semantic subtests of the AMI for each group of subjects were separately calculated and are also presented in Table 3. The mean scores for all 3 lifetime periods were within the “acceptable” range (Kopelman, Wilson & Baddley, 1990). A MANCOVA was carried out with the three subtest scores as dependent variables. Group as the between- subjects factor and age and verbal IQ as covariates (as these were both found to correlated with AMI performance). There was a significant multivariate effect of Group, Wilks' Lambda  $F(3, 51) = 4.73, P < .01$ , with the cancer patient evincing worse autobiographical memory scores than the controls. Furthermore, this group difference was significant on all subtests according to the univariate analyses (see Table 3).

Partial correlations were performed between IES-R total scores and the three AMI semantic subtests, with age and verbal IQ partialled out, for the patient group only. The correlations were significant and negative in each case: childhood,  $pr(24) = -.42, P < .05$ ; early adult life,  $pr(24) = -.40, P < .05$ ; recent,  $pr(24) = -.56, P < .01$ . We then examined the relationships between the AMI subscales and the Intrusion and Avoidance subscales of the IES-R. Again all correlations were negative, though not all significant: IESR-Intrusion - childhood,  $pr(24) = -.28, P = .15$ ; early adult life,  $pr(24) = -.41, P < .05$ ; recent,  $pr(24) = -.15, P = .47$ ; IES-R-Avoidance - childhood,  $pr(24) = -.51, P < .01$ ; early adult life,  $pr(24) =$

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-.26,  $P = .20$ ; recent,  $r(24) = -.60, P < .001$ . When BDI was also partialled out, the correlations across the board became non-significant.

### *Discussion*

This second study sought to investigate the relationship between PTSD symptoms and semantic aspects of autobiographical memory in cancer survivors two years after treatment relative to normal controls, using the Autobiographical Memory Interview (AMI). The results showed that cancer survivors with posttraumatic stress retrieved fewer personal semantic memories from across the lifespan and that worse memory was associated with greater posttraumatic stress, even after partialling out age and IQ.

These results extend the findings of Meesters et al. (2000) and indicate that reduced specificity of autobiographical memory is not specific to the episodic domain and is also present in semantic aspects of recollection. Furthermore, the present findings indicate, for the first time to our knowledge, that semantic autobiographical memory performance is correlated with degree of posttraumatic stress in trauma survivors. A limitation of the present study, of course, is the fact that the AMT was also not included. This would have permitted explicit examination of any parallels between reduced specificity of autobiographical episodic memories and of personal semantic information.

There are a number of possible accounts one could offer for the current data. The executive control account outlined in Study 1 would predict poorer performance generally on effortful cognitive tasks. However, it is important to note that the deficit in personal semantic recall reported here survived the partialling out of IQ measured on the WAIS, thus mitigating against a pure executive account. A similar counter-argument can be presented for a motivational hypothesis. In other words, performance is unlikely to have been poorer on the AMI simply because of differential effort or motivation across groups because presumably such differences would have also contributed to the profile of WAIS performance which was

partialled out of the key analyses. This leaves us with the affect regulation view outlined in the introduction to Study 1 (Williams et al., 1999; Williams et al, 2007). As discussed in the introduction to study 2, current conceptualizations of memory, personal semantic knowledge, and the self (e.g., Conway, 2005) are consistent with the notion that putative affect regulation processes, in addition to impeding access to specific episodic information, could impede access to specific semantic information about the autobiographical past, if one goal of the ‘working self’ (Conway, 2005) is to block access to autobiographical material as a form of functional avoidance (Williams et al., 2007).

It is interesting to reflect upon the different patterns of correlations with symptoms in the two studies. In the present study (Study 2), poorer semantic memory for the past was associated with more frequent symptoms of posttraumatic stress on the IES-R, for both the Avoidance and Intrusion subscales. In contrast, reduced episodic specificity in Study 1 was associated with higher frequency and severity of flashbacks but with lower levels of controlled avoidance. At the present time it is difficult to speculate with any conviction about the processes underlying these seemingly different patterns of findings because both the measures of post-traumatic stress and the nature of trauma-exposed populations differed across the 2 studies.

We know that, in contrast to the data from Study 1, when the IES is used as a measure of posttraumatic stress there is in fact a negative relationship between both intrusion and avoidance and degree of episodic memory specificity (see Williams et al., 2007, for a review) in line with the present Study 2 pattern of data. Consequently, we first need to replicate the present Study 1 findings involving avoidance, and examine the relationship between specific PTSD symptoms and semantic autobiographical memory, in order to further interpret the different profiles of correlational data across the 2 studies reported here.

## SUMMARY

The two studies reported here examined aspects of autobiographical memory specificity in trauma-exposed individuals with posttraumatic stress. Study 1 was concerned with the relationship between episodic specificity on the Autobiographical Memory Test (AMT) and the individual symptoms of PTSD in a sample of refugees whereas Study 2 was concerned with levels of semantic memory for the autobiographical past, as assessed by the Autobiographical Memory Interview (AMI), and its relationship to posttraumatic stress symptom frequency in a sample of cancer survivors.

The Study 1 results revealed that reduced episodic specificity, as measured by a standard cue word task, was associated with greater frequency of flashbacks in the refugee sample but with lower levels of controlled avoidance of the trauma. These data were interpreted in terms of both an executive control hypothesis and an affect regulation hypothesis about episodic memory specificity using the cue word task (Dalgleish et al., 2007; Williams et al., 2007).

The Study 2 results revealed that retrieval of semantic aspects of autobiographical memory was indeed impaired in trauma survivors with a past diagnosis of cancer and that degree of impairment was positively associated with levels of both intrusion and avoidance of the trauma. These data were interpreted in terms of putative affect regulation processes in trauma survivors and caution was expressed in interpreting the different patterns of correlational data cross the two studies, given differences in symptom measurement and type of sample.

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Table 1

Demographic characteristics, PTSD symptoms on the Posttraumatic Diagnostic Scale (PDS), self-reported depression, and Autobiographical Memory Test variables, from Study 1.

	Mean	SD
Age	38.51	14.73
Sum of Criterion B scores	9.24	3.52
Intrusions symptom score [B1]	1.73	0.87
Flashbacks symptom score [B3]	1.78	0.92
Cognitive avoidance [C1]	1.73	1.04
Behavioural avoidance [C3]	1.48	1.13
Sum of Criterion C scores	10.57	4.61
Sum of Criterion D scores	8.73	3.35
BDI	25.45	11.48
No. specific 1st memories	3.51	2.43

Note

BDI= Beck Depression Inventory

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Table 2

Partial correlations (unless specified) of PTSD symptomatology, and autobiographical memory specificity, with depressed mood partialled out, in Study 1.

	No. specific 1st memories
Sum of Criterion B scores	-0.01
Sum of Criterion C scores	0.29
Sum of Criterion D scores	0.10
Intrusions symptom score [E1]	0.07
Flashbacks symptom score [B3]	-0.34* ( $P = 0.04$ )
Cognitive avoidance score [C1]	0.54* ( $P = 0.001$ )
Behavioural avoidance [C2]	0.46* ( $P = .006$ )
BDI <sup>a</sup>	-0.24

Note

\* = Statistically significant correlations

a = This is a zero-order correlation

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**Table 3**

Means and standard deviations (SD) of the self-report and memory measures for cancer survivors and controls in Study 2

	Cancer Survivors		Normal Controls	
	N=28		N=28	
	M	SD	M	SD
Age	37.57	5.9	34.43	6.62
IQ	110.82	7.37	107.89	7.00
BDI***	19.93	8.84	10.11	4.90
STAI (state)***	38.21	8.05	27.39	6.10
STAI (trait)***	44.79	7.87	29.39	5.92
Total IES-R	46.68	6.93	-	-
AMI childhood***	18.03	1.68	19.21	1.52
AMI early adult***	18.85	1.20	19.87	1.30
AMI recent*	19.26	1.31	19.92	1.25

Note

BDI - Beck Depression Inventory; STAI = Spielberger State Trait Anxiety Inventory; IES-R = Impact of Event Scale - Revised; AMI = Semantic section of Autobiographical Memory Interview.

\*\*\* = groups differ at  $P < .001$

\* = groups differ at  $P < .05$

