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Trauma-centred identity and autobiographical memory in posttraumatic stress disorder (PTSD)

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Abstract

Posttraumatic stress disorder is a prevalent and disabling disorder that can occur following experience of trauma. Contemporary clinical models of PTSD assert that memories for trauma are poorly elaborated and inadequately integrated into autobiographical memory (AM). Recent work of cognitive psychologists suggests, however, that trauma memories remain highly accessible and form a cognitive reference point for the organisation of autobiographical knowledge, leading to the development of trauma-centred identity. The current study sought to explore further the relationships between PTSD symptoms, the phenomenological properties of AM for trauma, and trauma-centred identity. A community sample of 82 participants (male, n = 24; mean age = 36.10 years, SD = 10.82) was recruited. A within-subjects, correlational design was employed. Participants completed online questionnaires relating to PTSD symptoms, the phenomenological properties of a trauma memory and negative memory, and centrality of event to identity. Participants also provided written narratives of both a trauma and negative event. Differences between traumatic and negative memories, and relationships between trauma memory features and both PTSD and centrality were assessed using computerised textual analysis and self-report measures. Results indicated that trauma memories were significantly less coherent, less detailed, and contained fewer spatial references but more cognitive process terms than negative memories. PTSD symptoms correlated significantly with fragmentation of trauma memories and with use of the present tense in trauma narratives. A sense of reliving when remembering trauma and use of present tense were both significantly associated with centrality of event. Results were thus primarily consistent with contemporary clinical theories of PTSD with certain

elements of the centrality position also demonstrated. Findings were discussed in relation to the study's methodological limitations, including difficulties encountered through LIWC's lack of consideration of context when counting lexical items. Theoretical implications regarding the measurement of constructs such as fragmentation were outlined. Findings supported current treatment guidelines.

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CHAPTER 1

1 Introduction

1.1 Overview

Posttraumatic stress disorder (PTSD) is a prevalent and disabling disorder that can occur following exposure to trauma (American Psychiatric Association, 2013). Trauma-focussed psychological therapy is currently recommended as the most effective treatment for PTSD (NICE, 2005). Such therapeutic interventions have been developed from prominent clinical models of the disorder (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa & Rauch, 2006). These conceptualisations of PTSD highlight several psychological processes as implicated in the development and maintenance of the disorder. One such process that has generated much debate is autobiographical memory (AM), and in particular, the contextualisation and integration of trauma memories within AM. Leading clinical models of PTSD (e.g., Ehlers & Clark, 2000) assert that memory for trauma is poorly elaborated and inadequately integrated within AM. Cognitive psychologists (e.g., Berntsen & Rubin, 2006, 2007) have recently proposed, however, that traumatic memory is invariably clearer and better remembered than non-traumatic memory, resulting in the development of 'trauma-centred identity.' Empirical findings regarding the disorganisation and fragmentation of trauma memories, properties deemed to illustrate their inadequate integration within AM, are mixed (e.g., O'Kearney & Perrott, 2006). It has been suggested that methodological differences in how information about the trauma memory is obtained (self-report versus textual analysis) may determine whether or not certain properties of memory are established (e.g., Brewin, 2013). To date, there exists little evidence pertaining to the relationships between PTSD symptoms,

trauma-centred identity, and the phenomenological properties of trauma memory. Moreover, few studies have examined trauma memory features using both self-report and textual analysis measures. The current study thus aimed to explore trauma-centred identity, AM, and posttraumatic adjustment using both subjective (self-report) and objective (textual analysis) measures.

This introductory chapter begins with an overview of PTSD and AM. Prominent clinical theories and models of PTSD are outlined, and current practice regarding treatment of the disorder described. The construct of AM and its role within PTSD is explored with recourse to Conway's (2005) Self-Memory System model, while Ehlers and Clark's (2000) cognitive model and Brewin et al.'s (1996) Dual Representation Theory (DRT) provide theoretical frameworks for the conceptualisation of the disorder. These clinical models are contrasted with the 'centrality' position put forward relatively recently by cognitive psychologists (Rubin, Berntsen, & Bohni, 2008). Empirical evidence supporting each theory of PTSD is outlined and critiqued while strengths and limitations of the models in question are acknowledged. The chapter concludes with a rationale for the current study and outlines the study's research questions.

1.2 Posttraumatic Stress Disorder

1.2.1 Definition of trauma and its prevalence.

The American Psychiatric Association (APA, 2013, p. 271) defines a traumatic event as one involving "exposure to actual or threatened death, serious injury or sexual violence." Examples of trauma include events such as serious road traffic accidents, exposure to war, threatened or actual physical or sexual assault, torture, and natural or human-made disasters (APA, 2013). Both direct experience and witnessing others'

experience of such events may constitute a trauma (APA, 2013). Life-time prevalence rates for experiencing a trauma are estimated at approximately 70 per cent in the general population (Resick, 2001). While the majority of individuals who experience a trauma adjust remarkably well and do not suffer long-term adverse effects, a significant number of trauma survivors develop posttraumatic stress disorder (PTSD). Indeed, Kessler and colleagues (1995) found that the risk of developing PTSD after a traumatic event is 8.1 per cent for men and 20.4 per cent for women.

1.2.2 Clinical features of PTSD.

PTSD is a debilitating psychological disorder characterised by four core symptom groups: intrusion, avoidance, negative alterations in mood/cognitions, and arousal (APA, 2013). Recurrent, intrusive, involuntary re-experiencing of the traumatic event is considered the hallmark symptom of PTSD. Such intrusive symptoms may take the form of thoughts, images, sensory experiences, marked physiological reactions to internal or external cues relating to the trauma, flashbacks, nightmares, and dissociative experiences (APA, 2013; Brewin & Holmes, 2003). Avoidance symptoms, such as avoidance of trauma-related situations, thoughts and cues, further characterise PTSD. Alterations in cognitions and mood associated with the trauma include: an inability to remember an important aspect of the event; fragmented, disjointed voluntary memories of the trauma; persistent, exaggerated, negative cognitions, beliefs and expectations about oneself, others and the world, and/or about the causes and consequences of the traumatic event; feelings of detachment or estrangement from others, and a persistent inability to experience positive emotions. Alterations in arousal or reactivity associated with the trauma may manifest as irritable behaviour and angry outbursts, hypervigilance, problems

with concentration, and sleep disturbance (APA, 2013). In order to qualify for a diagnosis of PTSD, these symptoms must be present for more than one month following the traumatic event and must be causing clinically significant distress or impairment in functioning (APA, 2013).

1.2.3 Epidemiology of PTSD.

The universality of PTSD as a response to trauma, affecting people from diverse cultural backgrounds and individuals who have experienced different types of traumatic events, is increasingly being documented in the literature (e.g., Foa, Keane, Friedman, & Cohen, 2009; Mehta, Vankar, & Patel, 2005). Twelve-month prevalence rates for PTSD vary nonetheless across studies and across cultures from 1.3 per cent in Australia (Creamer, Burgess, & McFarlane, 2001) to 3.5 per cent in the United States (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005). In the United States, results from a National Comorbidity Survey (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) indicate a lifetime prevalence of approximately 6.8 per cent, with higher figures for women (9.7 per cent) than men (3.6 per cent). Research has shown that survivors of trauma in developing countries, particularly those experiencing warfare and political unrest, suffer increased levels of PTSD (e.g., Margoob et al., 2006), while ethnic minority groups and asylum-seekers in Western countries have also been shown to demonstrate significant difficulties with posttraumatic adjustment (Norris, Perilla, Riad, Kaniasty, & Lavizzo, 1999).

Empirical findings indicate that responses to trauma and the subsequent development of PTSD may vary as a function of the type of trauma experienced. For example, prevalence rates of PTSD in rape survivors are estimated to be 30 per cent (e.g.,

Breslau, 2001; Foa & Street, 2001;) and figures are similarly high among combat veterans (Richardson, Frueh, & Acierno, 2010), while rates of up to 50 per cent have been found in survivors of torture (Yehuda, McFarlane, & Shalev, 1998; see Johnson, Maxwell, and Galea, 2009, for a detailed review of the epidemiology of PTSD).

High rates of comorbidity have been shown with 80-85 per cent of sufferers of chronic PTSD (lasting longer than six months) meeting criteria for at least one other psychiatric diagnosis (APA, 2013; Creamer at al., 2001; Kessler et al., 2005). Comorbid anxiety disorders, particularly panic disorder and social phobia, are especially common, as are depression, bipolar disorder and substance use disorders (APA, 2013; Chung, Symons, Gilliam, & Kaminski, 2010; Owens, Steger, Whitesell, & Herrera, 2009). Research has also demonstrated high levels of comorbid physical health problems, particularly chronic illness and chronic pain (e.g., Otis, Keane, & Kerns, 2003; Schnurr & Green, 2004) and impaired immune functioning (e.g., Uddin et al., 2010). Data from several sources suggest that individuals who continue to meet PTSD criteria approximately six months post-trauma are likely (in the absence of effective treatment) to show a chronic course, with symptoms lasting for many decades (e.g., Kessler et al., 2005).

1.2.4 Socio-economic impact of PTSD.

Given the debilitating nature of PTSD and high rates of comorbidity associated with the disorder, it is unsurprising that it engenders substantial social, as well as personal costs. PTSD can significantly impair an individual's interpersonal functioning and capacity for occupational engagement (APA, 2013). In the UK, the National Institute for Health and Clinical Excellence (NICE) estimates the overall cost of 'neurotic disorders'

to the National Health Service (NHS) at over £5,600 million per year (NICE, 2005). Moreover, it is estimated that 91 million working days each year in the UK are lost through stress-related illness, at a cost to industry of £3,700 million (NICE, 2005). In 2003-2004, social and welfare costs of claims for incapacitation and disablement from severe stress and PTSD amounted to £103 million, £55 million more than was claimed five years previously (NICE, 2005). As such, it is indisputable that PTSD presents a considerable burden for individuals, families, communities, the NHS, and society as a whole.

1.2.5 Psychological processes implicated in PTSD.

PTSD is associated with disturbances in an extensive range of psychological processes and phenomena, including memory, attention, beliefs, appraisals, coping strategies, social support, and identity (see Brewin, 2011; Brewin & Holmes, 2003). Of these, the well-documented 'paradox' of memory disturbance in PTSD (i.e., enhanced involuntary, intrusive trauma memories but impoverished voluntary retrieval) is thought to distinguish the condition from other psychological disorders (Brewin, 2011). Indeed, PTSD has long been considered a disorder of memory, an understanding reflected in both classical and contemporary psychological theories of the condition (Brewin, 2011; van der Kolk, McFarlane, & Weisaeth, 2007). Research investigating the complex interrelations between memory and PTSD has highlighted the multifaceted nature of the phenomenon. Consequently, this has led to many questions regarding those specific aspects of memory that are altered in PTSD, including those which may be pre-existing vulnerability factors for the disorder, and those which influence how PTSD develops and is maintained following a traumatic event (Brewin, 2011).

Whilst several aspects of the complex relationship between memory and trauma have been elucidated, there remain certain controversies and areas of significant debate (Brewin, 2011). One such topic that has received considerable attention and prompted much research and discussion is that of autobiographical memory (AM). AM is personal memory for facts and events concerning the self (Conway, 2005). Current theorising and research on the subject continues to explore questions such as whether or not traumatic memories are inherently different from other types of autobiographical memories, whether memory for trauma is enhanced or impaired compared to memory for non-traumatic events, whether memories of traumatic events can be forgotten and then recalled later in life, and whether special mechanisms, such as repression or dissociation, underlie such forgetting (Brewin, 2007).

The current study aims to explore the question of whether or not memory for trauma in those with PTSD symptoms is integrated and contextualized within AM, and the implications of this integration (or lack thereof) for posttraumatic adjustment and one's sense of identity. In light of this aim, the following section will explore the concept of AM. Thereafter, currently influential theories and models of PTSD, along with empirical findings supporting each, will be described. The models' different positions regarding the integration of memory for trauma within AM will be highlighted throughout.

1.2.6 Autobiographical Memory (AM).

AM refers to memory for events recollected from an individual's life, drawing on both episodic memory (i.e., memory for personal experiences and events, associated emotions and other contextual knowledge, experienced at a particular time and place,

such as remembering one's fifth birthday party) and semantic memory (i.e., memory of personal knowledge, understandings, and other concept-based knowledge related to the self, such as knowing what secondary school one attended; Rubin, 1988). AM is deemed fundamental to human functioning, essential to an individual's sense of self and to one's ability to remain oriented in the world and pursue goals effectively through learning from past problem-solving experiences (Cohen, 1998; Conway & Pleydell-Pearce, 2000).

1.2.6.1 The functions of AM.

AM serves four key functions: directive, social, self (Bluck, Alea, Haberman, & Rubin, 2005; Pillemer, 1992), and adaptive (Williams, Conway, & Cohen, 2008). The directive function of AM refers to how AM utilises past experiences as a framework for solving current problems and guiding present and future thought and behaviour (see Bluck et al., 2005). The social function of AM involves developing and maintaining social bonds as AM provides material for conversation through which people share meaning and thereby experience a sense of connectedness (Cohen, 1998; Nelsen, 1993; Pillemer, 1998). The self function draws on personal memories to create and maintain a coherent sense of identity over time (Barclay, 1996; Brewer, 1986; Bluck & Levine, 1998; Conway, 1996). Finally, the adaptive function operates by recollecting positive personal experiences to maintain/improve well-being (Williams, Conway, & Cohen, 2008). Whilst only a small number of studies have to date reported empirical evidence of the four functions of AM (e.g., Hyman & Faries, 1992; Pasupathi, Lucas, & Coombs, 2002;), these categories are considered to be both theoretically sound and intuitively logical (for further information about these functions see Bluck et al., 2005).

The self function is of particular pertinence to the current study's exploration of the interrelations between AM and trauma-centred identity. Conway (1996) highlights the importance of AM in its ability to support and promote continuity and development of the self, a function which, in healthy individuals, typically preserves a coherent, stable sense of self over time (Barclay, 1996; Conway, 2005). This relationship between AM and the self is thought to be dynamic and reciprocal; each is both constituted by and constitutive of the other (Conway, 2005). Such an association forms a "coherent system, in which […] beliefs about, and knowledge of, the self are confirmed and supported by memories of specific experiences" (Conway, 2005, p. 595). Likewise, the self influences the encoding, storage, and retrieval of AMs. The self and identity guide or divert attention to/from different objects, events, and feelings, thus regulating the meaning and weight attached to different experiences and how these are interpreted and recorded or discarded (Conway, 2005; Howe, 2004; Wang & Conway, 2004).

1.2.6.2 AM and PTSD.

Importantly, AMs are recalled from the perspective of the current self (Conway, 2005; Conway & Pleydell-Pearce, 2000). Such recollection is essentially a process of *reconstruction* of AMs in keeping with current goals, self-images and self-beliefs at the point of retrieval (Conway, 2005). How an individual experiences their self and identity as a function of such processes is of great significance to the study of the autobiographical remembering of trauma and psychological theories of PTSD (e.g., Brewin, 2011; Ehlers & Clark, 2000). However, as considered further below, the interplay between one's sense of self and AM within the context of the trauma memory is a complex and much-debated phenomenon (Brewin, 2007; 2011).

As noted above, the hallmark symptom of PTSD is the intrusive recollection of AMs of the trauma (Brewin et al., 1996). Paradoxically, this elevated *involuntary* access to memories of the trauma is often accompanied by compromised *voluntary* access to coherent accounts of what happened during traumatic experiences (Brewin, 2011). Hence, the phenomenological properties of trauma narratives, reflecting how trauma memory is perceived and experienced, often include fragmentation, temporal disorganisation, and a predominance of sensory-perceptual features (Brewin 2011; Brewin et al., 1996; Foa, Molnar, & Cashman, 1995; Jelinek, Randjbar, Seifert, Kellner, & Moritz, 2009; Jones, Harvey, & Brewin, 2007; O'Kearney & Perrott, 2006). The models of PTSD, explored further below, assert that these memory disruptions and distortions arise due to the inadequate integration and poor contextualisation of the trauma memory (Brewin et al., 1996; Conway, 2005; Ehlers & Clark, 2000). As a consequence of these processes, it is proposed that the involuntary trauma memory is less associated with verbal access than non-trauma memories, and thus is difficult to retrieve voluntarily and is characterised by particular disruptions in certain phenomenological properties of the trauma memory (e.g., the memory is fragmented and laden with sensory-perceptual features) (Brewin et al., 1996; Conway, 2005).

These AM difficulties have been found to extend beyond the trauma memory to more global autobiographical remembering. For instance, research has found that those with PTSD have significant distortions in their memories of experiences that reflect and inform one's identity. Such empirical studies have demonstrated that those with PTSD tend to retrieve significantly more personal memories and goals that are related to their trauma experience than those who do not develop PTSD, i.e., their identities and personal

memories tend to have become 'trauma-centred' (e.g. Jobson & O'Kearney, 2006, 2008; McNally, Lasko, Macklin, & Pitman, 1995;; Sutherland & Bryant, 2005). A growing number of studies have similarly found a significant connection between alteration in self-concept following trauma and PTSD symptoms (e.g. Berntsen & Rubin, 2006). Such theoretical and empirical explorations of 'trauma-centred' identity have highlighted the ramifications of construing a trauma as central to one's sense of self in terms of the impact it has on one's overall identity and AM in general (e.g., Berntsen & Rubin, 2006; McNally et al., 1995; Sutherland & Bryant, 2005).

Reconciling the trauma memory with previously held assumptions about the self can prove highly problematic; the trauma memory thus greatly affects the self as it dominates mental life while the individual struggles to resolve these discrepancies (Brewin, 2011; Ehlers & Clark, 2000). Certain theorists argue however that the fact that the trauma experience can become central to identity indicates that the trauma memory is not *inadequately* integrated into AM and thus a poorly integrated trauma memory is not fundamental to the development of PTSD, as suggested by the PTSD models (e.g., Brewin & Holmes, 2003; Brewin, 2011; Ehlers & Clark, 2000; Foa et al., 1995). Rather, such theorists assert that the trauma memory is *overly* integrated into one's AM and sense of self and that this *centrality* of the trauma memory lies at the heart of PTSD (Berntsen & Rubin, 2006; Rubin, Bernsten, & Bohni, 2008).

Further consideration of these opposing views necessitates exploration of a number of currently influential psychological theories of PTSD as well as consideration of the neural correlates of the disorder. The following section will therefore commence with a brief outline of findings from neuropsychological research relating to the latter,

leading to a more comprehensive discussion of AM as conceptualised in the Self-Memory System model (Conway, 2005; Conway & Pleydell-Pearce, 2000; Conway & Williams, 2008) and an overview of both Ehlers & Clark's (2000) cognitive model of PTSD and Brewin et al.'s (1996) Dual Representation Theory (DRT).

1.2.7 Neural Correlates of PTSD.

Recent years have seen a marked increase in research investigating the neurophysiological substrates underpinning PTSD (for a comprehensive review see Shin, Rauch, & Pitman, 2006). This research has contributed to our understanding of the neuroanatomical structures implicated in the disorder, and has elucidated, in particular, the role of these structures in the so-called 'paradox' of memory in PTSD. More specifically, neuroimaging research has helped to elucidate the structure, neurochemistry and function of three regions of the brain considered to play a role in the development and maintenance of PTSD, namely the amygdala, medial prefrontal cortex and hippocampus (Shin et al., 2006).

The amygdala plays an integral role in the process of fear conditioning and the assessment of threat-related stimuli (e.g., Davis & Whalen, 2001; LeDoux, 2000). Given that hypervigilance concerning potential threat in the environment comprises one of the core clinical features of PTSD, it is unsurprising that the amygdala has been shown to be hyperresponsive in the disorder. Amygdala hyperresponsivity in PTSD has been observed during the presentation of personalised traumatic narratives (e.g., Shin et al., 2004) and cues (Driessen et al., 2004), combat sounds and photographs (e.g., Hendler et al., 2003) and trauma-related words (Protopopescu et al., 2005). Interestingly, in PTSD, the amygdala has also been shown to be hyperresponsive to trauma-unrelated affective

material, for example, fearful facial expressions (e.g., Williams et al., 2006). This suggests that major trauma may impair normal patterns of both medial prefrontal cortex (see below) and amygdala regulation, again highlighting the far-reaching effects of poor adjustment to trauma. Indeed, several studies have reported a strong positive correlation between amygdala hyperresponsivity (to both traumatic reminders and more general affective stimuli) and PTSD symptom severity (e.g., Armony et al., 2005; Bryant et al., 2005).

A second brain region implicated in PTSD is the medial prefrontal cortex, an area that is highly connected to the amygdala and involved in the process of extinction of fear conditioning and the retention of such extinction (Milad & Quirk, 2002; Morgan, Romanski, & LeDoux, 1993). The extinction process is impaired when the medial prefrontal cortex is damaged (Morgan et al., 1993). Sufferers of PTSD demonstrate both persistent inappropriate fear responses in daily life and diminished extinction of conditioned fear responses in laboratory settings, indicating that the medial prefrontal cortex may be adversely affected by PTSD (Orr et al., 2000). Shin and colleagues (2006) outline how neuroimaging research has shown that in PTSD the medial prefrontal cortex appears to be volumetrically smaller (e.g., Fennema-Notestine et al., 2002), and is hyporesponsive during both symptomatic states and during engagement in emotional-cognitive tasks (e.g., Britton et al., 2005). Moreover, the authors stress, several studies have demonstrated a negative correlation between medial prefrontal cortex responsivity and PTSD symptom severity (e.g., Williams et al., 2006, cited in Shin et al., 2006).

A third region of pertinence is the hippocampus which is involved in explicit

memory processes and the encoding of context during fear conditioning (e.g., Corcoran & Maren, 2001, cited in Shin et al., 2006). Of note, the hippocampus is thought to interact with the amygdala during the encoding of emotional memories (e.g., Dolcos, LaBar, & Cabeza, 2004), a process that is particularly relevant to the study of PTSD (Shin et al., 2006). In animals, hippocampal cell damage and memory impairment can result from extreme stressors and high levels of stress-related hormones (e.g., Sapolsky et al., 1990). PTSD (in humans) has been associated with memory impairment as well as reduced hippocampal volume and abnormal hippocampal function (Bremner et al., 2003; Gilbertson et al., 2002; Gurvits et al., 1996).

In summary, neuroimaging research findings indicate that in PTSD the amygdala is hyperresponsive, the medial prefrontal cortex hyporesponsive, and both the medial prefrontal cortex and the hippocampus appear to fail to inhibit the amygdala (Shin et al., 2006). This results in heightened fear responses and hypervigilance to threat. As will be outlined below, certain currently influential clinical models of PTSD have incorporated these neuropsychological understandings of the disorder into their frameworks and are increasingly drawing on evidence from cognitive psychology to illustrate and support their assertions (e.g., Brewin et al., 2010), thus lending substantial weight to their arguments. The following section will comprise a brief description of the prominent contemporary models and theories of PTSD informing current practice. An overview of some of the main empirical findings supporting each theory will be provided and clinical applications of the models, as well as the limitations inherent in each, highlighted.

1.2.8 Models and theories of PTSD.

1.2.8.1 The self-memory system.

As a conceptual framework for understanding AM, the Self-Memory System (SMS) is distinct from other models of memory in its focus on the role of the self and goals in remembering (Conway, 2005; Conway & Pleydell-Pearce, 2000). The SMS is described as a superordinate system comprising three core elements: a working self, conceptual self and autobiographical knowledge base (Conway, 2005). In association with the conceptual self, the working self functions produce 'patterns of activation' in the autobiographical knowledge base (Conway, 2005; Conway & Jobson, 2012; Conway, Meares, & Standart, 2004; Conway & Pleydell-Pearce, 2000). These transient patterns of activation are what are experienced by the individual as 'memories' (Conway, 2005; Conway & Jobson, 2012).

1.2.8.1.1 The working self.

The working self consists of a hierarchy of goals and sub-goals which regulate cognition and behaviour, thus enabling an individual to function successfully in the world by achieving certain desired ends and remaining consistent with preferred self-images (Conway & Pleydell-Pearce, 2000). In this sense, the working self refers to the currently active goal hierarchy, the purpose of which is to "reduce discrepancies between desired goal states and the current state" (Conway, 2005, p.597). The working self has a reciprocal relationship with the autobiographical knowledge base allowing for integration of experience with existing knowledge (Conway, 2005). New knowledge enters long-term memory through the goal hierarchy of the working self and it is also via this pathway that access is gained to pre-existing knowledge and memories are formed. As

such, the goal hierarchy of the working self functions to determine "encoding, accessibility of knowledge in long-term memory, and the construction of memories" (Conway, 2005, p. 597).

1.2.8.1.2 The autobiographical knowledge base.

The autobiographical knowledge base accommodates a three-level hierarchy of knowledge, ranging from event-specific, episodic memories at its base through to more general event knowledge in the middle to abstract 'self-conceptual knowledge' at its apex (Conway, 2005). These three levels together serve to structure autobiographical memory themes to form a broader life story. Just as the working self determines the accessibility of memories in the autobiographical knowledge base, the latter informs and constrains the self-images and goals of the working-self (Conway, 2005).

1.2.8.1.3 The conceptual self.

The conceptual self, alongside the working self, further serves to regulate autobiographical remembering. Conway et al. (2004) propose that the conceptual self is comprised of non-temporally-specified, abstract, conceptual self-structures, including personal scripts, possible selves, self-with-other units, internal working models, relational schema, self-guides, attitudes, values, and beliefs. Conway (2005) highlights that these abstract processes and phenomena exist independently of episodic memories and autobiographical knowledge, but are nonetheless linked to both in order to stimulate the construction of memories and experiences that reinforce, illustrate and give substance to the fundamental, underlying themes of the conceptual self (Conway & Jobson, 2012).

Within the conceptual self lies the 'life story,' a narrative-like account of the individual's life, which is thought to also contain templates and understandings of

cultural phenomena, such as 'life scripts' (Bluck, 2003; Bluck et al., 2005; Bluck & Habermas, 2001; Pillemer, 1998). The latter are understood to be socially accepted expectations and norms regarding the typical path of an individual's life, for example, going to school, university, getting a job, buying a house, getting married and having children (Berntsen & Rubin, 2004). As part of the conceptual self, these structures (life stories and life scripts) highlight the social aspect of AM and the interrelations between self, others, and the social, political and cultural systems within which all individuals and groups are embedded, and which therefore inevitably impact upon how memories are constructed and identities formed (Bruner, 1990; Conway et al., 2004; Pasupathi, 2001).

1.2.8.1.4 Autobiographical remembering in the SMS.

The SMS proposes two routes for the construction of AMs from the autobiographical knowledge base: generative and direct (Conway, 2005). Generative retrieval involves a deliberate search through the levels of the autobiographical knowledge base, prompted by a motivational goal of the working self. Direct retrieval occurs when a memory is unintentionally triggered by an associated cue; this type of retrieval does not involve a systematic search, rather it leads directly to event-specific knowledge. Typically, everyday, non-traumatic memories are integrated into the autobiographical knowledge base in such a way that they are linked to and embedded in lifetime periods, general events and general knowledge (i.e., all levels of the autobiographical knowledge base). This integration allows for a detailed, contextualised memory, amenable to voluntary recall via the first retrieval route (generative) while simultaneously serving to inhibit the second route (direct retrieval) (Conway, 2005).

1.2.8.1.5 PTSD and the SMS.

The SMS conceptualises PTSD in terms of the working self's failed attempts to reconcile traumatic experiences with current plans and goals (Conway & Pleydell-Pearce, 2000). Trauma violates previously held assumptions about the self, others and the world (e.g., Ehlers & Clark, 2000; Janoff-Bulman, 1992), and therefore cannot be accommodated or interpreted by one's corresponding goal hierarchy (Conway & Pleydell-Pearce, 2000). As such, the trauma memory cannot be integrated into the autobiographical knowledge base so instead remains associated with the working self and is triggered when the individual's goals are activated, resulting in the intrusion symptoms of PTSD. The lack of contextualisation and elaboration of the trauma memory results in increased retrieval via the direct route; trauma memories are thus typically experienced intrusively in response to associated cues and possess a 'here and now' quality, often lacking temporal and/or spatial detail (Ehlers & Clark, 2000). Moreover, the PTSD trauma memory is not grounded in information relating to what happened following the event, and crucial details, such as "I did not die," remain inaccessible, thereby increasing the perception of current threat and sense of reliving. Furthermore, as the trauma memory is not contextualised or integrated within the autobiographical knowledge base, generative retrieval is highly problematic, i.e., sufferers of PTSD often have difficulty intentionally recalling their trauma memories.

1.2.8.1.6 Clinical application of the SMS and empirical findings.

Conway (2005) proposes that SMS-informed treatment approaches to PTSD necessitate integration of the trauma memory into one's self-concept. The author highlights how this may involve exploring and correcting memory distortions. To

elucidate, Conway (2005) proposes that the SMS is motivated to protect itself from change in order to maintain coherence; such an incentive may induce alterations (distortions) in memory during traumatic experiences which overwhelm the self and thus threaten the individual's coherence of identity/self-concept. Conway (2005) gives examples of the self-system responding to trauma by "lower[ing] the accessibility of memories of the event […] or even distort[ing] the memories" (p.599). Conway's SMS posits as such that the control processes of the working self may serve to edit memory content or indeed generate false memories in order to resist change and, in doing so, preserve goal coherence. Conway (2005) notes that such distortions may in some cases maintain an illusion of coherence, but invariably this is "at the cost of psychological illness" (2005, p. 599). Conway (2005) also proposes that over time, the need for self-consistency may necessitate alteration in the individual's self-image/conceptual self, which in turn may lead to the development of a sense of identity centred on being a victim of trauma, and/or emphasising self-change since the event.

There is substantial evidence that personal memories tend to concur with reported goals (e.g., Demiray & Bluck, 2011; Singer & Salovey, 1993). Furthermore, research has shown that PTSD sufferers have significantly more concerns and goals involving trauma-focussed themes than those without PTSD (Sutherland & Bryant, 2005), that trauma survivors with PTSD selectively retrieve memories related to their trauma (McNally et al., 1995; Sutherand & Bryant 2005, 2008), and that discrepant self-image appears to "drive the nature of autobiographical memories that enter the awareness of trauma survivors" (Sutherland & Bryant, 2008, p. 557).

1.2.8.1.7 Critique of the SMS.

Whilst certain theorists and researchers have drawn on the SMS to explore AM within the context of PTSD, the model nonetheless remains a broad, cognitive model of AM, which, although providing valuable conceptualisations of the processes underpinning PTSD, currently offers limited direct clinical application. The SMS does not claim to be a theory or model of PTSD but rather is an account of AM that can be applied to PTSD. It is therefore unsurprising that it does not fulfil all requirements of such a theory (cf. Brewin & Holmes, 2003). Brewin and Holmes (2003) assert that a valid theory of PTSD should incorporate explanations of processes in PTSD that are both specific to the disorder and more general, as well as processes that are considered automatic (for example, helplessness and dissociation) and those that are more strategic (for example, appraisals of the trauma event and selected coping mechanisms).

The SMS also poses certain methodological challenges for researchers; it is difficult, for example, to reliably measure an individual's goal hierarchy at any given point in time (Demiray & Bluck, 2011). To date, relatively few studies have explicitly linked clinical models of trauma memory and theoretical approaches to examining the hierarchical structure of AM outlined in the SMS. It is thought that such an approach is critical to the validity of empirical investigation of proposals about the nature of trauma memories in PTSD (O'Kearney, Hunt, & Wallace, 2011).

It is further noteworthy that the SMS does not account for cognitive factors beyond disturbance in AM which contribute to the development and maintenance of PTSD, again highlighting that it cannot in its current form constitute a model of PTSD.

Such factors are considered in detail in frameworks such as Ehlers and Clark's (2000) cognitive model of PTSD and Brewin et al.'s (1996) DRT.

1.2.8.2 The cognitive model.

Ehlers and Clark's (2000) cognitive model of PTSD provides a comprehensive account of how symptoms of the disorder are maintained. The authors contend that PTSD is maintained in individuals who process the event in a manner that produces a sense of current threat. They propose that PTSD symptoms are a manifestation of such current threat perception and of the anxiety and coping strategies engendered by this sense of threat. The model identifies two key processes which lead to the experience of a current sense of threat: individual differences in the appraisal of the trauma and/or its sequelae, and individual differences in the nature of the memory for the trauma and its link to other autobiographical memories (Ehlers & Clark, 2000). The authors' conceptualisation of the latter process draws heavily on Conway's model of AM, the Self-Memory System (see section 1.2.8.1 above) and Brewin et al.'s (1996) DRT (see section 1.2.8.3 below), while their work on negative appraisals expands that of Foa and Rothbaum (1998) and Jones and Barlow (1990).

Ehlers and Clark's (2000) model purports that once activated, the perception of current threat is accompanied by intrusions and other re-experiencing symptoms, as well as symptoms of arousal, anxiety and other forms of negative affect. Moreover, the perceived threat prompts behavioural and cognitive responses aimed at reducing the sense of threat and alleviating distress (for example, avoidance of trauma-related cues and situations), which while somewhat effective in the short-term ultimately prevent cognitions from being challenged and changed in the longer term, thereby maintaining

PTSD (Ehlers & Clark, 2000). The cognitive model thus accounts for all of the established symptoms of PTSD, as described in current criteria for diagnosis of the disorder (APA, 2013).

1.2.8.2.1 Negative appraisals.

Negative appraisals of the trauma and/or its sequelae can relate to external phenomena and experiences (e.g., "The world is an unsafe place" / "Others are not to be trusted"), or internal, self-referential cognitions (e.g., "It's my fault that this happened" / "I will never be the same again"). Negative appraisals may take various forms, such as overgeneralisations (e.g., "nowhere is safe"); overestimation of the probability of repeated occurrence of trauma (e.g., "I attract disaster therefore something bad will likely happen to me again"), and negative appraisals of one's own actions during the trauma and its aftermath (e.g., "I should have tried harder to break free," "I'll never recover from this").

Two appraisals that have been found to be both associated with and predictive of PTSD, and also related to the self, thus of pertinence to the current study, are 'mental defeat' and 'permanent change' (Ehlers, Maercker, & Boos, 2000). Mental defeat, thought to occur during the trauma, is defined as the "perceived loss of all autonomy, a state of giving up in one's own mind all efforts to retain one's identity as a human being with a will of one's own" (Ehlers et al., 2000, p. 45). Permanent change is described as the perception of alienation from oneself whereby the trauma causes an apparently irrevocable transformation of the trauma sufferer's life goals, personality, or former life (Ehlers et al., 2000). As such, appraisals of mental defeat and permanent change have a

profound and debilitating effect on an individual's identity and sense of self (Brewin & Holmes, 2003).

1.2.8.2.2 The nature of the trauma memory.

The nature of the trauma memory is the second key element identified by Ehlers and Clark (2000). The cognitive model, like the DRT (Brewin et al., 1996) and Conway's SMS, proposes that memory disturbance in PTSD is due to impairment in memory processing and encoding. Ehlers and Clark (2000) cite the 'paradox of memory' in PTSD (i.e., intrusive, vivid unintentional recall coupled with impaired, fragmented, disorganised intentional recall) as evidence of the faulty mechanisms of memory processing at play. To elucidate their position, in keeping with Conway's SMS, Ehlers and Clark (2000) assert that trauma memories are poorly elaborated and inadequately integrated into the AM base, thus lacking temporal and spatial context, and disconnected from other non-trauma-related autobiographical memories. Ehlers and Clark explicate the difficulties associated with voluntary recall observed in PTSD in terms of the absence of a generative retrieval route due to the poor integration and elaboration of such memories into the autobiographical memory base. The here-and-now quality to intrusive trauma memories is considered to be indicative both of the absence of a temporal and/or spatial context, due again to lack of integration, and of the necessary direct retrieval route as the only retrieval route available, triggered by trauma-related cues (Conway, 2005; Conway & Pleydell-Pearce, 2000; Ehlers & Clark, 2000). The authors highlight how such intrusive re-experiencing symptoms appear to lack one of the defining features of episodic memories, autonoetic consciousness, defined as the ability to place oneself in the past, the future, or hypothetical situations (Baddeley, Eysenck, & Anderson, 2009). Re-

experiencing symptoms typically consist of sensory impressions rather than thoughts. These sensory features of the trauma memory are experienced as though happening in the present and the emotions accompanying them are the same as those experienced at the time of the trauma (Brewin et al., 1996; Foa & Rothbaum, 1998). Moreover, Ehlers and Clark (2000) draw attention to a phenomenon they term 'affect without recollection' which refers to how individuals with PTSD may re-experience sensations or emotions associated with the trauma without recalling the event itself. Related to this concept of 'affect without recollection,' Ehlers and Clark (2000) propose that strong stimulus-stimulus and stimulus-response associations are formed for traumatic material. In this way, contact with stimuli linked to the original trauma increases the probability of the occurrence of cue-driven, intrusive, re-experiencing symptoms.

1.2.8.2.3 Cognitive and behavioural coping strategies.

Ehlers and Clark (2000) illustrate how PTSD symptoms are maintained by cognitive and behavioural coping strategies employed by the individual to (temporarily) alleviate distress by reducing anxiety. Examples of such strategies include effortful suppression of memories, rumination, distraction, avoidance of trauma reminders, taking excessive precautions to prevent future trauma, engaging in 'safety behaviours' (Salkovskis, 1996), use of alcohol or drugs, selective attention to threat cues, and hypervigilance. These attempts to reduce the sense of current threat prevent change in both the individual's appraisals of the trauma and/or its sequelae and the nature of the trauma memory itself. Such behaviour thus serves ultimately to heighten anxiety and increase the sense of current threat (Ehlers & Clark, 2000).

1.2.8.2.4 Empirical findings.

Substantial supportive evidence for the conceptualisation of PTSD outlined in Ehlers and Clark's (2000) cognitive model has been gleaned from a large body of research carried out in the area since the authors' publication of their framework. This includes empirical findings indicating a strong relationship between PTSD symptoms and mental defeat (Ehlers et al., 2000); negative interpretations of the trauma (Dunmore, Clark, & Ehlers, 1997; Dunmore, Clark, & Ehlers, 1999); negative interpretations of initial PTSD symptoms (e.g., Clohessy & Ehlers, 1999; Mayou, Bryant, & Ehlers, 2001); perception of permanent change in self or life goals (Dunmore et al., 1999; Ehlers et al., 2000), and safety behaviours and avoidance (Dunmore et al., 1999).

Ehlers and Clark's (2000) claim that trauma memories are poorly elaborated and inadequately integrated into autobiographical memory is supported by findings demonstrating the fragmentation and disorganisation of trauma memories of those with PTSD. As this poor integration/contextualisation of the trauma memory within AM is fundamental to all of the PTSD models informing current practice, empirical findings relating to the subject are discussed in greater detail below (see section 1.2.8.4).

1.2.8.2.5 Critique of the cognitive model.

Ehlers and Clark's (2000) model is currently considered by many as the most comprehensive and useful model of PTSD, which both accounts for maintenance of the disorder and informs an effective treatment protocol, summarised below in section 1.2.9 (Brewin & Holmes, 2003; Taylor, 2006). As noted, several features of the model and its corresponding treatment programme have accumulated a strong evidence base (e.g., Duffy, Gillespie, & Clark, 2007; Ehlers, Clark, Hackmann, McManus, & Fennell, 2005).

Ehlers and Clark (2000) have also been commended for incorporating other valuable and influential theories of PTSD into their framework, thereby adding to its explanatory power (Taylor, 2006). The introduction and elaboration of the concepts of 'affect without recollection' and 'mental defeat' has further been deemed insightful (Brewin & Holmes, 2003; Taylor, 2006).

Certain aspects of the cognitive model have nonetheless been criticised. It has been proposed that the framework is lacking in parsimony when compared to other models of PTSD, such as Brewin et al.'s (1996; 2010) DRT (Taylor, 2006). It has also been suggested that the cognitive model does not offer a persuasive explanation of certain PTSD symptoms, including emotional numbing and dissociation (Dalgleish, 2004; Taylor, 2006).

Despite these limitations, Ehlers and Clark's (2000) model is a highly productive theoretical tool for the generation of research (Dalgleish, 2004) and is considered by many to be of significant clinical value (e.g., Brewin & Holmes, 2003; Dalgleish, 2004; Taylor, 2006). Moreover, by emphasising appraisal processes, the model provides one of the most comprehensive accounts available of how various types of cognition influence the aetiology and maintenance of the disorder (Dalgleish, 2004). A final noteworthy strength of Ehlers and Clark's (2000) model is its direct theory-practice links; for example, the model provides a powerful argument for the use of cognitive therapy techniques to aid recovery from PTSD (Dalgleish, 2004).

1.2.8.3 The Dual Representation Theory (DRT).

As in the SMS (Conway, 2005) and Ehlers and Clark's (2000) cognitive model, the DRT conceptualises PTSD in terms of memory disturbance, highlighting the paradox

of memory in trauma whereby intentional recall is often impaired, disorganised and fragmented, while intrusive, re-experiencing symptoms tend to be vivid and detailed (Brewin et al., 1996). The DRT draws on the seminal works of Horowitz (1976) and Janoff-Bulman (1992) with respect to the impact of trauma on one's ability to integrate the memory into one's identity and self-narrative, proposing that the manner in which traumatic events are attended to, encoded and represented in memory leads to the development and maintenance of PTSD symptoms.

The DRT posits that there are two memory systems which operate in parallel, but that one may predominate in certain situations (Brewin, 2001; Brewin et al., 1996). The two systems are the 'verbally accessible memory system' (VAM) and the 'situationally accessible memory system' (SAM). In the recently revised version of the DRT (Brewin, Gregory, Lipton, & Burgess, 2010), these systems have been renamed as the contextual memory system and the sensory-based memory system, and are proposed to accommodate abstract, *contextualised* representations of memory (C-reps) and inflexible, *sensory-bound* representations of memory (S-reps), respectively. This updated model is informed by evidence from cognitive psychology and neuroscience indicating distinct neural substrates underpinning the two systems (see Brewin et al., 2010).

The original DRT (Brewin et al., 1996; Brewin, 2001) described the VAM (contextual memory) system as representing verbal information that was consciously perceived and attended to. Such information is typically expressed in oral or written narratives of the traumatic event, thus contextualized in time and space. The amount of information that can be contained in the VAM system is nonetheless limited because input is restricted by mechanisms relying on the finite attentional capacities of the

individual, which are further reduced by high levels of arousal associated with the experience of trauma. As such, the VAM/contextual memory system can only encode elements of the event that the individual attends to, such as peri-traumatic evaluations and re-evaluations following the event, which have received sufficient processing to be encoded and stored in long-term memory. VAM representations/C-reps can thus be either automatically or intentionally retrieved and edited, and are thought to interact with the general autobiographical memory base in such a way that the memory is integrated within the individual's broader life-story, comprising one's past, present and future (Brewin, 2001; Brewin et al., 2010). VAM memories may therefore be accompanied by both primary emotions originally experienced during the trauma and secondary emotions engendered by retrospective cognitive appraisals of the event (Brewin et al., 1996). This concept echoes that of 'generative retrieval' of event-specific, episodic memory that is integrated within the autobiographical memory knowledge base, as described in Conway's SMS (Conway, 2005; Conway & Pleydell-Pearce, 2000) and later expanded in Ehlers and Clark's (2000) cognitive model of PTSD. The VAM/C-reps system is thought to depend on prefrontal areas of the brain involved in higher-order functions as well as medial temporal lobe structures, such as the hippocampus (Brewin, 2001). As noted earlier in section 1.2.7, neuropsychological research has demonstrated impaired functioning in these regions of the brain in individuals with PTSD.

The SAM (sensory-based memory) system contains information that is not recorded in the VAM/contextual memory system. The information represented in the SAM system is the product of extensive, lower level, perceptual processing of information "apprehended too briefly to be consciously recalled" (Brewin, McNally, &

Taylor, 2004, p. 105). Brewin et al. (1996) highlight that the information presented during a traumatic event may potentially be crucial to future survival, and is therefore recorded in a crude but efficient fashion in the form of large amounts of sensory and perceptual images, which lack temporal and spatial contextualisation. The resulting trauma memories represented in the SAM system are typically highly detailed but can only be accessed involuntarily when triggered by internal or external cues related to the trauma. As a result, S-reps can be highly difficult to control, especially when the individual is not aware of the triggers/cues prompting their reconstruction, as is often the case with intrusive symptoms in PTSD.

The SAM system records and stores images (a term used to refer to all sensory modalities), including information about the individual's physiological responses to the trauma, which are inextricably linked to the emotions experienced at the time of the event (i.e., primary emotions) (Brewin et al., 1996). The DRT posits that these sensory-bound memory representations (S-reps) form the basis for intrusive PTSD symptoms, such as nightmares and flashbacks, and are typically more detailed and emotion-laden than ordinary, non-traumatic memories. The neurophysiological substrates thought to underpin S-reps are those of subcortical structures, such as the amygdala and brain areas directly involved in perception, such as the temporal lobes, rather than areas dedicated to higher level functions (Brewin et al., 2010).

Traumatic memories in the form of S-reps are experienced as though they are happening in the present because they lack contextualisation in time and space. This is proposed to be related to the lack of involvement of structures such as the hippocampus in the processes underpinning the encoding of these memories (Brewin et al., 2010).

Moreover, the SAM system does not use a verbal code therefore the content of S-reps is typically difficult to communicate to others; trauma survivors tend to produce impoverished or confused descriptions of the traumatic event despite claiming that the images they experience are vivid and detailed (Brewin et al., 1996). S-reps appear to lack associations with general autobiographical memory and therefore cannot be updated or integrated in an adaptive fashion.

Importantly, both the VAM and SAM systems are conceived of as part of normal memory but as functioning in a disturbed manner in PTSD (Brewin, 2001). Typical encoding processes in healthy individuals involve the creation of C-reps and S-reps with strong interconnections. In contrast, the pathological encoding purported to characterise PTSD leads to the creation of relatively stronger S-reps, relatively weaker C-reps, and defective interconnections (Brewin et al., 2010). Brewin (2001) explains that the SAM and VAM systems compete with each other with the result that the more strongly activated memory system predominates and subsequently either activates or inhibits fear responses. When VAM memories take precedence, inhibitory pathways from the prefrontal cortex prevent inappropriate amygdala activation and the accompanying re-experiencing of primary emotions, such as fear (Brewin et al., 1996). It is proposed however that S-reps which contain information that is poorly represented in the VAM/contextual memory system invariably show a 'retrieval advantage' when confronted with cues relating to the trauma; this type of memory retrieval induces amygdala activation.

1.2.8.3.1 Clinical application of the DRT.

The DRT posits that recovery from PTSD necessitates resolution of both intrusive symptoms and negative cognitions associated with the disorder. Two mechanisms are proposed to facilitate such resolution: actively revisiting the trauma memory to generate a communicable narrative, and using cognitive reattribution techniques to integrate trauma experiences with prior beliefs. Detailed descriptions of the neural bases to these processes and related empirical evidence are provided in the revised DRT (Brewin et al., 2010), but given the scope of the current study it is not possible to recount these findings here.

1.2.8.3.2 Empirical evidence in support of the DRT.

As in the case of Ehlers and Clark's (2000) cognitive model, there is substantial support for the DRT, discussed below in section 1.2.8.4.

1.2.8.3.3 Critique of the DRT.

Despite the proposed clinical applications of the DRT outlined above, the theory is not linked to a specific therapeutic programme, as in the case of Ehlers and Clark's (2000) cognitive model (Brewin & Holmes, 2003; Taylor, 2006). The DRT is nonetheless considered a highly valuable, insightful model of PTSD, particularly in its current, updated form (Brewin et al., 2010). Moreover, the DRT incorporates evidence from cognitive psychology and neuroscience indicating distinct neural bases to both C-reps and S-reps. As with the cognitive model, the DRT's assertion that trauma narratives are typically fragmented and disorganised remains nonetheless controversial, particularly as the evidence supporting this position is inconclusive (O'Kearney & Perrott, 2006;

O'Kearney, Hunt, & Wallace, 2011). This issue is discussed in detail in section 1.2.8.4 below.

Certain critics have highlighted that the original DRT focuses primarily on flashbacks, considered the rarest of PTSD symptoms (APA, 2013), but does not address more common symptoms such as emotional numbing (Taylor, 2006). Dissociation is also relatively neglected as is the increased conditionability observed in PTSD (Brewin & Holmes, 2003). The original DRT has further been criticised for its failure to elucidate delayed onset PTSD; this phenomenon is briefly discussed however in the updated version of the model with recourse to neuropsychological findings regarding the capacity of the hippocampus to contextualise memories changing over time, although the authors concede that the hypotheses in question are as yet speculative (Brewin et al., 2010).

In conclusion, though not without its limitations, the DRT is thought to have substantial explanatory power and to be a highly useful theoretical tool in the generation of research and the development of clinical interventions for the treatment of PTSD (Dalgleish, 2004).

1.2.8.4 Empirical support for lack of integration of the PTSD trauma memory.

Prominent PTSD models (Brewin et al., 1996; Dalgleish, 2004; Ehlers & Clark, 2000; Horowitz, 1976; Janoff-Bulman, 1988), as discussed above, propose that the PTSD trauma memory is not well integrated or contextualised within autobiographical memory, thereby resulting in a trauma memory that is disorganised and fragmented. Of note, while certain clinicians and researchers differentiate between the two terms, fragmentation and disorganisation are frequently used interchangeably in the literature (O'Kearney & Perrott, 2006). Importantly, the phenomenological properties of both

disorganisation and fragmentation have been operationalised as a lack of narrative coherence in accounts of the traumatic event upon intentional recall (e.g., Jelinek et al., 2010; O'Kearney & Perrott, 2006). Indicators of such narrative incoherence in PTSD include confused temporal order, spontaneous shifts from past to present tense verbs, a lack of contextual markers, an inability to recall significant aspects of the trauma, low levels of complexity of the narrative, lack of detail, repetition, unfinished thoughts and speech fillers (Foa et al., 1995; Halligan, Michael, Clark, & Ehlers, 2003; Jelinek et al., 2010), and a relative lack of organised thoughts/statements "indicating realisation, decision-making, or planning" (Foa et al., 1995, p. 682; Halligan et al., 2003).

One of the earliest studies of these properties of trauma memories was Foa et al.'s (1995) analysis of changes in rape victims' trauma narratives during exposure therapy for PTSD. The authors found that narrative length increased from pre- to post-treatment as did percentage of words relating to thoughts and feelings, notably thoughts reflecting attempts to organise the trauma memory. The study also demonstrated a relationship between a decrease in narrative fragmentation and a reduction in PTSD symptoms. Many other studies have replicated the finding that disorganised and/or fragmented trauma narratives are associated with increased PTSD severity (Halligan et al., 2003; Harvey & Bryant, 1999; Jelinek et al., 2009; Jelinek et al., 2010; Jones et al., 2007; Kenardy et al., 2007; Murray, Ehlers, & Mayou, 2002; O'Kearney et al., 2011; Salmond et al., 2011; Van Minnen, Wessel, Dijkstra, & Roelofs, 2002; Waters, Shallcross, & Fivush, 2013; Young, 2000; Zoellner, Alvarez-Conrad, & Foa, 2002.). It has also been demonstrated that trauma memories are less conceptually connected than non-trauma memories (Ehlers, Hackmann, & Michael, 2004; Krans, Näring, Holmes, & Becker, 2009). Such

impairments in voluntary recall of trauma memories have been shown to predict the course of the disorder (e.g., Buck, Kindt, van den Hout, Steens, & Linders, 2007; Ehring, Ehlers, & Glucksman, 2008).

Involuntary, intrusive trauma memories in PTSD have consistently been described as perceptually detailed, frequently dominated by visual images (Ehlers et al., 2002; Ehlers & Steil, 1995; Hackmann et al., 2004) and typically vividly sensory when compared to non-trauma memories (e.g., Hellawell & Brewin, 2002; Holmes, Grey, & Young, 2005; Parry & O'Kearney, 2013; Rubin, Feldman, & Beckham, 2004; Speckens, Ehlers, Hackmann, Ruths, & Clark, 2007; Whalley, Farmer, & Brewin, 2007). The sense of reliving ('here-and-now' quality) characteristic of trauma memories has been shown to be more predictive of the course of the disorder than initial symptom levels (Halligan et al., 2003; Jones et al., 2007; Kleim, Ehlers, & Glucksman, 2007; Michael, Ehlers, Halligan, & Clark, 2005; Speckens, Ehlers, Hackmann, & Clark, 2006) while flashbacks are now considered to be causally related to the development of PTSD (Brewin et al., 2010). Importantly, these studies have for the most part sampled clinical populations, thus adding to their value in terms of clinical implications of findings (Brewin, 2013).

As such, there exists substantial evidence in support of the central tenets of the models of PTSD, particularly with respect to the phenomenological properties of memory for trauma. Some of the earlier studies supporting the inadequate integration position (e.g., Foa et al., 1995; Halligan et al., 2003; Harvey & Bryant, 1999; Murray et al., 2002) have nonetheless been criticised in terms of their design as they lacked a control either in the form of a comparison memory or a control group, such as PTSD versus non-PTSD participants (e.g., Rubin, 2011; Robinaugh & McNally, 2011). More recent studies have

therefore employed more rigorous methodology in terms of use of controls (Halligan et al., 2003; Jelinek, Randjbar, Seifert, Kellner, & Moritz, 2009). Despite such improved design and the existence of findings from multiple studies, data regarding the fragmentation, incoherence, and disorganisation of memories for trauma are somewhat inconclusive when examined together (e.g., O'Kearney & Perrott, 2006; Rubin, 2011; Zoellner & Bittenger, 2004). It has been proposed, however, that these discrepancies may be related to methodological differences between the studies involved (Bedard-Gilligan & Zoellner, 2012; Brewin, 2013; Megias, Ryan, Vaquero, & Frese, 2007) as discussed in section 1.2.8.4 below. It has also been highlighted that the properties of trauma memories established in the studies cited in support of the inadequate integration position do not irrefutably imply that traumatic memory is isolated within autobiographical memory (O'Kearney et al., 2011).

The theories and models discussed above, which support the disintegration view, inform prevailing treatment programmes for PTSD. The following section will briefly outline current guidelines for treatment of the disorder and will summarily describe the core components of certain prominent existing interventions.

1.2.9 Treatment of PTSD.

Recent meta-analyses examining the effectiveness of different treatments for PTSD indicate that trauma-focussed psychological treatments, such as individual trauma-focussed cognitive behavioural therapy (TF-CBT) and eye movement desensitization and reprocessing (EMDR), are more effective than generic, non-trauma-focussed therapies (e.g., Bisson & Andrew, 2009; Cloitre, 2009; Seidler & Wagner, 2006). In keeping with the DRT and Ehlers and Clark's cognitive model of the disorder, these treatments

privilege a focus on the client's memories of the trauma and the personal meanings they attribute to these events (Ehlers et al., 2010).

In line with these findings, current treatment guidelines, both in the UK and internationally, recommend trauma-focussed psychological interventions as first-line treatments for PTSD (APA, 2013; Foa, Keane, Friedman, & Cohen, 2009; NICE, 2005; Stein et al., 2009). The relative emphasis on various treatment procedures used in these interventions differs between protocols, with some focussing on exposure, for example, Prolonged Exposure (Foa, Rothbaum, Riggs, & Murdock, 1991), and others prioritising cognitive techniques, for example Cognitive Processing Therapy (Resick & Schnicke, 1992), and Cognitive Therapy (CT) for PTSD (Ehlers, Clark, Hackmann, McManus, & Fennell, 2005). Eye Movement Desensitisation and Reprocessing (EMDR; Shapiro & Maxfield, 2002) emphasises the role of bilateral stimulation during brief exposure to trauma-related images, which has been demonstrated to help with reprocessing the experience of trauma. Current guidelines in the UK recommend either EMDR or TF-CBT as the most effective psychological treatments for PTSD (NICE, 2005).

Of these two trauma-focussed treatments for PTSD, an ever-expanding body of empirical findings documents the efficacy of individual TF-CBT; thus providing compelling support for this models of treatment (e.g., Foa et al., 2009). The interventions employed in TF-CBT are informed by the inadequate integration theories of PTSD outlined earlier. Typically, such a treatment protocol involves several of the following components: psychoeducation, including information about PTSD and its treatment as well as a case formulation which is constructed in collaboration with the client; treatment engagement strategies; emotion regulation exercises, such as breathing retraining,

relaxation exercises, and mastery/pleasure exercises; repeated imaginal reliving of the trauma to promote extinction of conditioned fear reactions; confronting the feared memory in order to limit negative reinforcement of cognitive and behavioural avoidance of trauma-related thoughts, feelings, and reminders; reliving the trauma in a therapeutic, supportive setting with the aim of incorporating safety information into the trauma memory; focussing on the trauma memory for a prolonged period in order to differentiate the trauma from other, non-traumatic events, thereby facilitating realisation that the trauma is a specific occurrence rather than a template for all other (future) experiences; imaginal reliving to help alter the individual's appraisal of their PTSD symptoms from being a sign of personal incompetence to one of mastery and courage; other forms of cognitive restructuring, tailored to the needs of the individual, and preparation of a post-treatment programme for maintaining gains and preventing relapses (Ehlers et al., 2010; Foa et al., 2009; Taylor, 2006).

1.2.10 Trauma-centred identity and PTSD.

As highlighted above, the models of PTSD informing current practice conceptualise trauma memories in those with PTSD as being inadequately integrated into autobiographical memory. Such lack of integration is deemed fundamental to the development and maintenance of PTSD. In contrast to this disintegration view, however, certain cognitive psychologists have recently proposed that due to its distinctiveness and emotional impact, memory for trauma in most cases remains highly accessible, and further, may form 'a cognitive reference point for the organisation of autobiographical knowledge' (Berntsen & Rubin, 2007, p. 418). Moreover, proponents of this view posit that mechanisms which are fundamental to everyday, non-traumatic memory can account

for the properties of traumatic memories (Rubin et al., 2008; Rubin, Dennis, & Beckham, 2011). Models of trauma memory put forward by such theorists tend thus to be single-system models. Specifically, such theorists claim that PTSD-specific models are not necessary, but rather that the memory difficulties experienced by individuals with PTSD can be conceptualized within ordinary memory models. They argue that memory for trauma is essentially similar to general, normal memory as both are the product of the same high-level reconstructive processes associated with activity in the medial temporal lobes (e.g., Berntsen, Rubin, & Bohni, 2008; Rubin, Berntsen, & Bohni, 2008).

These contrasting theoretical positions are based on numerous studies that have explored the implications, in terms of posttraumatic psychological adjustment, of construing trauma as central to one's identity and to personal remembering (Berntsen & Rubin, 2006, 2007). Early evidence of the detrimental effects of regarding a trauma as key to one's identity was found in McNally et al.'s (1995) study of autobiographical memory in Vietnam combat veterans with and without PTSD. Among veterans with PTSD, a sub-group of soldiers who chose to wear Vietnam war regalia during testing disproportionately retrieved memories from the war relative to their peers, both those with and without PTSD. The authors suggested that the war regalia was symbolic of the centrality of the war (fought 20 years previously) to these participants' identities, and related to their high levels of PTSD symptoms. Moreover, Sutherland and Byrant's (2005) examination of self-defining memories in trauma survivors with and without PTSD demonstrates a clear relationship between trauma-centred identity and PTSD symptoms: participants with PTSD reported more self-defining memories that were trauma-related and of negative valence than non-PTSD and control participants.

Several other studies have found a strong association between trauma forming a central component of identity and the life story (as indexed by scores on the Centrality of Event Scale, Berntsen & Rubin, 2006) and PTSD symptom severity (see section 1.2.10.1 below for details). Berntsen and Rubin (2006) posit that these studies demonstrate the salience of the trauma memory, which, they assert, increases the accessibility and vividness of distressing memories of the event. This leads to further rehearsal of the memory, which in turn increases the availability of the memory, thereby maintaining and strengthening the memory, including its emotional impact, resulting in an increase in PTSD symptoms (Berntsen & Rubin, 2006). This is in keeping with Blagov and Singer's (2004) assertion that self-defining memories are typically highly vivid, affectively intense and repetitively recalled. These phenomenological properties and processes associated with the trauma memory, the cognitive theorists argue, are not exclusive to trauma memories, but apply to memories for all significant life events (Rubin et al., 2008).

Of note, the concept of perceived permanent change in self and in life expectations is in accordance with contemporary theories of PTSD (e.g., Brewin et al., 1996; Brewin et al., 2010; Ehlers & Clark, 2000; Ehlers et al., 2000). The key difference between these theories and the 'centrality' view is with respect to integration of the trauma memory into the autobiographical knowledge base.

1.2.10.1 Research supporting the centrality position.

Berntsen and Rubin (2006) developed the Centrality of Event Scale (CES) to assess the degree to which an individual construes a traumatic event as key to their identity. It measures the extent to which a memory becomes (i) a reference point for everyday inferences; (ii) a turning point in the life story, and (iii) a core component of

personal identity. Since its development, the CES has been employed in several studies investigating the relationship between trauma-centred identity and posttraumatic adjustment. The following is an overview of the key findings from some of the main studies to date in this area.

Berntsen and Rubin have demonstrated that CES scores are positively correlated with PTSD symptoms, even when controlling for depression and dissociation (Berntsen & Rubin 2006, 2007; Berntsen, Rubin, & Siegler, 2011). Boals (2010) replicated Berntsen and Rubin's (2006, 2007) findings in a sample of undergraduate students and demonstrated a significant relationship between trauma-centred identity and PTSD, depression and dissociation. Furthermore, this study explored various phenomenological properties of negative/traumatic memories and found that high CES scores were significantly related to emotional intensity of the memory, a sense of reliving, and visceral reactions while remembering.

Boals and Schuettler (2011) also found a significant positive correlation between CES scores event centrality and PTSD symptoms when controlling for depression, cognitive processing of the trauma and coping styles. The authors assert that their inclusion of a measure of cognitive processing provides evidence that the CES effectively assesses a construct (centrality of event) that is independent of cognitive biases, and thus claim to endorse the predictive contribution of event centrality to PTSD.

Schuettler and Boals (2011), using a large sample of undergraduate students, examined the roles of event centrality and coping styles in predicting PTSD symptoms. Regression analysis revealed six significant predictors of PTSD which accounted for 66 per cent of the variance. Event centrality and avoidant coping were the top two

predictors. Extending this study, Smeets, Giesbrecht, Raymaekers, Shaw, and Merckelbach (2010) included coping style in their analysis of the relationship between centrality of event and PTSD symptoms, again in a student sample. Here, however, Smeets et al. (2010) focussed on repressive coping style. Results, as per previous studies, indicated a significant positive correlation between CES scores and PTSD symptoms and between dissociation and PTSD scores. Somewhat controversially, this study demonstrated that repressive coping correlated negatively with PTSD symptoms. Of note, in Smeets et al.'s (2010) study, repressive coping is conceived of as a "habitual emotion regulation strategy" (p. 215), an adaptive response to adverse circumstances, thus indicative of resilience. Smeets et al. contrast the concept of repressive coping with that of 'cognitive reactivity,' considering their results in the context of previous studies of cognitive reactivity and resilience (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Coifman, Bonanno, Ray, & Gross, 2007). Importantly, however, such studies have found that resilience in the aftermath of traumatic events is determined by the individual's ability to shift flexibly between enhancing and suppressing emotions (Bonanno et al., 2004). Repressive coping alone is not typically deemed adaptive. Nonetheless, Smeets et al. (2010) demonstrated in their study that centrality of event, repressive coping and dissociation were each found to be independent predictors of PTSD. Webb and Jobson (2011) also replicated findings from previous studies using the CES in a university student sample, demonstrating a significant positive correlation between trauma-centred identity and PTSD symptoms.

Brown, Antonius, Kramer, Root, and Hirst (2010) replicated findings from the aforementioned studies in a clinical sample of combat veterans. Trauma centrality and

PTSD symptoms remained significantly correlated when controlling for depression in subgroups of veterans with and without PTSD. Robinaugh and McNally (2011) similarly reported on findings from a clinical population of adult females reporting a history of childhood sexual abuse. CES scores were significantly positively correlated with PTSD symptom severity and depression, and significantly negatively correlated with self-esteem. Roland, Currier, Rojas-Flores, and Herrera (2013) found that CES scores and PTSD symptom severity were positively correlated in a large sample (n = 257) of violence-exposed teachers in El Salvador.

Lancaster, Rodriguez, and Weston (2011) utilised the CES in a novel way, conducting a path analytic examination of various models of the possible relationships between posttraumatic cognitions and centrality of a trauma to one's sense of self in predicting PTSD symptoms. The authors thus empirically tested a variant of Ehlers and Clark's (2000) cognitive model of PTSD, incorporating centrality of trauma to identity. Although the centrality concept purportedly contradicts the inadequate integration stance inherent in Ehlers and Clark's model, Lancaster et al. (2011) posit that the proposed mechanism of PTSD maintenance is similar in both, i.e., both the cognitive model and the centrality view purport that PTSD is maintained by a heightened sense of current threat resulting from altered appraisals of the world engendered by the experience of trauma. The model employed by Lancaster et al. (2011) locates the CES as mediating the relationship between cognitions/appraisals and PTSD symptoms. Results indicate the existence of positive relationships between posttraumatic cognitions, centrality of event and PTSD symptoms. Controversially, the authors suggest that this mediating role of event centrality calls into question one of the central tenets of Ehlers and Clark's (2000)

cognitive model of PTSD, that of memories for trauma being maintained because they are poorly integrated within autobiographical memory.

Robinaugh and McNally (2010) investigated levels of PTSD in an online, community sample following events inciting shame or guilt and explored the relationship between PTSD symptoms and the centrality of the traumatic memory to participants' identity. The study controlled for depression and also examined visual perspective in traumatic memories (field or observer) as well as other phenomenological properties of these memories, such as emotional intensity, intrusiveness, reliving, contextual details, and personal coherence. As in previous studies, a significant positive correlation was found between PTSD symptoms and centrality of event. The study also found that CES mediated the moderating effect of visual perspective on the relationship between emotional intensity of memories and PTSD symptoms. Based on this, the authors proposed that visual perspective (field or observer) is indicative of the congruence between an individual's identity and their autobiographical memory for the shame-/guilt-provoking event. Results indicated that from an observer perspective, there was no significant relationship between emotional intensity and PTSD symptoms, yet from a field perspective there was a significant association, i.e., greater emotional intensity was associated with increased severity of PTSD. Interestingly, from a field perspective, participants also reported lower personal coherence, but better memory for the setting and spatial layout in which the event occurred.

Rubin et al. (2011) also explored the phenomenological properties of both voluntary and involuntary memories for stressful events associated with PTSD symptoms. In both voluntary and involuntary memories, they found that emotional

intensity, rehearsal of the memory, and centrality of the event to one's life story were positively associated with PTSD. The authors measured other properties traditionally associated with trauma memories, such as incoherence of voluntary memories and enhanced availability of involuntary memories (e.g., Brewin et al., 1996; Ehlers & Clark, 2000). Results showed that participants with PTSD rated their memories as more coherent, a difference which was not modified by voluntary versus involuntary retrieval. Moreover, all memories (traumatic/stressful/important/positive) in participants with PTSD demonstrated more emotional intensity, higher rates of retrieval (both voluntary and involuntary) and were more central to identity. The authors concluded that this implies a tendency for individuals with PTSD to react with intense affect to all memories, which in turn increases rehearsal and encoding and therefore also availability. Of note, participants with PTSD were shown to have memories that were more fragmented ('in pieces') than participants without PTSD, thus supporting the inadequate integration view rather than the centrality position, but the authors suggest that this fragmentation may be related to alcohol abuse and lack of social support rather than PTSD symptom severity.

1.2.10.2 Critique of the centrality view.

Whilst proponents of the centrality view suggest that the findings outlined above provide evidence of the significance of centrality of event in both the development and maintenance of PTSD, it is not yet clear whether trauma-centred identity plays a causal role in the development of the disorder. Indeed, all of the aforementioned studies are cross-sectional in design, thus precluding determination of causality. Furthermore, findings need to be replicated consistently in different populations, particularly clinical populations, as the majority of studies cited in support of the centrality view were

undertaken in student populations only (Brewin, 2011; Brewin, 2013; Robinaugh & McNally, 2011). As noted earlier, prevalence rates for experiencing a trauma are remarkably high, but only a certain number of individuals develop PTSD. Currently influential clinical theories of the disorder (Brewin et al., 2010; Ehlers & Clark, 2000) propose that the disturbance in memory that characterises PTSD cannot be established in healthy survivors of trauma but rather only in those who display poor traumatic adjustment to the extent that they meet criteria for a diagnosis (Brewin, 2013).

With respect to the debate on inadequate integration versus centrality, it is interesting to note that Lancaster et al. (2011) juxtaposed the two apparently contradictory concepts in their model of the relationships between cognitions/appraisals, CES and PTSD. They concluded that their findings significantly challenged the integrity of Ehlers and Clark's (2000) model. Proponents of the inadequate integration view have however suggested that this apparent contradiction is false and may be resolved through consideration of Conway's (2005) various levels of autobiographical memory (i.e., the working self, the conceptual self, and the autobiographical knowledge base). Brewin (2011, 2013) proposes that it is possible to retain conceptual knowledge of the self after experiencing a trauma with the fact of the trauma having happened dominating one's mental life, while also failing to integrate certain episodic memories into the autobiographical knowledge base, thus experiencing trauma memories as fragmented and disconnected. Indeed, proponents of the centrality view cite the positive association between CES scores and PTSD severity as evidence that greater integration leads to greater PTSD (e.g, Berntsen & Rubin, 2007), yet it has been proposed that items on the CES addressing the identity and turning point constructs may drive this association rather

than those addressing the integration of the trauma with other autobiographical memories (Robinaugh & McNally, 2011). Brewin (2013) has also highlighted that several of the CES studies show a problematic reliance on single-item measures to address complex concepts such as fragmentation and disorganisation, and also frequently fail to distinguish between voluntary and involuntary memory.

Of the studies discussed above, the four which examined the phenomenological properties of trauma memories noted that higher CES scores were related to higher ratings of memory vividness, emotional intensity and visceral reactions (Boals, 2010; Robinaugh & McNally, 2010; Rubin et al., 2011; Schuettler & Boals, 2011) and rehearsal (Rubin et al., 2011). In contrast, none of these studies reported evidence of fragmented or disintegrated memories for trauma (with the exception of Rubin et al., (2011) who proposed that the fragmentation they observed was more likely linked to substance misuse than incoherence of the trauma memory).

1.2.10.3 Clinical applications of the centrality view.

Trauma-centred identity appears to be highly significant in the maintenance, at least, of PTSD, and as such, it has been proposed that some individuals may benefit from therapy which explicitly addresses the centrality of the trauma to their view of self/others/the world (e.g., Lancaster et al., 2011; Robinaugh & McNally, 2010; Rubin et al., 2011). The findings relating to trauma-centred identity highlight the importance of considering self-concept in PTSD interventions, such as schema work that addresses 'vulnerable identities' (Brewin, 2003), integrating current views of the self into prior self-knowledge, and making sense of the trauma with respect to existing aspects of self-concept (Hembree & Foa, 2004). Importantly, negative changes in self-concept have

been found to predict a greater risk of developing PTSD (e.g., Dunmore et al., 1997; Ehlers, Mayou, & Bryant, 1998) and poorer response to exposure in those receiving treatment (Ehlers et al., 1998). It has therefore been proposed that construing a trauma as separate from the self may be a necessary step in the effective treatment of PTSD (Boals, 2010; Robinaugh & McNally, 2010; Webb & Jobson, 2011). Indeed, Shamai and Levin-Megged (2006), in their analysis of Holocaust survivors' therapeutic outcomes, concluded that the survivors "achieve[d] a sense of well-being by leaving the traumatic narrative in a capsule separated from other parts of the life-story" (p. 708). Critics of this approach nonetheless highlight that the exact role of centrality of event within PTSD symptomatology has yet to be elucidated; more substantial evidence supporting the effectiveness of separating the trauma memory must be accrued before conclusions can be drawn or current treatment programmes altered (Brewin, 2013).

1.3 Rationale for the current research

In light of the inadequate integration of PTSD trauma memories versus the centrality of PTSD trauma memories debate, the current study proposes to explore further the relationship between trauma-centred identity, autobiographical memory and adjustment to trauma. It will endeavour to investigate if indeed the two apparently opposing positions of centrality (Bernsten & Rubin, 2006) and inadequate integration (e.g., Brewin et al., 1996, 2010; Ehlers & Clark, 2000) can co-exist, as asserted by Brewin (2011, 2013). This will involve analysing the phenomenological properties of memory for trauma and memory for a negative, non-traumatic event with a view to then investigating the relationship between centrality, autobiographical remembering and PTSD symptoms. The inclusion of a negative, non-traumatic memory as a comparison

memory aims to distinguish properties of memory and centrality of event for trauma from those of general autobiographical memories.

Research has consistently shown that trauma narratives of individuals with PTSD are dominated by sensory, perceptual and emotional language (see O'Kearney & Perrott, 2006, for a review). The evidence relating to the fragmentation and disorganisation of trauma memories is, however, less consistent. Certain discrepancies in the literature have been explicated in terms of the different methodologies employed. It has been proposed that self-report standardised questionnaires show lower levels of fragmentation and disorganisation than analyses of trauma narratives (Brewin, 2013; Megias, Ryan, Vaquero, & Frese, 2007; Parry & O'Kearney, 2013). Accordingly, O'Kearney and colleagues (O'Kearney & Perrott, 2006; O' Kearney et al., 2011) highlight the need for further research on trauma narratives in terms of their lexicon and linguistic structure as such features may provide significant insights into memory organisation and the relationship between trauma memories and AM. In a related vein, O'Kearney et al. (2011) highlight the limitations of using memory self-report questionnaires alone and assert that multi-method approaches are critical to assess trauma memory integration within AM and the impact of this phenomenon on posttraumatic adjustment. Recently, Brewin (2013) reviewed findings relating to disorganisation and fragmentation of trauma memories and similarly proposed that brief, self-report measures have yielded less consistent findings than more rigorous, comprehensive studies involving textual analysis of trauma narratives as well as self-report measures. In light of these findings and suggestions, the current study hopes to add to existing research by investigating the

phenomenological properties of memories for trauma using both self-report measures and textual analysis.

Exploration of these issues may lead to greater understanding of the mechanisms at play in the relationship between AM, trauma-centred identity and adjustment to trauma. The results of the study may thus contribute to a theoretical basis for developing interventions for PTSD. If findings support Berntsen and Rubin's (2006) claim that higher levels of trauma integration lead to greater symptom severity, the clinical implications are significant. For example, treatment of PTSD may necessitate distinguishing the trauma memory from a client's self-defining autobiographical memory base, i.e., reframing and separating the trauma so that it is no longer a cognitive reference point for all other experience, but rather a piece of the individual's whole life story and identity (Webb & Jobson, 2011). If, however, evidence for lack of integration of trauma memory into the autobiographical knowledge base emerges, the implications for treatment are, as currently, a continued emphasis on developing conceptual associations between memories of the trauma and existing autobiographical memories (e.g., Ehlers et al., 2005). This approach aims to help the individual to integrate the trauma into their overall life story and identity in such a way as to allow processing of the trauma memory and subsequently, resolution of PTSD symptoms.

1.3.1 Research Questions.

The aim of the current study is to investigate whether disorganised/fragmented memories can be associated with centrality of event to identity (as indexed by the CES), and whether both disorganised/fragmented memories and centrality of event are associated with higher PTSD symptoms.

Specifically, the following research questions will be addressed:

1. Are there differences in the phenomenological properties of trauma memories when compared to non-traumatic, negative memories (as indexed by self-report measures and textual analysis measures)?
2. What phenomenological properties (indexed by both self-report measures and text analysis measures) of trauma memories are associated with higher PTSD symptom severity?
3. What properties of trauma memories (indexed by both self-report measures and text analysis measures) are associated with higher levels of centrality of trauma event to identity?

CHAPTER 2

2 Method

2.1 Overview

In this chapter, the design of the study is outlined. Following this, participant information and the recruitment process employed in the study are detailed. The measures utilised are described, ethical considerations discussed and the procedure reported. The chapter concludes with a plan for statistical analysis of the data obtained.

2.2 Design

The overall objective of the study was to investigate the relationship between trauma-centred identity, selected phenomenological properties of trauma memories and PTSD symptoms. To this end, a quantitative, cross-sectional, correlational within-subjects design was employed whereby all participants completed the same specified set of questionnaires (see section 2.5 below).

2.3 Participants

Participants aged between 18 and 65 years were recruited from the general community population. Inclusion criteria comprised having a sufficient level of English to effectively complete the measures and having experienced a traumatic event. Definition of a traumatic event was based broadly on the DSM-IV PTSD criteria (APA, 1994) as participants' experience of trauma and subsequent eligibility to participate in the study was assessed using the Posttraumatic Stress Diagnostic Scale (PDS).[1]

[1] DSM-5 (2013) is referred to in the introduction to this thesis as this edition of the manual was published in the year of submission, and the study sought to provide up-to-date details on the clinical features of PTSD. The PDS, however, was devised based on DSM-IV criteria for diagnosis of PTSD therefore the study's sample was considered with reference to this text as the study was designed prior to the publication of DSM-5.

Recommended sample sizes were based on calculations using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2009). Assuming a normal distribution in the obtained sample, for multiple two-tailed correlations to be carried out, calculations were based on a medium effect size of 0.3 (Cohen, 1988), an alpha error probability of .05 and power of .80. The sample size required for analysis was 82 participants. This sample size was also deemed adequate for investigating differences between the trauma memory and negative memory using multiple paired t-tests; assuming an effect size of 0.5 (based on previous research e.g., Hellawell & Brewin, 2002; Rubin et al., 2011), an alpha error probability of .05 and power of .80, a sample size of 34 participants was required to detect a significant difference. Given that prevalence rates for experiencing a trauma are estimated at approximately 70 per cent in the general population (Resick, 2001), it was expected that while there would be a large number of trauma survivors displaying a range of PTSD symptoms among study participants, a small proportion of those recruited would not meet the inclusion criteria for trauma exposure, and thus, their data would need to be excluded. Allowing for this exclusion of data relating to individuals who had not experienced a trauma, the study aimed to recruit a minimum of 100 participants in total.

2.4 Ethical considerations

2.4.1 Ethical approval.

Ethical approval for this study was granted by the UEA Faculty of Medicine and Health Sciences Research Ethics Committee (see Appendix A).

2.4.2 Informed consent.

Participants who expressed interest in the study were automatically redirected to the online survey when they clicked on the link on the advertisement. In the participant

information sheet (See Appendix C), potential participants were informed of the general topic of the study and of what participation entailed. The voluntary nature of participation was highlighted and confidentiality of responses assured. Relevant contact numbers and email addresses were also provided. Participants were next presented with a consent form screen (see Appendix D) which clearly explained that by clicking on "NEXT," the participant was giving consent to participate. At the end of each screen, participants were reminded that they had the right to withdraw from the study at any point without giving a reason for doing so. Data belonging to participants who clicked on the option to withdraw were destroyed.

2.4.3 Management of risk and distress.

Participants were deemed to be at some risk of becoming distressed by their involvement in the study as the questionnaires addressed potentially upsetting topics, such as previously experienced traumatic events. As noted above, at the end of each screen, participants were informed that they had the right to withdraw from the study at any point without giving a reason for doing so. Moreover, to minimise potential participant distress, a debrief sheet was provided to participants following participation, regardless of how many questionnaires the participants had completed (see Appendix L). This debrief sheet included details on services available to individuals struggling to cope with their mood, distress and/or memories; participants were advised to contact their GP and were made aware of charitable organisations (e.g., The Samaritans), who may be able to offer them support. Furthermore, telephone numbers and email/postal addresses for the researcher and primary supervisor were provided on both the participant information sheet and the debrief sheet for any participants who wished to contact them in the event

of experiencing distress, or if they had any significant concerns regarding their well-being and/or questions arising from their participation in the study.

2.4.4 Data storage and confidentiality.

Confidential data were held securely. Following study completion, digital data were saved onto the UEA secure hard drive and a password-protected memory stick. Data will be retained for five years in accordance with NHS protocol and the Data Protection Act (1998), i.e., that the research data be archived and accessible for critical review for this period of time (Department of Health, 2005). Participants' contact details for the prize draw were kept on a second encrypted memory stick, separate from that with the digital data from the questionnaires. These details were destroyed as soon as the draw had taken place (immediately after data collection had been completed).

2.4.5 Communicating study results.

After completion of the study questionnaires, all participants were given an opportunity to request that they receive information about the results of the study by providing an email address or contacting the researcher directly via email or telephone. Participants could choose to either be included in the prize draw or receive a summary of findings or both (see section 2.6 below detailing the study procedure, and Appendix K). For the duration of the study, participants' email addresses were stored on an encrypted memory stick and as soon as the summary of findings was sent and the prize winner notified, all contact details were destroyed.

2.5 Measures

2.5.1 Measures assessing posttraumatic psychological adjustment.

2.5.1.1 The Posttraumatic Stress Diagnostic Scale.

Posttraumatic Stress Disorder (PTSD) was assessed using the Posttraumatic stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). The PDS is a 49-item self-report measure which determines the severity of PTSD symptoms related to a single identified traumatic event (Foa et al., 1997). It assesses all DSM-IV criteria for PTSD (APA, 1994) and consists of four parts (see Appendix F). The first part is a trauma checklist which, as noted above, was used to ensure all participants had experienced a trauma event. The second part asks respondents to describe their most upsetting traumatic event. This part was slightly modified in the current study. Typically, in the PDS the participant is provided with a few lines to describe the trauma event. In the current study, in order to obtain rich trauma narratives conducive to textual analysis, participants were given a space of 6,000 characters (approximately 1,000 words) to type to describe this event. The third PDS section assesses the 17 PTSD symptoms outlined in DSM-IV (APA, 1994). Respondents are asked to rate the severity of each symptom on Likert-type scales which range from 0 (*not at all or only one time*) to 3 (*5 or more times a week/almost always*). The fourth and final part of the PDS assesses interference of PTSD symptoms in the individual's everyday functioning and well-being. Total severity scores range from 0 to 51, with scores of 15 or greater indicating clinical caseness (e.g., Sheeran & Zimmerman, 2002). Levels of severity of PTSD symptoms have been categorised as follows: 0 = no rating, 1-10 = mild PTSD, 11-20 = moderate PTSD, 21-35 = moderate-severe PTSD, >36 = severe PTSD. The PDS has shown high face validity and high

internal consistency (α = .92), with test-retest reliability high over a 2-3 week period (kappa = 0.74). The PDS has also demonstrated good convergent validity (kappa = .65; 82 per cent agreement with the PTSD module of the Structured Clinical Interview (SCID); Spitzer, Williams, Gibbons, & First, 1990). The measure is widely used in both clinical and research settings (Elhai, Gray, Kashdan, & Franklin, 2005) and has been consistently validated using samples aged 18-65 years (Keane, Silberbogen, & Weierich, 2008). Internal consistency for the PDS in the current study was high (Cronbach's alpha = .91).

2.5.1.2 The Centre for Epidemiological Studies – Depression scale.

In order to assess depressive symptoms, participants were asked to complete the Centre for Epidemiological Studies – Depression scale (CES-D; Radloff, 1977, see Appendix J). The CES-D consists of 20 items which are rated on a 4-point Likert-type scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). It comprises six scales reflecting major dimensions of depression: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Responses are based on the amount of time in the previous week during which symptoms have been experienced (i.e., ranging from less than one day to 5-7 days). Total score ranges from 0-60 with higher scores reflecting greater levels of depression. The CES-D has been shown to be a reliable measure for assessing the number, types and duration of depressive symptoms (Knight, Williams, McGee & Olaman, 1997; Radloff, 1977; Roberts, Vernon, & Rhoades, 1989). High internal consistency has been reported with Cronbach's alpha coefficients ranging from .85 to .90 across studies (Radloff, 1977). Both concurrent validity by clinical and

self-report criteria and construct validity have been demonstrated (Radloff, 1977). Internal consistency in the current study was found to be high (Cronbach's alpha = .93).

2.5.2 Measure of trauma-centred identity.

2.5.2.1 The Centrality of Event Scale.

Trauma-centred identity was assessed using the Centrality of Event Scale (CES; Berntsen & Rubin, 2006, see Appendix H). The CES is a 20-item Likert-type scale used to determine the extent to which an event is integral to an individual's identity**.** It assesses the extent to which the event is a turning point in one's life, the extent to which the event is central to one's identity, and the extent to which the event acts as a reference point structuring the organisation of autobiographical memory (Berntsen & Rubin, 2006). Responses are scored from 1 (*totally disagree*) to 5 (*totally agree*). Total scores range from 20-100 with higher scores reflecting greater centrality of event. The CES has been shown to correlate with all three symptom clusters of the DSM-IV PTSD diagnosis (Berntsen & Rubin, 2006) (range r = .28–32), and to be highly reliable (range α = .88 – .94). In the current study, participants completed the CES twice; once in relation to a trauma, described as part of the PDS, and once in relation to a negative event. Internal consistency was high (Cronbach's alpha = .96).

2.5.3 Measures of autobiographical memory quality.

2.5.3.1 Narratives.

As outlined above, for the trauma memory, as part of the PDS, participants were asked to write about their trauma in as much detail as possible and were given a large amount of typing space to do this (6,000 characters/1,000 words). Participants were instructed, as in Jobson (2011), to "write about this event in as much detail as you can.

All of your writing will be completely confidential. As you type, do not worry about punctuation or grammar, just write as much as you can and include thoughts, feelings, and reflections." Participants were also asked to describe a negative, non-traumatic event as a comparison memory (see Appendix I). As in the case of their description of a traumatic event, participants were given a large amount of space in which to type as much or as little as they wished. Instructions for this task were the same as those for the trauma memory.

2.5.3.2 Phenomenological properties of memory.

The phenomenological properties of participants' trauma and negative memories were investigated using two methods, a self-report questionnaire and computerised textual analysis.

The self-report measure used was the Autobiographical Memory Questionnaire (AMQ; Rubin, Schrauf, & Greenberg, 2003, see Appendix G). It consists of a set of scales to measure the phenomenological properties of autobiographical memories, i.e., how such memories are perceived and experienced by the individual. The AMQ assesses features of the memory on a 7-point Likert-type scale ranging from 1 (*not at all, completely different*) to 7 (*as clearly as if it were happening right now*). Phenomenological properties assessed by the AMQ include sensory detail of the memory (e.g., items such as '*As I remember the event, I can hear it in my mind*,' and '*As I remember the event, I can see it in my mind*); a sense of reliving experienced while remembering the event ('*As I remember the event, I feel as though I am reliving the original event*' and '*As I remember the event, I feel that I travel back to the time when it happened, that I am a subject in it again, rather than an outside observer tied to the*

present'); coherence of the memory ('*As I remember the event, it comes to me in words*' and '*As I remember the event, it comes to me in words or pictures as a coherent story or episode and not just as an isolated fact, observation or scene*'); and fragmentation ('*My memory of the event is fragmented into specific details with missing bits*'). In keeping with the aim of the current study to investigate fragmentation of trauma memories and centrality of event in relation to PTSD symptom severity, the analysis carried out involved these four AMQ properties as well as 'detail of the memory' ('*My memory for the event is only as detailed as the general knowledge of this type of event that I would expect most people to have*') and rehearsal of the memory ('*Since it happened I have thought or talked about this event*'). Of note, the current study grouped together all sensory items to form a sensory detail subscale, and similarly a reliving subscale and a coherence subscale with the two items pertaining to each (listed above) totalled. This is in keeping with previous research (e.g., Gauer, da Silva Alencastro, & Barbosa Gomes, 2010; Talarico, LaBar & Rubin, 2004).

The AMQ has been used extensively in research on autobiographical memory, mostly in relation to negative, positive and 'stressful' memories; less frequently in relation to traumatic memories, but is deemed suitable for this purpose (Rubin et al., 2011). As the scale is not totalled, reliability estimates cannot be reported. In the current study, participants completed the AMQ in relation to a trauma memory and also a negative, non-traumatic memory.

Textual analysis of the narratives was carried out using Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2007), a computerised textual analysis programme. The two narratives were coded using LIWC for the following lexical and

syntactic categories: number of words, cognitive processes (including, specifically, insight-related and causality-related words), negative emotions, positive emotions, sensory words, use of past tense, use of present tense, conjunctions, and contextual markers, such as spatial references (see Appendix M for examples of the types of lexical items counted by LIWC in these categories). These LIWC categories were chosen because the primary aim of the current study was to investigate trauma memory fragmentation in relation to centrality of event. As outlined earlier, fragmentation and disorganisation in trauma memories are typically operationalised as a lack of narrative coherence upon intentional recall of the trauma. The LIWC categories selected in the current study were based on the use of similar categories and/or comparable indices in previous studies to gauge narrative (in)coherence (e.g., Boals & Perez, 2009; Halligan et al., 2005; Jelinek et al., 2009; Jones et al., 2007; O'Kearney et al., 2011).

2.5.4 Demographics.

Participants were asked to disclose their age, gender, ethnicity, religious affiliation, level of education, and whether or not they had previously been diagnosed with PTSD (see Appendix E for the demographic information form). Apart from details relating to age and gender, these demographic items were not obligatory; participants could not continue to the study questionnaires if they did not provide their age and gender, but they could skip the other items if they so wished.

2.6 Procedure

The study was advertised on free online local advertising websites (namely www.freeads.co.uk; www.adtrader.co.uk; www.adoos.co.uk; www.freeindex.co.uk) and in local newspapers. Family members and friends of the researcher also posted the study

advertisement on social media networking sites, such as Facebook. The advertisement presented the study as an investigation into memory for significant events and how these events relate to one's sense of identity. It did not explicitly call for trauma survivors in order to avoid obtaining a potentially limiting self-selecting sample of individuals who defined themselves in terms of their trauma (see Appendix B).

The advertisement contained the study's website address, which those interested in participating could use to access all necessary information pertaining to the study as well as the questionnaires, which were presented to participants in an online format using SurveyMonkey®. Participants were reminded that they should take time to consider their participation before consenting to take part. Once participants agreed to participate by completing the consent page, they were brought to the study questionnaires (see Appendices D-J), which were presented in the following order (in the majority of cases, see below): demographics, PDS (including narrative of trauma memory), AMQ in relation to trauma memory, CES in relation to trauma memory, narrative of negative memory, AMQ in relation to negative memory, CES in relation to negative memory, CES-D (depression scale). The order of the negative and trauma memories was counterbalanced, and thus, the questionnaires were presented to participants according to their selection of either "1" (trauma narrative and associated tasks first, followed by negative memory and associated tasks) or "2" (negative narrative and associated tasks first, followed by trauma memory and associated tasks). Results showed that less than 5 per cent of participants chose option 2 therefore the vast majority of responses comprised questionnaires completed in the first order. The questionnaires took approximately 45-60 minutes to complete.

Participants' online responses were automatically stored on the secured website when they clicked on "FINISH." On completion of the study, participants were given the opportunity to be entered into a prize draw for £80 Amazon.co.uk vouchers as a way of thanking them for their participation (see Appendix K). Those who wished to be entered into the draw were asked to provide contact details in the form of an email address (see Appendix K). Participants' contact details for the prize draw were kept on an encrypted memory stick, separate from that holding the digital data from completed questionnaires. Following data collection, the researcher randomly selected an email address using 'The Hat,' a free online computer programme that shuffles data and randomly selects one item. Participants' contact details were destroyed as soon as the draw had taken place and the winner was notified.

2.7 Plan of Analysis

Data were analysed using the Statistical Package for Social Science for Windows, version 21.0 (SPSS, 2012). Firstly, data were examined for normality. Given that the majority of variables were non-normally distributed and remained non-normally distributed after attempts at transformation, non-parametric analyses were employed. In order to address the first research question investigating differences between the phenomenological properties of trauma memories and those of non-traumatic, negative memories (as indexed by self-report measures and textual analysis measures), Wilcoxon Signed Rank tests were used. In order to address both the second research question (i.e., what phenomenological properties of trauma memories are associated with PTSD symptoms) and third research question (i.e., what properties of trauma memories are

associated with higher levels of centrality of trauma event to identity), Spearman's Rho correlation co-efficients were employed.

CHAPTER 3

3 Results

3.1 Overview

This chapter begins by reviewing participant characteristics and the data management strategies employed in the study. Reliability and assumptions for parametric analyses are then assessed. Each research question is considered in turn. The chapter concludes with a summary of the study's findings.

3.2 Participant Characteristics

A total of 162 online participants were recruited between May 2013 and September 2013. Sixty-eight participants discontinued the study after completing the consent form (of which four did not give their consent to take part therefore they could not access the study questionnaires). Of the remaining 94 participants, 10 reported no experience of trauma and were therefore excluded from analysis. A further two were excluded for significant missing data.

The remaining 82 participants (male $n = 24$; mean age = 36.10 years, $SD = 10.82$ years) comprised the total number of cases that were analysed. In terms of ethnicity, data were gathered from the open-ended item on the demographic information form which enabled participants to describe their ethnicity in their own words. Twenty-two participants chose not to disclose their ethnicity. The 60 responses obtained were grouped into the following categories: White (including White British, White Irish, White Other), 49 participants; Asian/Asian British/Asian Other, 4 participants; Mixed Race/Multiple Ethnicity, 4 participants; Hispanic, 1 participant; Black/Black British/Black Other, 2 participants, and, finally, Other, 2 participants (these two

respondents described themselves as American Indian and Middle Eastern). Twenty-one participants chose not to disclose their religious affiliation. Of those who did provide this information, the following category totals were observed: Christian (22 participants), Jewish (1), Muslim (4), Hindu (2), Other religion (2), and Not religious (30).

In terms of the highest level of education completed by participants, the following data were gathered: primary school (2), secondary school (6), undergraduate degree/training (24), and postgraduate degree/training (28). Twenty-two participants did not disclose this information.

Five study participants reported that they had received a diagnosis of PTSD in the past. Twenty-one participants did not respond to this item. The remaining 56 reported that they had not received a diagnosis of PTSD. Participants reported a wide range of types of trauma. The most frequently endorsed category on the PDS was 'other' (25 per cent of participants). Participants classed traumas such as domestic violence, traumatic childbirth, learning of a suicide of a close friend or family member, and life-threatening illness of a close friend or family member as 'other.' The second largest category of trauma was accident (17 per cent), followed by life-threatening illness (15 per cent), then non-sexual assault by a family member and sexual assault by a family member (both 7 per cent). Details regarding the numbers of participants who experienced different types of trauma are available in Appendix N. With respect to length of time since occurrence of the trauma, the following details were gathered from the PDS, completed by all 82 participants included in the study's analysis: 1-3 months (2 participants), 3-6 months (3 participants), 6 months-3 years (10 participants), 3-5 years (12 participants), and more than 5 years (55 participants).

The group had a mean PTSD symptom score (as indexed by the PDS) of 11.92 (*SD* = 12.07) and a mean depression score (as indexed by the CES-D) of 18.07 (*SD* = 12.60). In terms of PTSD symptom severity, 15 participants had no symptoms of PTSD, 29 showed mild symptoms of PTSD (i.e. scored between 1-10 on PDS), 18 showed moderate symptoms of PTSD (i.e. scored between 11-20 on the PDS), 11 showed moderate to severe PTSD (i.e. scored between 21-35 on the PDS) and five participants showed severe PTSD (i.e. scored above 35 on the PDS) (Foa et al., 1997). Twenty-five of the study's 82 participants (31 per cent) obtained a score of 15 or more on the PDS, indicating clinical caseness (Sheeran & Zimmerman, 2002).

The sample had a mean score of 61.29 (*SD* = 21.62) for the CES in relation to the trauma event and a mean score of 45.77 (*SD* = 19.90) for the CES in relation to the negative event, which a Wilcoxon Signed Rank Test indicated differed significantly, $Z = 3.81$, $p < .001$, $r = .33$. Furthermore, as found in previous research, Spearman's Rho correlation co-efficient revealed a strong, positive relationship between PTSD symptom severity and CES scores in relation to the trauma event, $r_s(68) = .61$, $p < .001$.

3.3 Treatment of Data

Data were screened and analysed using SPSS 21.0 (SPSS, 2012). Missing data and anomalous values were investigated. No identifiable errors were found. Participants with missing data were subject to pairwise exclusion (Pallant, 2010; Tabachnik & Fidell, 2007).

Data obtained from each measure were examined to ascertain whether or not parametric assumptions were met. Histograms were used to assess data distributions visually. Normality was then tested using skewness and kurtosis values and the

Kolmogorov-Smirnov test statistic, whereby significance values of $p > .05$ indicate normality. Boxplots were used to identify outliers, of which there were none.

Kolmogorov-Smirnov tests revealed non-normally distributed data for PDS scores, AMQ scores in relation to trauma memory, CES scores in relation to trauma memory, depression (CES-D) scores, and LIWC scores on both trauma memory and non-trauma memory narratives. Log and square root transformations were attempted and achieved normality for the PDS and CES-D scores, but did not improve normality for the AMQ trauma scores, CES trauma scores or LIWC scores. Consequently, differences between trauma memories and non-trauma memories on the AMQ were examined using Wilcoxon Signed Rank tests. Correlation analyses which included the AMQ trauma and CES trauma were tested using Spearman's Rho.

3.4 Research Question Testing

3.4.1 Research question one.

1.a. Are there differences in the phenomenological properties of trauma memories and negative memories as indexed by the AMQ?

Table 1 shows that (with Bonferroni adjustment) there was a significant difference between trauma memories and negative memories on the coherence and detail subscales of the AMQ, and a trend towards significance on the fragmentation item of the AMQ; the trauma memory had significantly less cohesion and detail, and tended to be more fragmented than the negative memory. Table 1 also shows that there was no significant difference between trauma memories and non-trauma memories with respect to sensory detail, reliving, and rehearsal.

Table 1

Mean (Standard Deviation) and Median scores on the AMQ for Phenomenological Properties of Trauma and Negative Memories

	Trauma memory[a]	Negative memory[b]	*Z* value	*p* value[c]	Effect size (*r*)[d]
AMQ Subscales Mean (SD) *Mdn*					
Sensory detail	15.74 (5.40) *16*	15.60 (6.59) *16*	-.13	.899	.08
Reliving	7.36 (3.26) *8*	7.11 (3.52) *7*	-.71	.477	.04
Coherence	6.58 (3.51) *7*	8.31 (3.82) *9*	-2.60	.009	.23
Fragmentation	3.33 (2.06) *3*	2.63 (1.62) *2*	-1.82	.069	.06
Detail	2.52 (1.62) *2*	3.39 (1.87) *3*	-2.63	.008	.23
Rehearsal	4.36 (1.71) *4*	4.24 (2.04) 4	-.30	.762	.07

Note [a] *n* for trauma memory = 75

[b] *n* for negative memory = 62

[c] Variant of Bonferroni adjustment (Shaffer, 1995; Wright, 1992) applied to critical values to account for multiple testing (for details of this procedure, see Appendix O).

[d] To calculate effect size (*r*), *n* = number of cases over the two conditions, *df = n-2*

1.b. Are there differences in the phenomenological properties of trauma memories and negative memories, as indexed by LIWC?

Table 2 shows that (with Bonferroni adjustment) Wilcoxon Signed Rank Tests indicated significant differences in measures of cognitive processes and spatial references, and a tendency towards significance with regard to expressed negative emotion; participants scored significantly higher on cognitive processes, lower on spatial references, and tended to score lower in terms of negative emotion in relation to their trauma memory when compared to their non-trauma memory. A trend towards use of more sensory words in trauma narratives was observed. There were no significant differences, however, between trauma memories and non-trauma memories with respect to use of the past tense, use of the present tense, and use of conjunctions.

Table 2

Mean (Standard Deviation) and Median Percentage of Total Word Count for Phenomenological Properties of Trauma and Negative memories, as measured by LIWC

	Trauma memory[a]	Negative memory[b]	*Z* value	*p* value[c]	Effect size (*r*)[d]
LIWC Subscales (% of total word count) Mean (SD) *Mdn*					
Total word count	232 (255.3) *161*	94.39 (89.5) *79*	-5.94	<.001	.49
Cognitive processes	8.98 (4.77) *8.5*	4.93 (3.35) *4.8*	-6.02	< .001	.51
Sensory words	2.94 (2.54) *2.6*	2.48 (3.38) *1.95*	-1.77	.076	.01
Negative emotions	5.75 (7.35) *4.2*	7.50 (5.98) *7.0*	-2.30	.021	.20
Use of past tense	10.28 (11.3) *9.7*	7.83 (5.14) *9.0*	-.94	.348	.03
Use of present tense	4.74 (3.98) *4.0*	5.63 (5.0) *4.45*	-.24	.809	.07
Conjunctions	7.22 (3.30) *7.0*	7.69 (3.63) *8.9*	-.09	.927	.08
Spatial references	3.38 (2.05) *3.3*	4.99 (4.05) *4.4*	-2.58	.010	.21

Note [a] *n* for trauma memory = 82

[b] *n* for negative memory = 62

[c] Variant of Bonferroni adjustment (Shaffer, 1995; Wright, 1992) applied to critical values to account for multiple testing (see Appendix O).

[d] To calculate effect size (*r*) *n* = number of cases over the two conditions, *df = n-2*

3.4.2 Research Question Two.

2.a. What phenomenological properties of trauma memories, as indexed by the AMQ, are associated with PTSD symptoms?

Spearman's Rho correlation analyses were conducted to investigate the relationships between PTSD symptoms and selected phenomenological properties of the trauma memory, as indexed by the AMQ. With Bonferroni adjustment, analyses revealed a positive significant correlation between PTSD symptoms and fragmentation, $r_s(70) = .30$, $p = .008$, and a tendency towards significance in the relationship between PTSD symptoms and sensory details, $r_s(70) = .24$, $p = .04$, and a sense of reliving, $r_s(70) = .26$, $p = .03$. Results also showed a trend toward a negative relationship between rehearsal of the trauma memory and PTSD symptoms, $r_s(70) = -.22$, $p = .06$. There was no significant relationship between PTSD symptoms and coherence, $r_s(70) = -.01$, *ns*, or detail, $r_s(70) = .08$, *ns.*

2.b. What phenomenological properties of trauma memories, as indexed by LIWC, are associated with PTSD symptoms?

Relationships between PTSD symptoms and phenomenological properties of the trauma memory, as indexed by LIWC, were measured using Spearman's Rho correlation co-efficient analyses. With Bonferroni adjustment, results indicated a significant positive correlation between PTSD symptoms and use of the present tense, $r_s(77) = .47$, $p < .001$, a tendency towards significance regarding use of conjunctions, $r_s(77) = .23$, $p = .04$, and a tendency towards a significant negative relationship between PTSD symptoms and spatial references $r_s(77) = -.25$, $p = .03$. Results also showed a trend towards a positive relationship between PTSD symptoms and sensory detail, $r_s(77) = .20$, $p = .08$. Analysis

revealed that there were no significant correlations between PTSD symptom severity and cognitive processes, $r_s(77) = .13$, *ns*, expressed negative emotion, $r_s(77) = .06$, *ns*, and use of the past tense, $r_s(77) = -.10$, *ns*.

3.4.3 Research Question Three.

3.a. What properties of trauma memories, as indexed by the AMQ, are associated with higher levels of centrality of trauma event?

Spearman's Rho correlation co-efficient revealed a medium significant positive correlation between centrality of event to identity and a sense of reliving, $r_s(68) = .29$, $p = .02$. All other trauma memory properties were not significantly correlated with centrality of event score.

3.b. What properties of trauma memories, as indexed by LIWC, are associated with higher levels of centrality of trauma event?

Spearman's Rho correlation co-efficients revealed a positive significant correlation between CES scores and use of the present tense , $r_s(68) = .30$, $p = .01$ (with Bonferroni adjustment), and a tendency towards a significant negative correlation between CES scores and spatial references, $r_s(68) = -.25$, $p = .03$ (with Bonferroni adjustment). All other trauma memory properties were not significantly correlated with CES scores (cognitive processes, $r_s(68) = .12$, *ns*, sensory, $r_s(68) = -.06$, *ns*, negative emotion, $r_s(68) = .03$, *ns*, past tense, $r_s(68) = .01$, *ns*, and conjunctions, $r_s(68) = .00$, *ns*).

3.4.4 Post hoc analysis.

A multiple regression analysis was used to assess the ability of three items on the AMQ to predict PTSD symptoms. The three AMQ items included in the analysis were sensory, reliving and fragmentation. These three variables were selected given the strong

theoretical assertions and past empirical findings suggesting those with PTSD have significant distortions in the re-living, sensory detail and fragmentation properties of their trauma memories (e.g., Brewin, 2011, 2013; O'Kearney & Perrott, 2006). Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedascticity. The total variance in PDS scores explained by the model as a whole was 44 per cent, F (3, 68) = 5.53, p = .002. 'Fragmentation' was the only variable found to make a significant unique contribution to explaining the variance in PDS scores, t (69) = 3.16; β = .34, p = .01.

A further multiple regression analysis was used to assess the ability of four LIWC categories to predict PTSD symptoms. The four LIWC items included in the analysis were sensory, present tense, conjunctions, and spatial references. These variables were selected because previous studies have used similar lexical and syntactic categories as indicators of narrative (in)coherence (e.g., Hellawell & Brewin, 2004; Jelinek et al., 2010; O'Kearney et al., 2011). Again, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedascticity. The total variance in PDS scores explained by the model as a whole was 44 per cent, F (4, 74) = 4.51, p = .003. 'Present tense' was the only variable found to make a significant unique contribution to explaining the variance in PDS scores, t (75) = 2.32; β= .27, p = .02.

3.4.5 Summary of Findings.

The current study first investigated differences between the phenomenological properties of traumatic and negative memories, as indexed by both a self-report measure (AMQ) and a textual analysis programme (LIWC). Using Wilcoxon Signed Rank tests

(with Bonferroni correction), trauma memories (as measured by the AMQ) were shown to be significantly less coherent and less detailed than negative memories, with a tendency towards significantly more fragmentation in trauma memories. No significant differences were found on indices of sensory detail, a sense of reliving, or rehearsal of the memory. Again using Wilcoxon Signed Rank tests (with Bonferroni correction), trauma narratives (as rated by LIWC) were found to contain significantly more terms reflecting cognitive processes and significantly fewer spatial references than negative narratives, as well as a tendency towards significantly less expressed negative emotion and significantly more use of sensory terms. There were no significant differences in terms of use of either past or present tense or use of conjunctions.

Second, using Spearman's Rho correlation co-efficients, the study analysed the relationship between trauma memory properties (as indexed by the AMQ and LIWC) and PTSD symptoms and found a significant positive association between PTSD symptom severity and both fragmentation and use of the present tense (with Bonferroni correction). The study also observed a tendency towards significance in the positive relationship between PTSD symptoms and sensory detail (both AMQ and LIWC-rated), a self-reported sense of reliving, and use of conjunctions. Trends towards a significant negative relationship between PTSD symptoms and rehearsal of the trauma memory and use of spatial references were also noted.

Finally, the study again employed Spearman's Rho correlation co-efficients to examine the relationship between CES scores and trauma memory properties. With Bonferroni correction, results indicated a significant positive association between both a

sense of reliving and use of the present tense and CES scores. All other variables analysed produced insignificant results.

CHAPTER 4

4 Discussion

4.1 Overview

In light of the debate regarding the integration of trauma memories within AM in PTSD, the overall objective of this research was to explore the relationships between trauma-centred identity, autobiographical memory and adjustment to trauma. The study sought to investigate if the two apparently contradictory positions of centrality of event and inadequate integration can co-exist, as asserted by Brewin (2011, 2013). This involved analysing the phenomenological properties of memory for trauma and memory for a negative event, and then examining the relationships between trauma memory features, PTSD symptoms, and trauma-centred identity. Importantly, characteristics of autobiographical remembering were assessed using both a self-report measure and computerised textual analysis of participants' memory narratives.

This chapter first considers the results of the study in relation to existing research findings. Following this, the strengths and limitations of the study are considered. The chapter concludes with a discussion of the theoretical and clinical implications of the findings and directions for future research.

4.2 Summary of Findings

4.2.1 Research Question One.

The first research question investigated whether there were differences in the phenomenological properties of trauma and negative memories, as indexed by a self-report measure (AMQ) and a computerised textual analysis programme (LIWC). Using the AMQ, trauma memories were found to be subjectively rated as significantly less

coherent and less detailed than negative memories with a tendency towards more fragmentation. No differences were found, however, in terms of sensory detail, a sense of reliving, or rehearsal of the memory. Participants' trauma narratives and negative narratives were analysed objectively using LIWC. Compared to negative narratives, trauma narratives were found to contain significantly more terms reflecting cognitive processes and significantly fewer spatial references, as well as a tendency towards less expressed negative emotion and more use of sensory words. There were no observed differences in terms of use of either past or present tense or use of conjunctions. Significant findings are grouped together and discussed in greater detail below under the subheadings of sensory-perceptual detail; coherence, disorganisation and fragmentation, and expressed negative emotion.

4.2.1.1 Sensory-perceptual detail.

While participants' subjective rating of sensory-perceptual detail in their trauma and negative memories did not differ significantly, textual analysis of the narratives found that trauma narratives demonstrated a trend towards significantly more sensory references than non-trauma narratives. This latter finding is in line with previous findings that the trauma memories of those with PTSD are characterised by sensory detail (e.g., Ehlers et al., 2002; Hackmann et al., 2004; Speckens et al., 2007; Hellawell & Brewin, 2002). The current study's discrepant findings relating to sensory detail (self-report measure versus textual analysis) can perhaps be viewed as consistent with Megias et al.'s (2007) proposal that methodological differences in how information about the memory is obtained may determine whether or not certain properties are established. The authors refer to several studies which have ostensibly demonstrated contradictory results having

used either self-report measures of memory characteristics, or other subjective or objective measures (i.e., rater-coded or computer-rated), but not a combination of these. The difficulties inherent in using self-report measures which draw on meta-memory and those involved in using the ratings of an external 'judge' or computer programme in order to gauge and code memory properties will be discussed in greater detail below in the section on the theoretical implications of the current study's findings.

Importantly, in the current study, the sensory subscale of the AMQ lacked an olfactory item, yet olfactory details of participants' narratives were counted by LIWC. This omission is particularly significant in the study of trauma memories given that triggers for intrusive memories in the form of smells have been reported to be more powerful than those prompted by other sensory modalities (e.g., Toffolo, Smeets, & Van den Hout, 2012; Vermetten & Bremner, 2003). Moreover, exploration of the sensory/perceptual detail of trauma memories should involve analysis of all types of sensory image (e.g., Brewin, 2010; Foa et al., 1995; Hellawell & Brewin, 2004). Findings from the linguistic analysis programme in the current study may therefore provide a more comprehensive reflection of the sensory detail in participants' memories and a more useful index for comparison with existing literature relating to differences between trauma and non-trauma memories, as is perhaps evident from the following excerpts taken from study participants' trauma narratives:

> There are no specific memories of the actual accident. However, there are vivid memories of being in the hospital afterward. […] I remember it being very quiet other than machines beeping and the quick pace of the nurses. I also DISTINCTLY remember the smell. Any time I smell something similar, it takes me right back. Another thing I remember is the taste of the juices I had to drink. Apple juice. (I can't stomach it anymore)
> *Participant number 9; PDS score = 25, indicative of moderate-severe PTSD*

> I often have bitty memories of it and wonder if it was real at all but then it feels so real and i can smell his smell(whiskey) and i can feel the sick feeling in my stomach and the dread and the fear and the sense of releif later. i can't see the room but again i can smell the weird mothball small and i can hear a clock ticking and the whole thing just makes me shake even now writing this out.
> *Participant number 40, PDS score = 31, indicative of moderate-severe PTSD*[2]

Of note, the LIWC findings of a trend towards significantly more sensory detail in trauma narratives than in negative narratives support both clinical theories of PTSD (e.g., Brewin et al., 1996, Brewin et al., 2010; Ehlers & Clark, 2000) and the work of cognitive psychologists who endorse the centrality view (e.g., Rubin et al., 2008) as both propose that trauma memories are more sensory-laden than non-trauma memories.

4.2.1.2 Coherence, disorganisation and fragmentation.

As discussed previously, the terms fragmentation and disorganisation are frequently used interchangeably in the literature and both constructs are typically operationalised as a lack of narrative coherence upon intentional recall of the trauma memory. These phenomena will therefore be considered together here. Previous studies have demonstrated narrative incoherence in PTSD by measuring features such as confused temporal order, lack of contextual markers, an inability to recall important aspects of the trauma, lack of complexity of the narrative, lack of detail, repetition, unfinished thoughts, speech fillers, and an absence of organised thoughts (e.g., Foa et al., 1995; Halligan et al., 2003).

In the current study, participants rated their trauma memory as significantly less coherent than their negative memory, with a tendency towards greater fragmentation in the former, findings that are consistent with previous research using self-report measures

[2] Participants' trauma narratives are presented as typed in their online responses to the study's questionnaires. Importantly, as the excerpts included in this thesis are direct citations from participants' narratives, errors in spelling and/or punctuation are not corrected.

(e.g., Engelhard, Van den Hout, Kindt, Arnz,& Schouten., 2003; Halligan et al., 2003). Also significant was the finding that participants rated their trauma memory as significantly less detailed than their non-traumatic memory, a result that is again in keeping with existing empirical data (e.g., Halligan et al., 2003), and compatible with the aforementioned findings regarding self-ratings of coherence and fragmentation. The following excerpt captures the fragmented nature of such trauma memories, highlighting how certain details of the memory may be lacking, while also illustrating the intrusive nature of involuntary memories. Other elements of incoherence of the narrative are also evident, such as errors and unfinished utterances:

> The memories and blurry, choppy, repressed. But every now and then I am burdened with a sudden onset of violation and frustration. I don't remember everything, but I remember enough. I was six years old the first time it ever happened. I used to wet the bed at night. I'd be so afraid to tell my mother... Eventually my step dad caught wind of what was happening and he would help me clean the sheets. Once everything was cleaned up, he would come back to bed with me...I feel as though details ate not necessary, I can barely remember details. The brain is such an intricate, and unique organ. It continues to repress, but the the memories still push on through.
> *Participant number 142; PDS score = 19, indicative of moderate PTSD*

Further indicative of the incoherence and disorganisation of the trauma memory was the current study's finding that participants' trauma narratives contained significantly fewer spatial references than their non-trauma narratives, demonstrating a lack of contextual detail, again concordant with previous findings (e.g., Foa et al., 1995; Jelinek et al., 2010; Parry & O'Kearney, 2013), and suggestive of poor elaboration and contextualisation of the trauma memory within AM (Conway, 2005; Ehlers & Clark, 2000).

An absence of 'organised thoughts,' referring to statements indicating realisation, decision-making, or planning (Foa et al., 1995; Halligan et al., 2005), is also considered a

marker of narrative incoherence, and therefore of disorganisation and fragmentation. In an attempt to measure this property of memories, the current study used LIWC to calculate the number of 'cognitive processes' observed in trauma and non-trauma narratives and found that the former contained more cognitive processes than the latter. Importantly, in this category, LIWC counts words relating to cognitive processes, such as 'think, realise, know, hence, understand' (see Appendix M for details). Research has shown that elevated use of such 'cognitive' terms to describe stressful experiences is typical in the aftermath of such events (Cohn, Mehl, Pennebaker, 2004; Pennebaker & Lay, 2002). Such an increase in cognitive word use has been interpreted as indicating that the individual is searching for meaning and understanding of the event (Boals & Klein, 2005; Boals & Perez, 2009; Klein & Boals, 2010), a process that is thought to precede and contribute to the development of narrative coherence (Boals & Perez, 2009; Jelinek et al., 2010). Indeed, high levels of cognitive word use have been shown to reflect adaptive psychological adjustment and effective coping mechanisms in Holocaust survivors (Boals & Perez, 2009). It is nonetheless important to note that the measurement of cognitive processes in the current study was limited by the use of LIWC as this software does not measure these lexical items in context. For example, expressions containing cognitive words, such as 'believe, think, know, understand, realise, therefore, because' are not considered in conjunction with any negative qualifiers, such as '(I don't) understand.' The latter phrase would likely indicate a lack of 'organised thoughts' as conceptualised by Foa and colleagues (1995), characteristic of poor psychological adjustment, but indicates 'use of cognitive processes' according to LIWC, which may be interpreted mistakenly as adaptive. The following excerpt from a

trauma narrative illustrates how neglecting the negatives accompanying indicators of cognitive processes renders interpretation of the current study's results quite difficult:

> I never really realized what had happened until I was 15. I can't comprehend why it happened.
> *Participant number 32; PDS score = 22, indicative of moderate-severe PTSD*

The methodological limitations encountered through the use of LIWC are discussed in greater detail in section 4.4.3.5 below.

4.2.1.3 Expressed negative emotion.

The current study found that trauma narratives contained fewer negative emotion words than non-trauma narratives, a finding that is inconsistent with certain previous studies (e.g., Holmes et al., 2007) while in keeping with others (e.g., Jelinek et al., 2010). The relative lack of expressed negative emotion observed in the current study's trauma narratives may be explained in terms of PTSD sufferers' tendency to avoid talking or thinking about the trauma, and the emotional numbing that can occur following such an experience (APA, 2013). Recent studies (e.g., Jelinek et al., 2010) have also explained low levels of expressed negative emotion in terms of the higher levels of alexithymia reported in individuals with PTSD (Frewen, Dozois, Neufield, & Lanius, 2008). As with those phenomenological properties of memories discussed above, however, it is important to note that LIWC may not have accurately measured participants' negative emotions. The category 'negative affect' is thought to inadequately cover the entire range of negative emotions found in sufferers of PTSD; for example, feelings of guilt, shame and disgust are not included under this label (Jelinek et al., 2010). The following excerpt clearly illustrates a lack of expressed (and felt) negative emotion, however, and is

suggestive of the numbing and alienation characteristic of clinical levels of PTSD (APA, 2013):

> I was able to recall memories but they were like derivatives - not my own but someone else's. Mentally, I knew they were mine but they felt removed, I had no emotional or direct connection to them. The same was true of how I felt or related to my wife or children.
> *Participant 148; PDS score = 16, indicative of moderate PTSD*

When considering the current study's findings regarding differences between trauma and non-trauma memories, it is important to note that participants were requested to write and think about a trauma memory and a non-traumatic, negative memory, unlike many previous studies which elicited positive memories as a comparison to trauma memories (e.g., Boals, 2010). Some of the events detailed as non-traumatic in the current study included events such as relationship break-ups, divorce, redundancy, death of a life-long pet, and diagnosis of chronic illness, as well as more everyday events, such as losing in a sporting event and delays in transport. The apparent lack of difference between the two types of memory observed on some indices may be due to the fact that many participants chose events that were highly important to them and had affected them quite significantly. It is easier to find differences between traumatic and positive memories; the use of negative, non-traumatic memories as a comparison in the current study is thus a strength, but this may also have limited findings of difference.

4.2.2 Research question two.

The second research question involved analysing the relationship between the phenomenological properties of trauma memories, indexed by the AMQ and LIWC, and PTSD symptoms. Findings will now be discussed under the subheadings of sensory-perceptual detail, sense of reliving, fragmentation/incoherence, and rehearsal.

4.2.2.1 Sensory-perceptual detail.

The current study revealed a strong tendency towards a significant positive association between sensory-perceptual detail (as indexed by the AMQ) and PTSD symptoms, thus largely in keeping with findings from several previous studies (e.g., Berntsen et al., 2003; Engelhard et al., 2003; Murray et al., 2002; van der Kolk & Fisler, 1995). Results also indicated a tendency towards a positive relationship between sensory-perceptual detail (as measured by LIWC) and PTSD symptoms. Inspection of the trauma narratives suggests the presence of this relationship, particularly in narratives of participants scoring in the moderate-severe and severe ranges of PTSD symptom severity, as is evident in the following extracts:

> [ ] and weirdly i don't remember the pain as much as the smells and the sounds and the rag stuffed in my mouth making me gag.
> *Participant number 6; PDS score = 41, indicative of severe PTSD*

> I don't remember the content of the conversation at all or what the remark was that had led to it- the shouting and the way in which he was physically restraining me from leaving the bed - thereby escaping him - is what I can recall.
> *Participant number 7; PDS score = 29, indicative of moderate-severe PTSD*

4.2.2.2 Sense of reliving.

The current study demonstrated a significant positive association between use of the present tense in trauma narratives and PTSD symptoms, and a tendency towards a positive relationship between the latter and a self-reported sense of reliving when remembering the trauma. Both findings are in keeping with previous studies (e.g., Hackmann, Ehlers, Speckens, & Clark, 2004; Hellawell & Brewin, 2004; Young, 2000). Use of the present tense in trauma narratives has previously been interpreted as indicative of flashbacks (e.g., Hellawell & Brewin, 2004). Spontaneous shifting from past to

present tense may also be viewed as illustrative of the disorganisation of the trauma memory (e.g., Young, 2000). The current study's findings therefore pertain to discussions on both reliving and disorganisation/fragmentation. The following narrative excerpts illustrate an unambiguous sense of the 'here-and-now' quality of trauma memories, indicative of the intrusive symptoms of PTSD:

> I can see his face now in a rage, his eyes are really wild and crazy and it's pretty clear he's going to blow and then he starts smashing things and comes over to me and is screaming and pushing me away but coming right up again then and it just goes on lilke that until he clams down by which point he has ususally yanked me around the place and hurt me, i always had these burns on my arms from where he would twist them like capet burns really. I can hear him shouting but i can't make out what he's saying, i just know i'm gonna get it.
> *Participant number 28; PDS score = 36, indicative of severe PTSD*

> YOU'RE GOING TO NEED A CAESAREAN. Sign this, consent, bleeding, death, put a line in here, take this tablet, have this medicine, husband go here, wear this. *Participant 45; PDS score = 17, indicative of moderate PTSD*

Interestingly, a recent study found that participants used more past tense constructions when describing a previously disclosed event and more present tense constructions when describing an undisclosed event (Pasupathi, 2007). The author proposed that use of the past tense could indicate increased psychological distance and a higher degree of resolution for disclosed events compared to undisclosed events. This hypothesis may provide further insight into the current study's findings relating to present tense use and PTSD symptom severity, especially when these results are considered in conjunction with findings relating to rehearsal of the trauma memory, outlined in section 4.2.2.4 below.

4.2.2.3 Fragmentation and incoherence.

In keeping with previous research on the subject (e.g., Engelhard et al., 2003; Hellawell & Brewin, 2004; Murray et al., 2002; Rubin et al., 2011), the current study found a positive relationship between PTSD symptoms and participants' rating of their trauma memory as fragmented. Indicators of this reported fragmentation are also apparent upon inspection of the trauma narratives. The following excerpts contain features such as direct references to the fragmented nature of the memory, abrupt changes in tense, temporal disorganisation, lack of detail, lack of complexity of the narrative, and lack of contextual markers:

> repeated sexual assault by a great unclue but no idead even how old i was definately young maybe 4 5 6 I'm not so sure. I often have bitty memories of it and wonder if it was real at all but then it feels so real
> *Participant number 109; PDS score = 31, indicative of moderate-severe PTSD*

> I remember a few seconds before the accident, when it was already clear that the car is approaching and the speed is high to stop in time. I couldnt even move and watching it hitting my side of the car like in a slow motion.
> *Participant number 87; PDS score = 7, indicative of mild PTSD*

Earlier studies have analysed use of conjunctions in narratives as indicators of coherence (e.g., Graesser, McNamara, Louwerse, & Cai, 2004; O'Kearney et al., 2011). Somewhat unexpectedly, the current study found a tendency towards a significant positive association between use of conjunctions in trauma narratives and PTSD symptom severity. As outlined earlier, fragmentation of the trauma memory is typically observed as a lack of coherence in the trauma narrative (e.g., Brewin et al., 1996; Ehlers & Clark, 2000). As such, a negative relationship between PTSD symptoms and use of conjunctions would be anticipated. The current study's findings may be explained, however, with reference to the limited sophistication of LIWC's method for counting

such conjunctions. LIWC simply calculates the percentage of conjunctions relative to overall word count without taking contextual details into account. Certain trauma narratives may contain large numbers of conjunctions but may not present as 'coherent,' as is the case in the following excerpt containing 12 conjunctions within one sentence:

> It's all a bit jumbled and all over the place and i don't realy know the exact order of what went on but i can smeel the smells and hear the sounds and it is all just so horrible and disgusting and feels interminable biut obviously it did stop at some point although i think i kinda zoned out out during it coz it just seeemed like the best thing to do and weirdly i don't remember the pain as much as the smells and the sounds and the rag stuffed in my mouth making me gag.
> *Participant number 6; PDS score = 41, indicative of severe PTSD*

The current study also found that participants with higher PTSD scores used fewer spatial references in their trauma narratives, thus in keeping with certain previous studies' findings regarding lack of contextual detail in trauma memories (e.g., Parry & O'Kearney, 2013), while inconsistent with others typically cited in support of the centrality view (e.g., Robinaugh & McNally, 2010).

4.2.2.4 Rehearsal.

The current study used an item on the AMQ to measure rehearsal of the trauma memory ('*I have thought or talked about the event since it happened*'). Previous studies using the AMQ have found greater rehearsal to be associated with higher levels of PTSD symptoms (e.g., Rubin et al., 2011), and have cited these findings in support of the centrality view which asserts that increased rehearsal leads to increased availability of the memory and thus raises PTSD symptom levels (Berntsen & Rubin, 2006; 2007). The current study found the opposite, i.e., participants with greater PTSD symptom severity reported less rehearsal of their trauma memory. This finding is perhaps suggestive of higher levels of avoidance in participants with greater PTSD symptom severity, an

interpretation that would be consistent with the concept of poor elaboration of the trauma memory, central to prominent clinical theories of PTSD (e.g., Brewin et al., 1996; 2010; Conway, 2005; Ehlers & Clark, 2000). This finding may also perhaps be understood with reference to Pasupathi's (2007) proposal that present tense use is greater in trauma narratives for undisclosed (therefore unrehearsed) events, particularly as the current study found that greater present tense usage was significantly associated with higher levels of PTSD. Inspection of the trauma narratives obtained in the current study suggests that participants with higher levels of PTSD attempted to suppress and avoid their trauma memories rather than rehearse them. Thought suppression and avoidance of talking about the trauma are examples of the cognitive and behavioural responses in which trauma survivors with PTSD typically engage in an attempt to reduce their fear and distress, but which ultimately lead to increased symptom severity as the trauma memory cannot be elaborated or contextualised with AM (Ehlers & Clark, 2000). The following excerpts illustrate such attempts at thought suppression and avoidance:

> When i remember it I usually get to the bit where he grabs my arms and i try to not think about it but can see it, my 2 arms in in just one of his to stop me from hitting back and i can feel the clench (he was very strong, had a tight hold of me) and his face is up in mine and i am terrified,i know i'm in for some serious pain and i guess sometimes i'm like, oh my god, i could actually die this time or maybe he will injure me so badly that i will never be physically ok and i worry that i might get brain damage and turn into a vegetable, i would definitely prefer to die.
> *Participant number 37, PDS score = 40, indicative of severe PTSD*

> I am still not sure if I can describe this as an assault or attempted assault which is why I find it so hard to come to terms with it and why I havent told anyone about it - Its also why I ticked both boxes because I dont know if it falls into both categories. I am deeply ashamed of it though.
> *Participant number 68; PDS score = 8, indicative of mild PTSD*

In contrast, other trauma narratives conveyed the positive effects of rehearsal in terms of posttraumatic adjustment:

> I began to acknowledge that I was angry scared and resentful to the event my reaction and the perpetrators. I spoke with my friends about it, the court case was dragged out for almost two years. The support of my parents through that made a huge difference to me. I am a healthcare professional myself now and the interactions with the various professions had a big effect. My GP followed up a few days after the event and he acknowledged that I was lucky in terms of my injuries and the main effect was going to be psychological. Acknowledging this made a huge difference. I now openly talk about my experience and I think it has in a strange way added to my character in a positive manner.
> *Participant number 72; PDS score = 0, indicative of no PTSD*

4.2.3 Research question three.

The third research question examined the association between selected phenomenological properties of trauma memories and centrality of event scores. Informing this exploration were the current study's findings that PTSD symptom severity and centrality of event were strongly correlated, and that the trauma event reported by participants was significantly more central to identity than the negative event. Both of these findings were in keeping with previous research (e.g., Brown et al., 2010; Lancaster et al., 2011; Roland et al., 2013; Rubin, 2011). Of the memory properties included in the current analysis, the 'reliving' item from the AMQ and the 'present tense' category in LIWC were found to have a significant positive association with CES scores, i.e., participants who rated their trauma as more central to their identity experienced a greater sense of reliving when remembering the trauma and used more present tense constructions to describe it. In addition, the LIWC category of spatial references was found to show a tendency towards a significant negative association with centrality of event.

Given that use of the present tense is considered indicative of reliving experiences (e.g., Hellawell & Brewin, 2004), it is perhaps logical that 'present tense use' and 'reliving' would function in a similar fashion and that therefore both or neither would correlate with CES scores. The sense of reliving reported by participants with higher CES scores and observed in their trauma narratives may be viewed as concordant with both the inadequate integration theory of PTSD and the centrality view, as is discussed in 4.6 below. The study's findings regarding the relationship between CES and reliving/present tense are consistent with those of the few existing studies that have investigated this relationship (e.g., Boals, 2010; Robinaugh & McNally, 2010). Of note, present tense use, and in particular, spontaneous shifting from past to present tense, is also regarded as indicative of disorganisation and fragmentation of the memory (e.g., Hellawell & Brewin, 2004; Young, 2000). Moreover, a lack of spatial references, observed in the current study to be related to higher CES scores, may perhaps also be considered to demonstrate some level of disorganisation and/or fragmentation of the memory. As such, though moderate, these findings may tentatively be taken to suggest that centrality of event and fragmentation (as indexed by characteristics of the trauma memory, such as present tense use) may co-exist, although such results may depend on whether the fragmentation in question is established through self-report or textual analysis, and, importantly, on how constructs such as fragmentation, disorganisation and coherence are defined, as is discussed further in section 4.6 below.

Previous studies that have used both the AMQ and CES in relation to trauma have assessed other phenomenological properties of the trauma memory, such as vividness, emotional intensity, visceral reactions, rehearsal and contextual detail, and have reported

higher levels of all as related to trauma-centred identity (Boals, 2010; Robinaugh & McNally, 2010; Rubin et al., 2011; Schuettler & Boals, 2011). Of these memory properties, the present study examined the relationship between rehearsal of the trauma memory and centrality of event scores and found a non-significant negative relationship. This result is inconsistent with the aforementioned studies' findings and with the centrality view that increased rehearsal is associated with greater centrality of event, and subsequently, greater PTSD symptom severity (Berntsen & Rubin, 2006; 2007; Rubin, Berntsen, & Bohni, 2008). The present study chose not to examine items such as emotional intensity and visceral reactions as these properties of trauma memories are well-documented in the literature as associated with high levels of PTSD symptom severity (e.g., Brewin, 2011; O'Kearney & Perrott, 2006) and are not of pertinence to the primary aims of this study.

Importantly, the current study found no relationship between centrality of event and the other AMQ properties of the trauma memory analysed. These were: sensory detail, coherence, fragmentation, and level of detail of the memory. Likewise, the study failed to establish a relationship between centrality of event and the other LIWC variables analysed (cognitive processes, sensory words, negative emotions, use of past tense, and use of conjunctions). Therefore, whilst the positive relationship between present tense use in trauma narratives and centrality of event may be deemed illustrative of a certain level of fragmentation/disorganisation, consideration of this result in light of other findings obtained in the study is imperative. Findings regarding the lack of relationship between traditional indices of fragmentation/disorganisation (e.g., self-reported coherence, fragmentation, and level of detail of the memory) and centrality of event

would suggest that the current study failed to provide substantial evidence that fragmentation and trauma-centred identity can co-exist. However, as noted earlier, certain memory properties typically cited as evidence for the centrality view, such as self-reported rehearsal of the memory (e.g., Rubin et al., 2011), equally showed no relationship to CES scores in the current study. Also of note, the current study found significant relationships between PTSD symptoms and each of fragmentation, present tense use (also indicative of fragmentation and disorganisation) and centrality of event. When viewed together, these latter findings suggest that fragmentation and centrality of event may possibly co-exist in individuals with PTSD. Indeed, inspection of the trauma narratives obtained in the study suggests that individuals reporting high levels of trauma-centred identity may experience this altered sense of self as a form of 'permanent change,' as described by Ehlers et al. (2000) and outlined in the introduction to this study. The following excerpt illustrates the perceived sense of irrevocable damage and permanent change engendered by trauma:

> I always think of myself as bad and ruined, damaged in a way that I can never move beyond.
> *Participant number 155; PDS score = 34, indicative of moderate-severe PTSD; CES score = 79, indicative of high trauma-centred identity.*

Such permanent change has previously been observed in trauma sufferers also reporting high levels of fragmentation and disorganisation of their trauma memories (e.g., Ehlers et al., 2000). Importantly, the ramifications of construing a trauma as integral to one's identity are acknowledged and detailed by both clinical theories of PTSD and the centrality position, as is discussed further in section 4.6 below.

The study's collective findings regarding the interrelations between trauma-centred identity (as measured by the CES), fragmentation, and PTSD symptom severity are nonetheless inconclusive, and must be interpreted with caution.

4.2.3 Subsidiary analyses.

A multiple regression analysis was carried out to assess the fit of a model of three self-report (AMQ) items (sensory detail, reliving and fragmentation) in terms of predicting PTSD symptoms. These three properties of the trauma memory were selected because of the existing evidence base demonstrating a relationship between such memory features and PTSD symptom severity (e.g., Brewin, 2013; O'Kearney & Perrott, 2006). Taken together, the model predicted 44 per cent of variance in scores suggesting that these memory properties did, to a considerable extent, account for PTSD symptoms. Of these, 'fragmentation' was the only variable to make a unique significant contribution (34 per cent). This finding, though tentative and exploratory in nature, may conceivably be interpreted as in keeping with studies supporting inadequate integration theories of PTSD (e.g., Brewin et al., 1996; 2010; Ehlers & Clark, 2000). The finding is therefore inconsistent with results from studies indicating no predictive role for fragmentation in PTSD symptom severity, i.e., studies that advocate the centrality view (e.g., McNally, 2003; Rubin, 2011; Rubin et al., 2010).

A further multiple regression analysis was used to evaluate the relationship between PTSD symptom severity and four textual analysis (LIWC) categories of interest (sensory, present tense, conjunctions, and spatial references). Again these items were chosen for analysis because of the extant literature documenting these properties as indicators of narrative (in)coherence/fragmentation/disorganisation (e.g., Foa et al.,

1995; Hellawell & Brewin, 2004; O' Kearney et al., 2011). Again, as a whole, the model explained 44 per cent of the variance in PTSD scores. 'Present tense' made a significant unique contribution to explaining the variance in PTSD scores (27 per cent). As already noted several times, use of the present tense is considered to indicate narrative incoherence, a marker of fragmentation (e.g., Hellawell & Brewin, 2004; Jelinek et al., 2010), therefore it is perhaps unsurprising that both fragmentation and present tense were the strongest unique predictors found in these two subsidiary analyses. Importantly, present tense use also signals the presence of reliving symptoms of PTSD and previous studies have found intrusive memories to be the strongest predictor of long-term PTSD severity and poor treatment response (e.g., Brewin et al., 2010; Brewin, 2013; Kleim et al., 2007; Michael et al., 2005; Speckens et al., 2006). The current study's post hoc analysis findings, though moderate and exploratory in nature, may be interpreted as providing support for the clinical theories of PTSD that conceptualise the disorder in terms of inadequate integration and contextualisation of the trauma memory within AM.

4.3 Overall summary of findings

Trauma memories were found to be significantly less coherent, less detailed and to contain fewer spatial references and less expressed negative emotion than negative memories. These findings suggest that within AM trauma memories are less consolidated, less contextualised and less elaborated than negative memories. Such results thus support the contemporary clinical theories of PTSD which propose that disturbance in memory, in terms of both encoding and recall, result in a trauma memory that is inadequately integrated and poorly elaborated within AM, and that this process is fundamental to the development and maintenance of the disorder (e.g., Brewin et al.,

1996; 2010; Ehlers & Clark, 2000). The study's finding that trauma memories contained less expressed negative emotion than negative memories was inconsistent with certain previous studies while in keeping with others. This was interpreted in terms of the avoidance and emotional numbing symptoms of PTSD (APA, 2013) and in terms of the documented increased levels of alexithymia in sufferers of the disorder (Frewen et al., 2008). The study observed certain discrepancies in findings obtained from the AMQ and those obtained from LIWC. For example, participants reported no difference between their trauma memories and negative memories on the AMQ in terms of sensory detail, yet LIWC observed a near-significant difference. Such disparities were explored in terms of the difference in construct being measured (i.e., lack of an olfactory item on the AMQ versus all sensory modalities included in the LIWC analysis), with brief mention of the difficulties inherent in comparing self-report findings with other-rated findings, an issue that will be discussed in greater detail in section 4.6 below.

The inadequate integration position espoused by contemporary clinical theories of PTSD was further supported by the current study's findings of a significant positive association between symptoms of the disorder and both self-reported fragmentation and use of the present tense in trauma narratives. The study also noted a tendency towards significance in the relationship between PTSD symptoms and sensory detail (both self-report and LIWC-rated) and a self-reported sense of reliving. These latter findings are in keeping with previous studies and are consistent with both clinical theories of PTSD (e.g., Brewin et al., 1996; Ehlers & Clark, 2000) and recent cognitive psychologists' conceptualisations of the disorder (e.g., Rubin et al., 2008). The study revealed an unexpected finding that increased use of conjunctions in the trauma narrative was

associated with greater PTSD symptom severity. Greater use of conjunctions is typically interpreted as a mark of narrative coherence. Consideration of the impact of LIWC's limited method of counting such syntactical features without taking context into account was essential when interpreting such findings. Finally, the study revealed a tendency towards a significant negative association between PTSD symptoms and use of spatial references in the trauma narrative, again suggesting a certain lack of contextualisation of the trauma memory within AM.

In keeping with previous research, the study revealed a strong positive correlation between PTSD symptom severity and CES scores, and a significant difference between CES scores for the trauma memory and negative memory, whereby the trauma was more central to identity than the negative event. Centrality of event was then found to be significantly positively associated with a self-reported sense of reliving and use of the present tense in the trauma narrative. Certain theorists and clinicians purport that present tense use in trauma narratives, and in particular, spontaneous shifting from past to present tense, indicates disorganisation and fragmentation of the memory (e.g., Hellawell & Brewin, 2004; Young, 2000). In this sense, the finding regarding the relationship between CES scores and present tense use may possibly suggest that trauma-centred identity and fragmentation are not wholly incompatible. It is essential, however, to consider this finding in relation to the observed lack of relationship between CES scores and self-reported fragmentation, and indeed other traditional indices of fragmentation/disorganisation/incoherence. The study's findings in this respect are therefore inconclusive and must be interpreted with caution.

The post hoc analysis undertaken provided some support for the role of both fragmentation and use of present tense in trauma narratives in predicting PTSD symptom severity. These findings were again considered to endorse clinical theories of the disorder in terms of both fragmentation and use of present tense, and to support the work of proponents of the centrality view in terms of present tense use as an indicator of reliving symptoms of PTSD. These results were considered in light of the established predictive role of intrusive, reliving symptoms in terms of long-term PTSD severity and poor response to treatment.

Collectively, the study's findings may be seen to partially support prominent clinical models and theories of PTSD, but nonetheless fail to provide substantial evidence regarding the co-existence of centrality of event and fragmentation of the trauma memory, as proposed by Brewin (2011, 2013). Moreover, as previously noted, the sample size in question in the current study was relatively small, and certain analyses undertaken were exploratory in nature; the findings outlined above should thus be interpreted with caution.

4.4 Methodological strengths and limitations

4.4.1 Design.

The design employed in the current study had certain strengths. The advertisement recruiting participants did not explicitly call for trauma survivors thus reducing selection bias. With a view to promoting ease of participation, use of online questionnaires enabled participants to take part in the study at their own convenience. Furthermore, it allowed for complete anonymity, an important consideration given the sensitive nature of information disclosed by participants in the study. The online nature

of the study also facilitated wide distribution which allowed the researcher to obtain a diverse sample thereby increasing ecological validity. Moreover, online research prevents experimenter demand effects and social conformity bias as there is no interaction with the experimenter or with other participants (Kraut et al., 2004). This was particularly important in the current study given ethical considerations with regard to participants' option to discontinue at any point during completion of the questionnaires.

The current study compared trauma memories with negative, non-traumatic memories. Most previous studies in the area have used positive memories as a control/comparison (e.g., Boals, 2010; Bohanek, Fivush, & Walker, 2005). It has previously been proposed that PTSD may be associated with deficits in neutral, positive or negative memories which are not uniquely related to trauma (McNally, 2003). The current study's selection of a negative memory as a comparison memory aimed to distinguish properties of memory for trauma from those of general autobiographical memories. The choice of a negative memory is a strength as it comprised a strict comparative given that the memories should be quite similar in terms of valence, thereby facilitating exploration of exceptional and anomalous features of trauma memories. This design has been employed effectively in a small number of previous studies (e.g., Halligan et al., 2003; Jelinek et al., 2010). Another important strength of the current study is its use of both self-report measures and a computerised textual analysis programme. Moreover, the study obtained rich data in the form of participants' trauma and non-trauma narratives. These measures are discussed in greater detail in section 4.4.3 below.

The current study also had several design limitations. The cross-sectional, correlational design prevented assessment of change over time, a factor possibly influencing PTSD presentation and precluded the possibility of drawing causal inferences. As a retrospective study of memory, time elapsed since the recalled events may also have comprised a confounding variable, thus potentially introducing bias on memory through distortion and selective recall (e.g., Gray & Lombardo, 2001). Future analyses may benefit from controlling time since event to limit this bias. Typical of online studies, attrition rates were quite high (e.g., Kraut et al., 2004); large numbers of participants chose not to continue after completing the consent form. It is possible that the estimated length of time involved in participation (45-60 minutes) deterred some participants. Admittedly, the study involved a certain level of participant burden given the number of questionnaires to be completed. The progress bar at the top of each screen allowed participants to see how much of the study they had completed; as such, what might have seemed like slow progress may have discouraged them from continuing. Regrettably, the progress bar did not reflect the different types of task involved; rather, it counted each screen as equal thereby inaccurately representing the amount of the study the participant had completed in certain sections relative to the overall task. For example, the trauma narrative and negative narrative involved more time and effort than other sections, but the progress bar did not capture this. It is also possible that some participants felt emotionally drained after describing their trauma and may therefore have chosen to discontinue and/or withdraw from the study at this point or soon thereafter. Unfortunately, demographic details of those who chose to withdraw their participation

were not available therefore it is not possible to speculate as to possible reasons for this attrition.

Importantly, the study did not control for several variables which may have influenced findings, such as treatment received/therapy undertaken, IQ, verbal fluency, or literacy levels. These variables may have comprised confounding variables with respect to analysis of participants' trauma narratives as well as their ratings of the phenomenological properties of their trauma memories (e.g., Bedard-Gilligan & Zoellner, 2012; Gray & Lombardo, 2001; Rubin, 2011; Zoellner et al., 2002).

To the researcher's knowledge, this was the first study to use LIWC, AMQ and the CES to explore trauma memories in an adequately powered, community sample; Rubin (2011) carried out a study using these three measures with 30 undergraduate university students with an age range 18-22 years. As an online project, the current study used written (typed) narratives rather than verbal narratives. This rendered it difficult to measure certain phenomenological properties of memory typically associated with trauma, such as speech fillers, repetition and unfinished thoughts, thereby also somewhat limiting comparisons with certain iconic studies in the area, such as Foa et al. (1995) and Halligan et al. (2003). Also inconsistent with certain previous studies, the current study used a within-subjects design rather than a between-groups design of participants with PTSD versus participants without PTSD. An 'extreme groups' approach was considered for analysis of the data obtained but was deemed inappropriate in light of the well-documented criticisms of this methodology (e.g., Preacher, Rucker, MacCallum, Nicewander, 2005) and given the relatively small sample size. Future studies would

benefit from recruiting a larger sample to allow for analyses of separate groups (PTSD versus non-PTSD).

Overall, the design of this study reflected previous literature and enabled total anonymity with minimal pressure to participate as individuals could opt-in from advertisements and take part in their own time in their own homes. Several limitations are also identified, such as the omission of measures of verbal fluency and a relatively large number of tasks/questionnaires possibly producing a significant level of participant burden. The correlational, within-subjects design was also a limitation with respect to both inferences of causality and drawing conclusions regarding differences in memory for trauma in individuals with PTSD and without.

4.4.2 Sample.

Initial power calculations required a total sample size of 82; this sample was successfully recruited and provided an adequate number of participants to power the analyses undertaken (Wilcoxon Signed Rank tests, correlations and multiple regression analyses involving four predictor variables). Ideally, further participants would have been recruited to increase the power and the reliability of conclusions drawn from the study's findings, but this was beyond the practical limitations of the project. The community sample obtained covered a wide age-range (19-65 years, M = 36.1 years, SD = 10.8) and reported an extensive range of trauma types, both interpersonal and other, including one-off events and chronic, ongoing trauma, such as child sexual abuse and intimate partner violence (see Appendix N for details). The inclusion of mixed trauma types may however have posed certain limitations. It is possible that self-relevant information from certain types of trauma, such as trauma involving interpersonal abuse,

may be especially difficult to reconcile with pre-existing autobiographical knowledge and therefore such types of trauma may produce different results to other, one-off events (e.g. car accidents) that are not interpersonal in nature (O'Kearney et al., 2011). Given the sample size in the current study and the limited scope of the project, it was not possible to group participants according to trauma type for analysis. Future studies may consider this option of selecting a more homogeneous group in terms of trauma experience. The gender ratio in the current study was consistent with previous research; typically more female than male participants tend to take part in research on trauma, which may be a reflection of the well-documented increased incidence of PTSD in females compared to males (e.g., Olff et al., 2007). Importantly, the current study's sample contained a significant proportion of participants who displayed clinical levels of PTSD, meeting DSM-IV diagnostic criteria for the disorder. Moreover, twenty-five of the 82 participants (30 per cent of the sample) scored 15 or above on the PDS, a documented cut-off score indicating clinical caseness (Sheeran & Zimmerman, 2002). These same 25 participants also met DSM-IV criteria for PTSD (APA, 1994). Details of the severity level of participants' PTSD scores are given in section 3.2 above. To date, the majority of studies investigating trauma-centred identity have tested undergraduate student samples (e.g., Berntsen & Rubin, 2006, 2007; Boals, 2010; Boals & Schuettler, 2011; Smeets et al., 2010) with a relatively restricted age-range and subclinical levels of PTSD, prompting criticism from prominent clinicians and researchers in the area (e.g., Brewin, 2013). A strength of the current study is that the sample contained participants with a range of PTSD symptoms, including a significant proportion with high levels of PTSD. Furthermore, there was diversity in terms of age, nationality, and ethnicity (see section

3.2 above). Finally, the study also included participants who cited a traumatic event other than those listed as A criteria events in DSM-IV, as is explained in section 4.4.3.1 below. The inclusion of these participants may be considered a strength based on the growing evidence base that inclusion based solely on A criteria events may lead to under-detection of PTSD (e.g., Bedard-Gilligan & Zoellner, 2008; Boals & Schuettler, 2009).

4.4.3 Measures.

The measures selected in this study were drawn from previous research in the field (e.g., Brown et al., 2010; Robinaugh & McNally, 2010, Rubin et al., 2011; Schuettler & Boals, 2011). The CES and CES-D were used routinely and their strong published psychometric properties were supported with good reliability in this study. As the PDS and AMQ were adjusted slightly from their previously published form, they will first be discussed in some detail before a brief note on the CES and CES-D. Following this, the use of LIWC in the current study will be explored.

4.4.3.1 PDS.

The PDS is a well-established standardised measure of PTSD symptoms, widely used in both clinical and research settings. The current study adapted it slightly to include certain events that are not typically deemed traumatic, such as diagnosis of a non-life-threatening, chronic illness, and divorce. Reliability assessment remained very good (Cronbach's alpha = .91). The inclusion of these events reflects current debate in the literature regarding what constitutes a trauma (e.g., Mol et al., 2005; Van Hooff, MacFarlane, Baur, Abraham, Barnes, 2009) and is informed by theory on how the individual's perception/appraisal of the event as traumatic is more predictive of outcome than an external rating of the classification of the event (e.g., Boals & Schuettler, 2009;

Breslau & Davis, 1987; Magnus, Diener, Fujita, & Pavot, 1993). Admittedly, in the current study, only two of the 82 participants included in the analysis undertaken cited events that were outside of those typically listed as traumatic; their inclusion thus likely had little impact on the results obtained. Finally, the current study increased the amount of space traditionally provided in the PDS for participants to write about their trauma with a view to gathering rich data conducive to textual analysis. It may perhaps be argued that allowing participants a larger space to write about their traumatic experience may potentially have primed them to think about these traumas in a more deliberate manner and in greater detail than would have been the case with the original PDS. As such, this modified PDS may possibly have influenced perceptions of centrality of event and/or the phenomenological properties of the memory. It is noteworthy, however, that trauma narrative length varied greatly (see details on the total word count of trauma narratives, section 3.4.1); several participants did not avail of the extra space provided.

4.4.3.2 AMQ.

The AMQ was employed to assess participants' phenomenological properties of trauma and non-trauma memories. As the measure is not typically totalled, psychometric properties are not reported, which is a distinct limitation of the questionnaire. The current study found the subscales used (detailed below) to have moderate-acceptable reliability (Cronbach's alpha ranged from .58 to .77) although such figures are difficult to interpret given the small number of items in each subscale. In keeping with previous research (e.g., Talarico et al., 2004), to facilitate analysis by reducing the number of statistical procedures performed, certain items on the questionnaire were grouped together to form subscales, such as a sensory subscale and a reliving subscale. As

previously noted, however, the sensory subscale of the AMQ lacked an olfactory item, an omission that was potentially significant in the current study, particularly as sensory detail on the AMQ was compared with sensory detail of participants' narratives, as gauged by LIWC, and which accounted for olfactory elements. Moreover, although previously considered together as a measure of coherence, it has recently been suggested that the AMQ items 'in words' and 'as a coherent story' may tap different constructs, i.e., that 'in words' may measure language processes while 'story' gauges narrative organisation (Gauer et al., 2010). It may therefore be inappropriate to group them together as the current study did, although further research regarding this matter is required. The use of self-report measures such as the AMQ in studies of memory for trauma will be discussed in detail in section 4.6 below.

4.4.3.3 CES.

The Centrality of Event Scale (CES) was used in the current study to assess trauma-centred identity. The measure showed good reliability (Cronbach's alpha = .96) in the study sample. The length of the questionnaire (20 items) may perhaps be seen as a weakness contributing to some participant burden, particularly as the measure was completed in relation to both a trauma memory and a negative memory. Recent studies (e.g., Roland et al., 2013) have used the short form of this questionnaire containing seven items (CES-SF; Berntsen & Rubin, 2006) and have reported good reliability estimates although more evidence exists regarding the psychometric properties of the longer version. Future studies may consider the short form option to reduce participant burden.

4.4.3.4 CES-D.

The depression measure used (CES-D) showed good reliability in the current sample (Cronbach's alpha = .93). A weakness of the study is that the data relating to depression were not used in the primary analyses undertaken. As a depression measure is typically included in PTSD studies, it was considered appropriate to do so in the current study in order to provide further information regarding participants' profile and general symptomology. Several studies investigating centrality of event and PTSD symptoms covary out depression in their analyses (e.g., Boals, 2010; Brown et al., 2010; Robinaugh & McNally, 2011), but as depression was not included in the current study's analyses this was not necessary. Moreover, it has been proposed by some researchers and clinicians (e.g., O'Donnell, Creamer, & Pattison, 2004) that covarying out depression in this way may remove some of the PTSD symptoms (see Miller & Chapman, 2005, for a general discussion of the potential problems engendered by the use of analysis of covariance in psychopathology research).

4.4.3.5 LIWC.

As a computerised textual analysis programme, LIWC avoids the potential bias of a subjective rater, is easy to use and can analyse large amounts of data in seconds (O' Carroll Bantum & Owen, 2009; Tausczik & Pennebaker, 2010). Despite these advantages, LIWC has many limitations, some of which were of particular significance to the current study, as highlighted earlier. Of relevance, in its basic format, LIWC cannot measure errors, or features such as confused temporal order, lack of complexity of a narrative, level of detail of a narrative, repetition, or set phrases, such as 'I don't remember…' or 'I can't understand.' The software designers succinctly convey some of

LIWC's shortcomings by stating that the programme "ignores context, irony, sarcasm, and idioms" (Tausczik & Pennebaker, 2010, p. 30). LIWC has been criticised for its findings being at odds with human-rated findings (e.g., Alpers et al., 2005; O'Carroll Bantum & Owen, 2009). Those evaluating LIWC's effectiveness (e.g., O'Carroll Bantum & Owen, 2009) have highlighted that the programme's ability to distinguish between words which are frequently used to convey quite different meanings could be substantially improved through use of more advanced computational linguistic coding strategies, such as word disambiguation (Agirre, & Edmonds, 2006) or key word in context (Weik, 1996).

It is nonetheless possible to create a tailored dictionary for LIWC to use in its analyses. The scope of the current study did not allow for this, but future studies may consider issues such as those described earlier in relation to the measurement of cognitive processes, i.e., it may be more helpful to programme LIWC to count cognitive processes in conjunction with negative qualifiers, such as 'I don't understand, can't think' etc. Of note, however, there have been no studies to date analysing the use of such additional rules; it is difficult to predict how much these features would improve LIWC's performance.

In the current study LIWC's 'sensory detail' category was potentially more valid than the AMQ sensory subscale as LIWC detected olfactory detail as well as the other sensory modalities. A further limitation of use of LIWC, however, is that word categories are rarely normally distributed and they have low base rates; consequently, standard measures of reliability are not appropriate (Tausczik & Pennebaker, 2010). In

the current study, use of LIWC necessitated the use of non-parametric statistics to conduct the proposed analyses.

4.4.4 Data analysis.

The number of participants in the current study provided adequate power for all proposed analyses as well as some subsidiary analyses to be carried out. Given the study's moderate findings and the exploratory nature of certain analyses, however, results obtained must be viewed as preliminary and therefore must be interpreted with caution. As noted earlier, analysis involving a between-groups design of participants with and without PTSD would likely have added to the study's findings, but this was not feasible given the sample size in question in these groups (25 participants qualified for the PTSD condition; 57 for the non-PTSD group) and an extreme groups approach would have led to very small sample sizes for comparison (25 in each group). Also, as previously highlighted, the extreme groups approach has attracted a certain amount of criticism in the literature.

The first research question was assessed using a series of Wilcoxon Signed Rank tests; the second and third using the non-parametric correlation co-efficient, Spearman's Rho. Non-parametric tests are less powerful than parametric tests; the use of these was therefore a slight weakness of the study. Of note, in order to reduce the increased risk of Type I errors caused by multiple testing, a variant of the Bonferroni adjustment was applied (see Appendix xx for details). This variant was employed instead of the traditional Bonferroni as the latter method is considered too conservative by many and thought to substantially increase the risk of occurrence of Type II errors (e.g., Cohen, 1988; Holm, 1979; Perneger, 1998; Rice, 1989).

The post hoc analysis undertaken involved two multiple regressions. These were adequately powered as they included only four and three predictor variables, however a more sophisticated regression analysis was not possible given the sample size. It is nonetheless a strength of the study that these basic regression analyses were carried out as they provided more information about the relationship between the variables of interest and also demonstrated the role of certain properties of memory in predicting PTSD symptom severity.

4.5 Procedure

The questionnaire-based design employed in the current study was in keeping with previous research (e.g., Robinaugh & McNally, 2011) while also adding to extant findings by incorporating textual analysis of participants' trauma and non-trauma narratives. As an online study, participants could take part at their own convenience, however, as already stated, online studies tend to have higher rates of attrition than *in vivo* studies. A clear strength is the use of validated and established measures, yet it is important to note that the delivery order of these questionnaires may have influenced the results obtained. Attempts to limit this were made as counterbalancing procedures were incorporated into the study's design to ensure balanced delivery of trauma and non-trauma conditions. This was achieved via random selection of order within the online design (participants were asked to select '1' or '2' to determine question delivery order). The vast majority of returned datasets completed the trauma memory first. As participants could discontinue at any point, completion of the trauma section first meant that there were more data relating to trauma memories than negative memories. Future studies may gain from counterbalancing in a more controlled manner, monitoring

completed questionnaires and ensuring that the online order is either randomly allocated or that selections are not weighted, for example, rather than choosing '1' or '2,' presenting the participant with a selection of neutral shapes may be preferable.

4.6 Theoretical implications

As highlighted in the introduction to this study, the integration of trauma within AM is currently an area of some debate in the field of PTSD studies. Prominent contemporary PTSD theories (e.g., Brewin et al., 1996, 2010; Ehlers & Clark, 2000) posit that memories for trauma in those with PTSD are unique in that they are poorly elaborated and inadequately contextualised and integrated into AM. Findings from recent studies by cognitive psychologists, however, suggest that memories for trauma are not unique and, as such, can be explained using standard cognitive models of memory (e.g., Berntsen & Rubin & Rubin, 2006, 2007; Rubin et al., 2011). Such theorists claim that due to their distinctiveness and emotional impact, trauma memories remain highly accessible, and form a cognitive reference point for the organisation of autobiographical knowledge (i.e., they are highly integrated into AM). They cite studies that have demonstrated how, in the aftermath of trauma, one's identity can become trauma-centred, which in turn is associated with PTSD symptoms, and claim that such findings imply that the trauma memory is *overly* integrated into one's AM and sense of self (Berntsen & Rubin, 2006; 2007).

In response, Brewin (2011, 2013) has proposed that this apparent contradiction is false and may be resolved through consideration of Conway's (2005) SMS, outlined in section 1.2.8.1 above. Brewin (2011, 2013) contends that it is possible to retain *conceptual* knowledge of the self after experiencing a trauma, while simultaneously

lacking *episodic* knowledge of elements of the trauma. To elucidate, the author highlights how the fact of the trauma having happened may dominate one's mental life (as evidenced, for example, in the intrusive symptoms of PTSD), while at the same time, the individual may fail to integrate certain episodic memories of the trauma into the autobiographical knowledge base. The dominance of the trauma memory in the form of reliving symptoms may lead to the individual developing a sense of identity that is trauma-centred. To clarify, as outlined in the introduction to this study, Conway's SMS purports that within AM, the working self has a reciprocal relationship with the autobiographical knowledge base, allowing for the integration of experience with existing knowledge (Conway, 2005). New knowledge enters long-term memory through the goal hierarchy of the working self, and it is also via this pathway that access is gained to pre-existing knowledge and that memories are formed. The goal hierarchy of the working self thus determines the encoding and accessibility of knowledge in long-term memory, and the construction of memories (Conway, 2005). In terms of PTSD, Brewin (2011, 2013) emphasises that the detrimental impact of trauma on an individual's sense of self and identity is a phenomenon that has been repeatedly observed and reported by clinicians and researchers alike for many years (e.g., Ehlers et al., 2000; Herman, 1992; Pillemer, 1998; Sutherland & Bryant, 2005). Trauma-centred identity, as such, is not a novel concept, but rather one that makes sense within Conway's AM framework (Brewin, 2013). Trauma typically shatters previously held assumptions about the self, others and the world (e.g., Ehlers & Clark, 2000, Janoff-Bulman, 1992), and therefore cannot be accommodated or interpreted by one's corresponding goal hierarchy (Conway, 2005; Conway & Pleydell-Pearce, 2000). As a result, the trauma memory cannot be integrated

into the autobiographical knowledge base but instead remains associated with the working self and is triggered when the individual's goals are activated, leading to development of the intrusion symptoms of PTSD (Conway, 2005; Ehlers & Clark, 2000). This unresolved association with the working self, which leads to the pervasive awareness of the occurrence of the trauma, may be understood as trauma-centred identity.

Lack of integration within AM also results in increased retrieval of the trauma memory in response to triggers/cues (Conway, 2005); as such, involuntary trauma memories are typically experienced intrusively and possess a 'here-and-now' quality, often lacking temporal and/or spatial detail (Ehlers & Clark, 2000), i.e., the individual retains perceptual memory of the event while lacking certain episodic memories. The poor elaboration within AM, often exacerbated by avoidance of the trauma memory, further leads to the experience of trauma memories as fragmented and disconnected, yet knowledge of the trauma having occurred may remain intact and may determine the individual's sense of self (i.e., trauma-centred identity).

The current study endeavoured to investigate if indeed the two apparently opposing positions of centrality and inadequate integration can co-exist. Of note, the study's analyses were preliminary and exploratory in nature; the results obtained must therefore be interpreted with caution. The (tentative) theoretical implications of these findings with respect to the positions of centrality/inadequate integration will now be summarily outlined, followed by a brief discussion of the significance of findings in relation to construct definition and measurement.

Results from the current study were in keeping with some of the central tenets of prominent clinical theories of PTSD. For example, the study found evidence of

impoverished voluntary recall of traumatic events when compared to negative memories (e.g., Brewin et al., 1996; Ehlers & Clark, 2000) as opposed to the highly accessible memories proposed by the centrality view to characterise memory for trauma (e.g., Berntsen & Rubin, 2007). Participants also rated their trauma memories as less coherent and more fragmented than their negative memories, again in keeping with current clinical conceptualisations of PTSD but inconsistent with the detailed recall reported in certain studies cited in support of the centrality position (e.g., Lancaster et al., 2011; McNally, 2003). Participants expressed less negative emotion and used fewer spatial references in their trauma narratives than in their negative narratives, also concordant with the inadequate integration position (Brewin et al., 1996; Conway, 2005; Ehlers & Clark, 2000). Importantly, positive (albeit moderate) relationships were established between PTSD symptoms and certain phenomenological properties of trauma memories typically cited in support of clinical models of the disorder (fragmentation, sensory detail, a sense of reliving, and use of present tense verbs when describing the trauma). Also of note, the study found a trend towards a negative relationship between spatial references in trauma narratives and PTSD symptoms, and a trend towards less rehearsal of the trauma memory in those with greater PTSD symptom severity. Regression analysis revealed that fragmentation and use of the present tense each made a unique, significant contribution to explaining the variance in PTSD scores; the former finding may be viewed as consistent with the inadequate integration position, while the latter supports both clinical theories of PTSD and the centrality position.

Taken together, these findings, though moderate and preliminary in nature, may be considered indicative of the disruption to certain phenomenological properties of the

trauma memory outlined in clinical models of PTSD, deemed to illustrate the inadequate integration and poor contextualisation of the trauma memory with AM (Brewin et al., 1996; Conway, 2005; Ehlers & Clark, 2000). Among these findings supporting the clinical theories of PTSD, however, the current study also revealed certain apparent discrepancies, which may be viewed as inconclusive. For example, participants reported no difference between their trauma and non-trauma memories in terms of sensory detail, but analysis using LIWC indicated a difference between the two. The difficulties encountered in interpreting data obtained using different methodologies will be explored in greater detail below in a discussion on the study's implications for construct measurement.

With respect to centrality of event, the current study's findings were in keeping with theoretical and empirical accounts of the positive association between trauma-centred identity and PTSD symptoms (e.g., Berntsen & Rubin, 2006; McNally et al., 1995; Sutherland & Bryant, 2005; Rubin et al., 2008) participants with higher PTSD scores showed greater centrality of event. Moreover, the sense of reliving, both reported by participants with higher CES scores and observed in their trauma narratives in the use of the present tense, may be viewed as concordant not only with the centrality view but also the inadequate integration theories of PTSD. Both positions highlight the 'here-and-now' aspect of intrusive symptoms of the disorder as indicative of how the trauma memory comes to dominate mental life. As outlined earlier, reconciling the trauma memory with previously held assumptions about the self can prove highly problematic as the individual struggles to resolve these discrepancies (Brewin, 2011; Conway, 2005; Ehlers & Clark, 2000). In this way, the reliving symptoms are both constituted by and

constitutive of this mental dominance of the trauma memory, which may also be conceived of as trauma-centred identity. The current study's finding that lower levels of rehearsal of the trauma memory were associated with higher levels of PTSD symptom severity is, however, inconsistent with the centrality view that increased rehearsal leads to higher PTSD scores.

Also of significance was the finding that use of the present tense in trauma narratives was positively correlated with CES scores. As discussed earlier, such use of the present tense is frequently interpreted as a marker of fragmentation of the trauma memory, indicative of its inadequate integration within AM. Interpreting the finding in this way lends some support to Brewin's (2011, 2013) claim that fragmentation and centrality of event can co-exist, i.e., that identity may become trauma-centred without memories for the event necessarily remaining highly accessible. The presence of this relationship may, however, be contingent on whether the fragmentation in question is established through self-report or textual analysis measures, as is discussed below. Furthermore, as also highlighted earlier, it is necessary to consider this finding in relation to the observed lack of relationship between CES scores and self-reported fragmentation, and between CES scores and other traditional indices of fragmentation/disorganisation. The study's findings in this respect are therefore inconclusive as they do not provide strong evidence to substantiate Brewin's (2011, 2013) assertion that the alleged contradiction between inadequate integration and centrality of event is false; nor, however, does the study provide evidence that trauma memories are *not* unique or fragmented, as posited by advocates of the centrality view (e.g., Rubin et al., 2008).

Also of critical importance in terms of the theoretical implications of the current study, it has been highlighted that the properties of trauma memories established in studies cited in support of the inadequate integration position do not irrefutably imply that traumatic memory is isolated within autobiographical memory (O'Kearney et al., 2011). Contributing to this controversy are the substantial challenges posed by the measurement of constructs such as fragmentation, disorganisation and coherence. As previously noted, reviews have shown that data regarding the fragmentation, incoherence, and disorganisation of memories for trauma are somewhat inconclusive when examined in their totality (e.g., O'Kearney & Perrott, 2006; Zoellner & Bittenger, 2004), and it has been proposed that these discrepancies may be explained in terms of the different methodologies employed (Bedard-Gilligan & Zoellner, 2012; Brewin, 2013; Megias et al., 2007). Brewin (2013), for example, has suggested that certain disparities in findings may be due to a lack of distinction in such studies between voluntary and involuntary memories and consequent ambiguity regarding the properties pertaining to each. Other explanations of incompatible results include findings that self-report measures show lower levels of fragmentation and disorganisation than analyses of trauma narratives (Brewin, 2013; Megias et al., 2007). Indeed, Brewin (2013) very recently reviewed findings relating to disorganisation and fragmentation of trauma memories and proposed that brief, self-report measures, and in particular, single-item measures, have yielded less consistent findings than more rigorous, comprehensive studies involving textual analysis of trauma narratives as well as self-report measures. O'Kearney et al. (2011) also highlight the limitations of using self-report questionnaires alone, and assert that multi-method approaches are critical to assess trauma memory integration within

autobiographical memory and the impact of this psychological process on posttraumatic adjustment.

Recent studies using both standardised questionnaires and textual analysis to examine phenomenological properties of memories have, however, observed noteworthy discord between results obtained from self-report measures and those based on narrative analysis. Bohanek et al. (2005), for example, examined memories of positive and negative emotional events and found little relation between the objective content of narratives (computer-coded) and participants' subjective ratings of their memory experiences. O'Kearney and colleagues (2011) found that participants' self-ratings of the disorganisation of their trauma memories were strongly associated with PTSD symptom severity while computer-rated and rater-coded disorganisation showed no such relationship. Bedard-Gilligan and Zoellner (2012) reviewed findings on the association between peri-traumatic dissociation and trauma narrative fragmentation and found that this relationship was prominent when analysing participants' own ratings of memory fragmentation, but not computer-rated or rater-coded measures. Kindt and colleagues (Kindt & van den Hout, 2003; Kindt, van den Hout, & Buck, 2005) likewise observed divergence between participants' subjective ratings and computer-coded objective ratings of memory fragmentation when examining the relationship between dissociation and memory disturbances, noting again that significant results were observed only in relation to subjective, self-report ratings.

In light of such research, theorists and clinicians are considering the importance of meta-memory findings that illustrate participants' *perception* of their trauma memories relative to *actual/observable* memory quality gauged through textual analysis (Bedard-

Gilligan & Zoellner, 2012). Within the field of AM studies, it has been suggested that the two methods (self-report/textual analysis) may in fact measure different constructs which may not necessarily map on to each other as closely as was previously assumed (Bohanek et al., 2005; Gauer et al., 2010). Such researchers urge nonetheless that findings from both types of measurement be taken into account as both provide relevant information to understandings of autobiographical memory even if referring to different aspects of the phenomenon, the unique features of which remain as yet undefined (Bohanek et al., 2005; Gauer & Gomes, 2010). In the context of PTSD studies, it may prove profitable to consider how various factors affect memory and meta-memory for trauma differently, and this may necessitate analysis of the construct validity of certain measures currently in use. It is widely acknowledged, for instance, that a comprehensive method of assessment that truly captures the clinical phenomenon of fragmentation has not yet been devised (Bedard-Gilligan & Zoellner, 2012; Brewin et al., 2010; Brewin, 2013).

Nonetheless, whilst fragmentation is admittedly challenging to measure, it is also important to recognise that fragmentation, and the related concepts of coherence and (dis)organisation, do not necessarily accurately capture or reflect integration into AM (O'Kearney et al., 2011). Contributing to the complexity of the debate is the heterogeneity of definitions of these constructs (O'Kearney et al., 2011). For example, despite the operationalisation of the fragmentation and disorganisation of trauma memories in terms of coherence, there is no agreed upon definition of narrative coherence in the literature (Baker-Ward et al., 2007). It has also been proposed, however, that the relative lack of convincing evidence gathered to date regarding the fragmentation of

trauma memories may signal that the construct is not as robust as clinical observations would suggest, a viewpoint espoused by proponents of the centrality view (e.g., McNally, 2003; Rubin et al., 2008). In response, leading clinical theorists (e.g., Brewin, 2011, 2013) have highlighted that centrality of event does not necessarily indicate coherence or a *lack* of fragmentation of the trauma memory. The claim that voluntary memory for trauma is fragmented and disorganised thus remains highly controversial (Brewin, 2013), and further research is required to elucidate and unravel the many complexities of the debate.

4.6 Clinical implications

Overall, the current study's findings, though moderate, appear to be predominantly consistent with contemporary clinical conceptualisations of the inadequate integration of trauma memories within AM in PTSD. As such, these findings support current practice guidelines (NICE, 2005), adding to the large body of existing research underpinning prevailing approaches to the treatment of PTSD, outlined in the introduction to this study.

A sense of reliving when remembering trauma has been shown to predict long-term PTSD severity and poor treatment response to exposure-based treatment (Speckens et al., 2006; Michael et al., 2005). The current study found that reliving was positively correlated with both PTSD symptom severity and centrality of event. These results support current treatments of PTSD which target the individual's experience of reliving symptoms and also facilitate the construction of an integrated, comprehensive trauma narrative, thereby elaborating and contextualising the trauma memory within AM (Brewin et al., 1996; Conway, 2005; Ehlers and Clark, 2000; Ehlers et al., 2010; Foa et al., 2009; Taylor, 2006). The current study's findings regarding the relationship between trauma-centred identity and reliving symptoms also suggest that certain sufferers of PTSD may require schema work that addresses their 'vulnerable identities' (Brewin, 2003), and indeed a greater emphasis on appraisal work focussing on the meaning of the trauma for the individual in terms of sense of self and identity. Unlike conclusions drawn from certain previous studies (e.g., Boals, 2010; Robinaugh & McNally, 2010; Shamai & Levin-Megged, 2006), the current study's findings do not indicate that the trauma

memory needs to be construed as separate from the self in order to achieve healthy posttraumatic adjustment.

Fragmentation of trauma memories is frequently clinically observed and remains an important focus in current treatments of PTSD (e.g., Becker, Zayfert, & Anderson, 2004; Foa et al., 2009; van der Kolk, Roth, Pelcovitz, Sunday & Spinazzola, 2005). If, however, as the current study's findings appear to suggest, the perception of fragmentation (as assessed by self-report measures) is more related to PTSD symptom severity than actual/observed fragmentation, then perhaps treatment of the disorder should emphasise beliefs about the memory rather than actual memory quality (Bedard-Gilligan & Zoellner, 2012). Such an approach would further highlight the role of appraisals, as in Ehlers and Clark's (2000) cognitive model of PTSD and corresponding cognitive therapy treatment programme.

With respect to the issues regarding the measurement of fragmentation explored in the current study, it is essential that clinicians treating PTSD are aware of not only the empirical evidence supporting or contradicting the theories underpinning current practice, but also the methodological strengths and limitations of research studies informing such interventions. As such, there is a greater need for transparency in published findings regarding the definition and measurement of different constructs of pertinence to clinical studies of PTSD, AM, and trauma-centred identity.

4.7 Future Research

The discussion of findings and of the methodological and theoretical issues raised by the current study has highlighted some of the possibilities for future research in the area. A summary of these central points is now provided.

Future investigations into the relationship between trauma-centred identity and the fragmentation of trauma memories may benefit from using all three possible methods of assessing memory properties (i.e., self-report, computer- and rater-coded measures). Such an approach would allow future studies to examine memory quality and experience in a more comprehensive manner, which may provide some insight into the potentially different constructs being assessed by each type of measure.

The current study encountered several difficulties through the use of LIWC in its most basic format. Future studies may consider creating a dictionary that would allow for more in-depth analysis of categories, such as counting 'cognitive processes' in conjunction with any negative qualifiers evident in the text. Moreover, future studies could potentially create lists of set phrases that would pertain to analyses of certain phenomenological properties of trauma narratives, for example, a 'fragmentation' category, including items such as 'in pieces, bitty, choppy, disjointed, shattered,' some of which were observed upon inspection of the current study's trauma narratives. Several such relevant categories could be devised, including a list of terms connoting 'incoherence/disorganisation,' such as 'jumbled, unclear, fuzzy, muddled, blurry, confused…' and so on.

In a related vein, future studies may consider eliciting verbal rather than written narratives from participants. As noted earlier, the current study could not gauge certain indices of fragmentation/disorganisation, such as speech fillers, repetitions, and non-fluencies as these are typically absent from written text. Inclusion of such markers of fragmentation may add value to future findings. Interestingly, LIWC has categories for such linguistic properties therefore use of the programme may be more suited to analysis

of verbal speech. Moreover, such a study would necessitate *in vivo* research, which may also allow the research to better distinguish between participants' voluntary and involuntary memories by asking participants to retrospectively highlight relevant sections of their narratives that are flashbacks, similar to in Hellawell and Brewin's (2004) study. Admittedly, such a study would comprise a vast piece of work, and the disadvantages of removing the anonymity element afforded by online research would need to be carefully considered.

As previously noted, future studies would gain significantly from recruiting larger samples and employing a between-subjects design involving a PTSD group and a non-PTSD group as certain phenomenological properties of trauma memories may only be ascertainable in individuals presenting with clinical levels of the disorder (Brewin, 2013). Needless to say, a larger sample would also be better powered for more sophisticated statistical analysis. Moreover, a number of variables in the current study showed borderline significance; more highly powered studies would likely clarify these findings.

Finally, future studies should limit confounding variables by including, and controlling for, measures of verbal fluency, IQ, time elapsed since event, and PTSD treatment undertaken. Such studies may also consider analysing by trauma type, differentiating between interpersonal trauma and other (Allen, 2001).

4.8 Conclusion

The integration of memory for trauma within AM remains a contentious issue in the field of PTSD studies (Brewin, 2013). In particular, the claim that voluntary memory for trauma is fragmented and disorganised continues to be controversial (Brewin, 2013), with several studies reporting seemingly contradictory findings (O'Kearney & Perrott,

2006). In light of Brewin's (2011, 2013) proposal that the ostensibly contradictory positions of the centrality view, advocated by recent cognitive psychologists (e.g., Rubin et al., 2008), and the theory of inadequate integration of trauma memories, outlined in contemporary clinical theories of PTSD (e.g., Ehlers & Clark, 2000), the current study endeavoured to shed light on the complex relationships between PTSD symptoms, AM, and centrality of trauma event to identity, and to examine findings for evidence in support/contradiction of Brewin's (2011, 2013) proposal.

The study's findings were primarily consistent with contemporary clinical conceptualisations of PTSD indicating disturbed memory processes underpinning the disorder (e.g., Brewin et al., 1996; 2010; Ehlers & Clark, 2000), while also replicating findings relating to the strong association between PTSD symptoms and centrality of trauma event to identity. When examined critically, the study's findings provided no clear, strong evidence supporting Brewin's (2011, 2013) claim that the two positions of centrality and inadequate integration can co-exist. A number of methodological issues, including a relatively small sample size, and difficulties encountered through the use of LIWC, a computerised textual analysis programme, prevented firm conclusions from being drawn. Interestingly, the study noted that textual analysis and subjective self-report measures of the phenomenological properties of trauma memories may provide different perspectives on the individual's experience. In view of the importance accorded to the psychological processes implicated in PTSD in current conceptualisations of the disorder, further empirical investigation is required in order to better clarify the mechanisms underpinning how trauma is encoded and recalled, with recourse to the role of AM within such processes, and the impact of these phenomena on one's sense of identity. To

elucidate the disparities between findings obtained from different methodologies, and to further explore Brewin's (2011, 2013) assertion that inadequate integration and centrality are not wholly incompatible positions, more rigorous, comprehensive designs using precise definitions of the constructs under investigation are called for.

References

Agirre, E., & Edmonds, P. (2006). *Word sense disambiguation*. Dordrecht, Holland: Springer.

Allen, J. G. (2001). *Traumatic relationships and serious mental disorders*. New York, US: John Wiley & Sons Ltd.

Alpers, G. W., Winzelberg, A. J., Classen, C., Roberts, H., Dev, P., Koopman, C., & Barr Taylor, C. (2005). Evaluation of computerized text analysis in an Internet breast cancer support group. *Computers in Human Behaviour*, *21*(2), 361-376.

Alvarez-Conrad, J., Zoellner, L.A., & Foa, E.B. (2001). Linguistic predictors of trauma pathology and physical health. *Applied Cognitive Psychology, 15*, 159-170.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*. Washington, DC: American Psychological Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Washington, DC: American Psychological Association.

Armony, J. L., Corbo, V., Clément, M. H., & Brunet, A. (2005). Amygdala response in patients with acute PTSD to masked and unmasked emotional facial expressions. *American Journal of Psychiatry*, *162*(10), 1961-1963.

Baddeley, A. D., Eysenck, M., & Anderson, M. C. (2009). *Memory*. Hove: Psychology Press.

Baker-Ward, L., Bauer, P. J., Fivush, R., Haden, C. A., Ornstein, P. A., & Reese, E. (2007). Coding coherence in autobiographical narratives. In *Symposium conducted at the biennial meetings of the Society for Applied Research in Memory and Cognition*.

Barclay, C. R. (1996). Autobiographical remembering: Narrative constraints on objectified selves. *Remembering our past: Studies in autobiographical memory*, 94-125.

Becker, C. B., Zayfert, C., & Anderson, E. (2004). A survey of psychologists' attitudes towards and utilization of exposure therapy for PTSD. *Behaviour Research and Therapy*, *42*(3), 277-292.

Bedard-Gilligan, M., & Zoellner, L. A. (2012). Dissociation and memory fragmentation in post-traumatic stress disorder: An evaluation of the dissociative encoding hypothesis. *Memory*, *20*(3), 277-299.

Bedard-Gilligan, M., & Zoellner, L. A. (2008). The utility of the A1 and A2 criteria in the diagnosis of PTSD. *Behaviour research and therapy*, *46*(9), 1062-1069.

Berliner, L., Hyman, I., Thomas, A., & Fitzgerald, M. (2003). Children's memory for trauma and positive experiences. *Journal of Traumatic stress*, *16*(3), 229-236.

Berntsen, D., & Rubin, D. C. (2004). Cultural life scripts structure recall from autobiographical memory. *Memory & Cognition*, *32*(3), 427-442.

Berntsen, D., & Rubin, D.C. (2006). The centrality of event scale: A measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. *Behaviour Research and Therapy*, *44*, 219-231.

Berntsen, D., & Rubin, D.C. (2007). When a trauma becomes key to identity: Enhanced integration of trauma memories predicts posttraumatic stress disorder symptoms. *Applied Cognitive Psychology*, *21*, 417-431.

Bisson, J., & Andrew, M. (2007). *Psychological Treatment of Post-traumatic Stress Disorder (PTSD)(Review)*. Wiley. The Cochrane Database Systematic Reviews. 2007 July 18(3).

Bisson, J. I., Ehlers, A., Matthews, R., Pilling, S., Richards, D., & Turner, S. (2007). Psychological treatments for chronic post-traumatic stress disorder Systematic review and meta-analysis. *The British Journal of Psychiatry*, *190*(2), 97-104.

Blagov, P. S., & Singer, J. A. (2004). Four Dimensions of Self-Defining Memories (Specificity, Meaning, Content, and Affect) and Their Relationships to Self-Restraint, Distress, and Repressive Defensiveness. *Journal of personality*, *72*(3), 481-511.

Bluck, S. (2003). Autobiographical memory: Exploring its functions in everyday life. *Memory*, *11*(2), 113-123.

Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A tale of three functions: The self-reported uses of autobiographical memory. *Social Cognition*, *23*(1), 91-117.

Bluck, S., & Habermas, T. (2001). Extending the study of autobiographical memory: Thinking back about life across the life span. *Review of General Psychology*, *5*(2), 135-147.

Bluck, S., & Levine, L. J. (1998). Reminiscence as autobiographical memory: A catalyst for reminiscence theory development. *Ageing and Society*, *18*(2), 185-208.

Boals, A. (2010). Events that have become central to identity: Gender differences in the Centrality of Events Scale for positive and negative events. *Applied Cognitive Psychology, 24*, 107-121.

Boals, A., & Klein, K. (2005). Word use in emotional narratives about failed romantic relationships and subsequent mental health. *Journal of Language and Social Psychology, 24*(3), 252-268.

Boals, A., & Perez, A.S. (2009). Language use predicts phenomenological properties of Holocaust memories and health. *Applied Cognitive Psychology, 23*, 1318-1332.

Boals, A., & Schuettler, D. (2009). PTSD symptoms in response to traumatic and non-traumatic events: The role of respondent perception and A2 criterion. *Journal of Anxiety Disorders, 23(4)*, 458–462.

Boals, A., & Schuettler, D. (2011). A double-edged sword: Event centrality, PTSD and posttraumatic growth. *Applied Cognitive Psychology*, *25*(5), 817-822.

Bohanek, J.G., Fivush, R., & Walker, E. (2005). Memories of positive and negative emotional events. *Applied Cognitive Psychology*, *24*, 53-64.

Bremner, J. D., Vythilingam, M., Vermetten, E., Southwick, S. M., McGlashan, T., Nazeer, A., ... & Charney, D. S. (2003). MRI and PET study of deficits in hippocampal structure and function in women with childhood sexual abuse and posttraumatic stress disorder. *American Journal of Psychiatry, 160*(5), 924-932.

Breslau, N. (2001). The epidemiology of posttraumatic stress disorder: what is the extent of the problem? *Journal of Clinical Psychiatry, 62*, 16-22.

Breslau, N., & Davis, G. C. (1987). Posttraumatic stress disorder: the stressor criterion. *Journal of Nervous and Mental Diseases, 175,* 255-264.

Brewin, C. R. (2001). Memory processes in post-traumatic stress disorder. *International Review of Psychiatry, 13*(3), 159-163.

Brewin, C. (2003). *Post-traumatic stress disorder: Malady or myth?* London: Yale University Press.

Brewin, C. R. (2007). Autobiographical memory for trauma: Update on four controversies. *Memory*, *15*(3), 227-248.

Brewin, C.R. (2011). The nature and significance of memory disturbance in post-traumatic stress disorder. *Annual Review of Clinical Psychology, 7*, 203-227.

Brewin, C. R. (2013). Episodic Memory, Perceptual Memory, and Their Interaction: Foundations for a Theory of Posttraumatic Stress Disorder. *Psychological Bulletin, Advance online publication. Doi: 10.1037/a0033722.*

Brewin, C.R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of post-traumatic stress disorder. *Psychological Review, 103,* 670-686.

Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive images in psychological disorders: characteristics, neural mechanisms, and treatment implications. *Psychological Review, 117*(1), 210-232.

Brewin, C. R., & Holmes, E. A. (2003). Psychological theories of posttraumatic stress disorder. *Clinical Psychology Review, 23*(3), 339-376.

Britton, J. C., Phan, K. L., Taylor, S. F., Fig, L. M., & Liberzon, I. (2005). Corticolimbic blood flow in posttraumatic stress disorder during script-driven imagery. *Biological Psychiatry, 57*(8), 832-840.

Brown, A.D., Antonius, D., Kramer, M., Root, J.C., & Hirst, W. (2010). Trauma centrality and PTSD in veterans returning from Irag and Afghanistan. *Journal of Traumatic Stress, 23,* 496-499.

Bruner, J. (1994). The "remembered" self. In U. Neisser, & R. Fivush (Eds.). *The remembering self: Construction and accuracy in the self-narrative*. (pp. 41-54). New York: Cambridge University Press.

Bryant, R. A., Felmingham, K. L., Kemp, A. H., Barton, M., Peduto, A. S., Rennie, C., ... & Williams, L. M. (2005). Neural networks of information processing in posttraumatic stress disorder: a functional magnetic resonance imaging study. *Biological Psychiatry*, *58*(2), 111-118.

Buck, N., Kindt, M., van den Hout, M., Steens, L., & Linders, C. (2007). Perceptual memory representations and memory fragmentation as predictors of post-trauma symptoms. *Behavioural and Cognitive Psychotherapy*, *35*(3), 259-272.

Chung, M. C., Symons, C., Gilliam, J., & Kaminski, E. R. (2010). The relationship between posttraumatic stress disorder, psychiatric comorbidity, and personality traits among patients with chronic idiopathic urticaria. *Comprehensive Psychiatry*, *51*(1), 55-63.

Cloitre, M. (2009). Effective psychotherapies for posttraumatic stress disorder: a review and critique. *CNS Spectr*, *14*(1), 32-43.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences (2nd Ed.)*. Hillsdale, NJ: Erlbaum.

Cohn, M. A., Mehl, M. R., & Pennebaker, J. W. (2004). Linguistic markers of psychological change surrounding September 11, 2001. *Psychological Science*, *15*(10), 687-693.

Conway, M. A. (1996). Autobiographical knowledge and autobiographical memories. In D. C. Rubin, (Ed). *Remembering our past: Studies in autobiographical memory, pp. 67-93*. New York, NY, US: Cambridge University Press

Conway, M.A. (2005). Memory and the self. *Journal of Memory and Language, 53*, 594-628.

Conway, M.A., & Jobson, L. (2012). On the nature of autobiographical memory. In D. Berntsen, & D. C. Rubin, (Eds.). *Understanding autobiographical memory: Theories and approaches* (pp. 54-69). New York: Cambridge University Press.

Conway, M., Meares, K., & Standart, S. (2004). Images and goals. *Memory*, *12*(4), 525-531.

Conway, M.A., & Pleydell-Pearce, C.W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review, 12*, 261-288.

Cook, T.D., & Campbell, D.T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Chicago: Rand-McNally.

Corcoran, K. A., & Maren, S. (2004). Factors regulating the effects of hippocampal inactivation on renewal of conditional fear after extinction. *Learning & Memory, 11*(5), 598-603.

Creamer, M., & O' Donnell, M. (2002). Post-traumatic stress disorder. *Current Opinion in Psychiatry, 15*, 163-168.

Creamer, M., Burgess, P., & McFarlane, A. C. (2001). Post-traumatic stress disorder: findings from the Australian National Survey of Mental Health and Well-being. *Psychological medicine, 31*(07), 1237-1247.

Cromer, L.D., Freyd, J.J., Binder, A.K., & Becker-Blease, K. (2006). What's the risk in asking? Participant reaction to trauma history questions compared with reaction to other personal questions. *Ethics and Behaviour* 16(4), 347-362.

Dalgleish, T. (2004). Cognitive approaches to posttraumatic stress disorder: the evolution of multi-representational theorizing. *Psychological Bulletin, 130*(2), 228-260.

Davis, M., & Whalen, P. J. (2001). The amygdala: vigilance and emotion. *Molecular psychiatry, 6*(1), 13-34.

Department of Health. (2005). Research governance framework for health and social care (2nd ed.). Retrieved from http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4122427.pdf on March 9, 2012.

Demiray, B., & Bluck, S. (2011). The relation of the conceptual self to recent and distant autobiographical memories. *Memory*, *19*(8), 975-992.

Dolcos, F., LaBar, K. S., & Cabeza, R. (2004). Interaction between the amygdala and the medial temporal lobe memory system predicts better memory for emotional events. *Neuron*, *42*(5), 855-863.

Driessen, M., Beblo, T., Mertens, M., Piefke, M., Rullkoetter, N., Silva-Saavedra, A., ... & Woermann, F. G. (2004). Posttraumatic stress disorder and fMRI activation patterns of traumatic memory in patients with borderline personality disorder. *Biological Psychiatry*, *55*(6), 603-611.

Dunmore, E., Clark, D. M., & Ehlers, A. (1997). Cognitive factors in persistent versus recovered post-traumatic stress disorder after physical or sexual assault: A Pilot Study. *Behavioural and Cognitive Psychotherapy*, *25*, 147-159.

Dunmore, E., Clark, D. M., & Ehlers, A. (1999). Cognitive factors involved in the onset and maintenance of posttraumatic stress disorder (PTSD) after physical or sexual assault. *Behaviour Research and Therapy*, *37*(9), 809-829.

Ehlers, A., Bisson, J., Clark, D. M., Creamer, M., Pilling, S., Richards, D., ... & Yule, W. (2010). Do all psychological treatments really work the same in posttraumatic stress disorder? *Clinical Psychology Review*, *30*(2), 269-276.

Ehlers, A., & Clark, D. (2000). A cognitive model of post-traumatic stress disorder. *Behaviour Research and Therapy*, *38*, 319-345.

Ehlers, A., Clark, D. M., Hackmann, A., McManus, F., & Fennell, M. (2005). Cognitive therapy for post-traumatic stress disorder: development and evaluation. *Behaviour Research and Therapy*, *43*(4), 413-431.

Ehlers, A., Clark, D. M., Dunmore, E., Jaycox, L., Meadows, E., & Foa, E. B. (1998). Predicting response to exposure treatment in PTSD: The role of mental defeat and alienation. *Journal of Traumatic Stress*, *11*(3), 457-471.

Ehlers, A., Hackmann, A. & Michael, T. (2004). Intrusive reexperiencing in posttraumatic stress disorder: Phenomenology, theory, and therapy. *Memory*, *12*, 403-415.

Ehlers, A., Hackmann, A., Steil, R., Clohessy, S., Wenninger, K., & Winter, H. (2002). The nature of intrusive memories after trauma: The warning signal hypothesis. *Behaviour Research and Therapy*, *40*(9), 995-1002.

Ehlers, A., Maercker, A., & Boos, A. (2000). Posttraumatic stress disorder following political imprisonment: the role of mental defeat, alienation, and perceived permanent change. *Journal of Abnormal Psychology*, *109*(1), 45-55.

Ehlers, A., Mayou, R. A., & Bryant, B. (1998). Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. *Journal of Abnormal Psychology*, *107*(3), 508-519.

Ehlers, A., & Steil, R. (1995). Maintenance of intrusive memories in posttraumatic stress disorder: A cognitive approach. *Behavioural and Cognitive Psychotherapy*, *23*, 217-217.

Ehring, T., Ehlers, A., & Glucksman, E. (2008). Do cognitive models help in predicting the severity of posttraumatic stress disorder, phobia, and depression after motor vehicle accidents? A prospective longitudinal study. *Journal of Consulting and Clinical Psychology*, *76*(2), 219-230.

Elhai, J. D., Gray, M. J., Kashdan, T. B., & Franklin, C. L. (2005). Which instruments are most commonly used to assess traumatic event exposure and posttraumatic effects?: A survey of traumatic stress professionals. *Journal of Traumatic Stress, 18*(5), 541-545.

Engelhard, I. M., Van Den Hout, M. A., Kindt, M., Arntz, A., & Schouten, E. (2003). Peritraumatic dissociation and posttraumatic stress after pregnancy loss: A prospective study. *Behaviour Research and Therapy*, *41*(1), 67-78.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behaviour Research Methods, 41,* 1149-1160.

Fennema-Notestine, C., Stein, M. B., Kennedy, C. M., Archibald, S. L., & Jernigan, T. L. (2002). Brain morphometry in female victims of intimate partner violence with and without posttraumatic stress disorder. *Biological Psychiatry, 52*(11), 1089-1101.

Foa, E. B., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment, 9,* 445-451.

Foa, E. B., Keane, T. M., Friedman, M. J., & Cohen, J. A. (Eds.). (2009). *Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies*. New York: Guilford Press.

Foa, E. B., Molnar, C., & Cashman, L. (1995). Change in rape narratives during exposure therapy for posttraumatic stress disorder. *Journal of Traumatic Stress, 8*(4), 675-690.

Foa, E. B., & Rothbaum, B. O. (1998). *Treating the trauma of rape: Cognitive Behavioural Therapy for PTSD*. New York: Guilford.

Foa, E. B., Rothbaum, B. O., Riggs, D. S., & Murdock, T. B. (1991). Treatment of posttraumatic stress disorder in rape victims: a comparison between cognitive-behavioural procedures and counselling. *Journal of Consulting and Clinical Psychology, 59*(5), 715-723.

Foa, E. B., Steketee, G., & Rothbaum, B. O. (1989). Behavioural/cognitive conceptualizations of post-traumatic stress disorder. *Behaviour Therapy, 20*(2), 155-176.

Frewen, P. A., Dozois, D. J., Neufeld, R. W., & Lanius, R. A. (2008). Meta-analysis of alexithymia in posttraumatic stress disorder. *Journal of Traumatic Stress, 21*(2), 243-246.

Gauer, G., da Silva Alencastro, L., & Gomes, W. B. (2010). Remembering and Telling: Narrative Coherence and Phenomenal Aspects of Autobiographical Memories. *R. Interam. Psicol*, *44*, 150-156.

Gauer, G., & Gomes, W. B. (2010). Phenomenal qualities of autobiographical memories in an event-cuing Paradigm. *R. Interam. Psicol*, *44*(3), 467-474.

Gilbertson, M. W., Shenton, M. E., Ciszewski, A., Kasai, K., Lasko, N. B., Orr, S. P., & Pitman, R. K. (2002). Smaller hippocampal volume predicts pathologic vulnerability to psychological trauma. *Nature Neuroscience*, *5*(11), 1242-1247.

Graesser, A. C., McNamara, D. S., Louwerse, M. M., & Cai, Z. (2004). Coh-Metrix: Analysis of text on cohesion and language. *Behaviour Research Methods, Instruments, & Computers*, *36*(2), 193-202.

Gray, M. J., & Lombardo, T. W. (2001). Complexity of trauma narratives as an index of fragmented memory in PTSD: A critical analysis. *Applied Cognitive Psychology*, *15*(7), 171-186.

Gurvits, T. V., Shenton, M. E., Hokama, H., Ohta, H., Lasko, N. B., Gilbertson, M. W., ... & Pitman, R. K. (1996). Magnetic resonance imaging study of hippocampal volume in chronic, combat-related posttraumatic stress disorder. *Biological Psychiatry*, *40*(11), 1091-1099.

Hackmann, A., Ehlers, A., Speckens, A., & Clark, D. M. (2004). Characteristics and content of intrusive memories in PTSD and their changes with treatment. *Journal of Traumatic Stress*, *17*(3), 231-240.

Hackmann, A., Ehlers, A., Speckens, A., & Clark, D. M. (2004). Characteristics and content of intrusive memories in PTSD and their changes with treatment. *Journal of traumatic stress*, *17*(3), 231-240.

Halligan, S. L., Michael, T., Clark, D. M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: The role of cognitive processing, trauma memory, and appraisals. *Journal of Consulting and Clinical Psychology*, *71*(3), 419-431.

Harvey, A. G., & Bryant, R. A. (1999). The relationship between acute stress disorder and posttraumatic stress disorder: a 2-year prospective evaluation. *Journal of consulting and clinical psychology*, *67*(6), 985.

Hellawell, S. J., & Brewin, C. R. (2004). A comparison of flashbacks and ordinary autobiographical memories of trauma: Content and language. *Behaviour Research and Therapy*, *42*(1), 1-12.

Hendler, T., Rotshtein, P., Yeshurun, Y., Weizmann, T., Kahn, I., Ben-Bashat, D., ... & Bleich, A. (2003). Sensing the invisible: differential sensitivity of visual cortex and amygdala to traumatic context. *Neuroimage*, *19*(3), 587-600.

Herman, J.L. (1992). *Trauma and Recovery*. New York: Basic Books.

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 65-70.

Holmes, D., Alpers, G. W., Ismailji, T., Classen, C., Wales, T., Cheasty, V., ... & Koopman, C. (2007). Cognitive and emotional processing in narratives of women abused by intimate partners. *Violence Against Women*, *13*(11), 1192-1205.

Holmes, E. A., Grey, N., & Young, K. A. (2005). Intrusive images and "hotspots" of trauma memories in posttraumatic stress disorder: An exploratory investigation of emotions and cognitive themes. *Journal of Behaviour Therapy and Experimental Psychiatry*, *36*(1), 3-17.

Horowitz, M.J. (1976). *Stress response syndromes*. New York: Aronson.

Hyman, I. E., & Faries, J. M. (1992). The functions of autobiographical memory. *Theoretical perspectives on autobiographical memory*, 207-221.

Janoff-Bulman, R. (1992). Shattered Assumptions*: Towards a new Psychology of Trauma*. New York: Free Press.

Jelinek, L., Randjbar, S., Seifert, D., Kellner, M., & Moritz, S. (2009). The organization of autobiographical and nonautobiographical memory in posttraumatic stress disorder (PTSD). *Journal of Abnormal Psychology, 118*(2), 288-296.

Jelinek, L., Stockbauer, C., Randjbar, S., Kellner, M., Ehring, T., & Moritz, S. (2010). Characteristics and organization of the worst moment of trauma memories in posttraumatic stress disorder. *Behaviour Research and Therapy, 48*(7), 680-685.

Jobson, L. (2011). Cultural differences in levels of autonomous orientation in autobiographical remembering in post-traumatic stress disorder. *Applied Cognitive Psychology, 25*, 175-182.

Jobson, L. & O' Kearney, R. (2008). Cultural differences in personal identity in post-traumatic stress disorder. *British Journal of Clinical Psychology, 47*, 95-109.

Johnson, J., Maxwell, A.R., & Galea, S. (2009). The epidemiology of post-traumatic stress disorder. *Psychiatric Annals, 39*(6), 326-334.

Jones, J. C., & Barlow, D. H. (1990). The aetiology of posttraumatic stress disorder. *Clinical Psychology Review, 10*(3), 299-328.

Jones, C., Harvey, A. G., & Brewin, C. R. (2007). The organisation and content of trauma memories in survivors of road traffic accidents. *Behaviour Research and Therapy*, *45*(1), 151-162.

Keane, T. M., Silberbogen, A. K., & Weierich, M. R. (2008). Post-traumatic stress disorder. In J. Hunsley, & E. J. Mash (Eds.), *A guide to assessments that work* (pp. 293-315). USA: Oxford University Press.

Kenardy, J., Smith, A., Spence, S. H., Lilley, P. R., Newcombe, P., Dob, R., & Robinson, S. (2007). Dissociation in children's trauma narratives: an exploratory investigation. *Journal of Anxiety Disorders*, *21*(3), 456-466.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, *52*(12), 1048-1060.

Kindt, M., & van den Hout, M. (2003). Dissociation and memory fragmentation: Experimental effects on meta-memory but not on actual memory performance. *Behaviour Research and Therapy*, *41*(2), 167-178.

Kindt, M., Van den Hout, M., & Buck, N. (2005). Dissociation related to subjective memory fragmentation and intrusions but not to objective memory disturbances. *Journal of Behaviour Therapy and Experimental Psychiatry*, *36*(1), 43-59.

Klein, K., & Boals, A. (2010). Coherence and narrative structure in personal accounts of stressful experiences. *Journal of Social and Clinical Psychology*, *29*(3), 256-280.

Kleim, B., Ehlers, A., & Glucksman, E. (2007). Early predictors of chronic post-traumatic stress disorder in assault survivors. *Psychological Medicine, 37*(10), 1457-1463.

Knight, R. G., Williams, S., McGee, R., & Olaman, S. (1997). Psychometric properties of the Centre for Epidemiologic Studies Depression Scale (CES-D) in a sample of women in middle life. *Behaviour Research and Therapy*, *35*(4), 373-380.

Krans, J., Näring, G., Becker, E. S., & Holmes, E. A. (2009). Intrusive trauma memory: A review and functional analysis. *Applied Cognitive Psychology*, *23*(8), 1076-1088.

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., & Couper, M. (2004). Psychological research online: report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet. *American Psychologist*, *59*(2), 105-112.

Lancaster, S.L., Rodriguez, B.F., & Weston, R. (2011). Path analytic examination of a cognitive model of PTSD. *Behaviour Research and Therapy, 49*, 194-201.

LeDoux, J. E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*(1), 155-184.

Magnus, K., Diener, E., Fujita, F., & Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: a longitudinal analysis. *Journal of Personality and Social Psychology*, *65*(5), 1046-1053.

Margoob, M. A., Firdosi, M., Banal, R., Khan, A. Y., Malik, Y. A., Ahmad, S. A., ... & Shah, M. S. (2006). Community prevalence of trauma in South Asia: Experience from Kashmir. *JK-Pract, 13*, 14-7.

Mayou, R., Bryant, B., & Ehlers, A. (2001). Prediction of psychological outcomes one year after a motor vehicle accident. *American Journal of Psychiatry*, *158*(8), 1231-1238.

McNally, R. J. (2003). Progress and controversy in the study of posttraumatic stress disorder. *Annual Review of Psychology*, *54*(1), 229-252.

McNally, R., Lasko, N.B., Macklin, M.L., & Pitman, R.K. (1995). Autobiographical memory disturbance in combat-related posttraumatic stress disorder. *Behaviour Research and Therapy, 33*, 619-630.

Megias, J. L., Ryan, E., Vaquero, J. M. M., & Frese, B. (2007). Comparisons of traumatic and positive memories in people with and without PTSD profile. *Applied Cognitive Psychology, 21*, 117-130.

Mehta, K., Vankar, G., & Patel, V. (2005). Validity of the construct of post-traumatic stress disorder in a low-income country Interview study of women in Gujarat, India. *The British Journal of Psychiatry*, *187*(6), 585-586.

Michael, T., Ehlers, A., Halligan, S. L., & Clark, D. M. (2005). Unwanted memories of assault: what intrusion characteristics are associated with PTSD? *Behaviour Research and Therapy*, *43*(5), 613-628.

Milad, M. R., Vidal-Gonzalez, I., & Quirk, G. J. (2004). Electrical stimulation of medial prefrontal cortex reduces conditioned fear in a temporally specific manner. *Behavioural Neuroscience*, *118*(2), 389-394.

Miller, G. A., & Chapman, J.P. (2001). Misunderstanding analysis of covariance. *Journal of Abnormal Psychology, 110*, 40–48.

Mol, S. S., Arntz, A., Metsemakers, J. F., Dinant, G. J., Vilters-Van Montfort, A.P., & Knottnerus, J. A. (2005). Symptoms of post-traumatic stress disorder after non-traumatic events: evidence from an open population study. *The British Journal of Psychiatry*, *186*(6), 494-499.

Morgan, M. A., Romanski, L. M., & LeDoux, J. E. (1993). Extinction of emotional learning: contribution of medial prefrontal cortex. *Neuroscience Letters*, *163*(1), 109-113.

Mundorf, E.S., & Paivio, S.C. (2011). Narrative quality and disturbance pre- and post-emotion-focussed therapy for child abuse trauma. *Journal of Traumatic Stress, 24*, 643-650.

Murray, J., Ehlers, A., & Mayou, R. A. (2002). Dissociation and post-traumatic stress disorder: two prospective studies of road traffic accident survivors. *The British Journal of Psychiatry*, *180*(4), 363-368.

National Institute for Health and Clinical Excellence. Clinical Guideline 26. 2005. Post-traumatic stress disorder (PTSD): the management of PTSD in adults and children in primary and secondary care. Retrieved on 26/06/2013 from http://www.nice.org.uk/nicemedia/live/10966/29769/29769.pdf

Nelson, K. (1993). The psychological and social origins of autobiographical memory. *Psychological Science*, *4*(1), 7-14.

Newman, E., & Walker, E.A. (1999). Assessing the ethical costs and benefits of trauma-focussed research. *General Hospital Psychiatry, 21*, 187-196.

Norris, F. H., Perilla, J. L., Riad, J. K., Kaniasty, K., & Lavizzo, E. A. (1999). Stability and change in stress, resources, and psychological distress following natural disaster: findings from Hurricane Andrew. *Anxiety, Stress & Coping*, *12*(4), 363-396.

O' Carroll Bantum, E., & Owen, J. E. (2009). Evaluating the validity of computerized content analysis programs for identification of emotional expression in cancer narratives. *Psychological Assessment*, *21*(1), 79-88.

O'Donnell, M. L., Creamer, M., & Pattison, P. (2004). Posttraumatic stress disorder and depression following trauma: understanding comorbidity. *American Journal of Psychiatry*, *161*(8), 1390-1396.

O'Kearney, R., Hunt, A., & Wallace, N. (2011). Integration and organisation of trauma memories and post-traumatic symptoms. *Journal of Traumatic Stress, 24*, 716-725.

O'Kearney, R., & Perrott, K. (2006). Trauma narratives in post-traumatic stress disorder: A review. *Journal of Traumatic Stress, 19*, 81-93.

Olff, M., Langeland, W., Draijer, N., & Gersons, B. P. (2007). Gender differences in posttraumatic stress disorder. *Psychological Bulletin, 133*(2), 183-204.

Orr, S. P., Metzger, L. J., Lasko, N. B., Macklin, M. L., Peri, T., & Pitman, R. K. (2000). De novo conditioning in trauma-exposed individuals with and without posttraumatic stress disorder. *Journal of Abnormal Psychology, 109*(2), 290-298.

Otis, J. D., Keane, T. M., & Kerns, R. D. (2003). An examination of the relationship between chronic pain and post-traumatic stress disorder. *Journal of Rehabilitation Research and Development, 40*(5), 397-406.

Owens, G. P., Steger, M. F., Whitesell, A. A., & Herrera, C. J. (2009). Posttraumatic stress disorder, guilt, depression, and meaning in life among military veterans. *Journal of Traumatic Stress, 22*(6), 654-657.

Pallant, J. (2010). *SPSS survival manual: A step by step guide to data analysis using SPSS*. Berkshire, UK: Open University Press/McGraw-Hill.

Pasupathi, M. (2001). The social construction of the personal past and its implications for adult development. *Psychological Bulletin*, *127*(5), 651-672.

Pasupathi, M. (2007). Telling and the remembered self: Linguistic differences in memories for previously disclosed and previously undisclosed events. *Memory*, *15*(3), 258-270.

Pasupathi, M., Lucas, S., & Coombs, A. (2002). Conversational functions of autobiographical remembering: Long-married couples talk about conflicts and pleasant topics. *Discourse Processes*, *34*(2), 163-192.

Parry, L., & O'Kearney, R. (2013). A comparison of the quality of intrusive memories in post-traumatic stress disorder and depression. *Memory*, (ahead-of-print), 1-18.

Pennebaker, J.W., Chung, C.K., Ireland, M., Gonzales, A., & Booth, R.J. (2007). *The development and psychometric properties of LIWC2007*. Austin, Texas: LIWC.net.

Pennebaker, J. W., & Lay, T. C. (2002). Language use and personality during crises: Analyses of Mayor Rudolph Giuliani's press conferences. *Journal of Research in Personality, 36*(3), 271-282.

Perneger, T. V. (1998). What's wrong with Bonferroni adjustments. *British Medical Journal, 316,* 1236-1238.

Pillemer, D. B. (1992). Remembering personal circumstances: A functional analysis. In E. Winograd, & U. Neisser, (Eds.), *Affect and accuracy in recall: Studies of "flashbulb" memories. Emory symposia in cognition, 4, 236-264*. New York, NY, US: Cambridge University Press.

Pillemer, D.B. (1998). *Momentous events, vivid memories*. Cambridge, MA: Harvard University Press.

Preacher, K. J., Rucker, D. D., MacCallum, R. C., & Nicewander, W. A. (2005). Use of the extreme groups approach: a critical reexamination and new recommendations. *Psychological Methods*, *10*(2), 178-192.

Protopopescu, X., Pan, H., Tuescher, O., Cloitre, M., Goldstein, M., Engelien, W., ... & Stern, E. (2005). Differential time courses and specificity of amygdala activity in posttraumatic stress disorder subjects and normal control subjects. *Biological Psychiatry*, *57*(5), 464-473.

Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

Resick, P. A. (2001). *Stress and trauma*. Philadelphia, PA: Taylor & Francis Inc.

Resick, P. A., & Schnicke, M. K. (1992). Cognitive processing therapy for sexual assault victims. *Journal of Consulting and Clinical psychology*, *60*(5), 748-756.

Rice, W. R. (1989). Analysing tables of statistical tests. *Evolution, 43*, 223-225.

Richardson, L. K., Frueh, B. C., & Acierno, R. (2010). Prevalence estimates of combat-related post-traumatic stress disorder: Critical review. *Australian and New Zealand Journal of Psychiatry*, *44*(1), 4-19.

Robinaugh, D.J., & McNally, R.J. (2011). Trauma centrality and PTSD symptom severity in adult survivors of childhood sexual abuse. *Journal of Traumatic Stress, 24*, 483-486.

Roberts, R. E., Vernon, S. W., & Rhoades, H. M. (1989). Effects of language and ethnic status on reliability and validity of the Centre for Epidemiologic Studies-Depression Scale with psychiatric patients. *The Journal of Nervous and Mental Disease*, *177*(10), 581-592.

Roland, A. G., Currier, J. M., Rojas-Flores, L., & Herrera, S. (2013). Event centrality and posttraumatic outcomes in the context of pervasive violence: A study of teachers in El Salvador. *Anxiety, Stress & Coping*, (ahead-of-print), 1-12.

Rubin, D. (1986). *Autobiographical memory*. Hoboken, NJ, US: John Wiley & Sons, Ltd.

Rubin, D. C. (2011). The coherence of memories for trauma: Evidence from posttraumatic stress disorder. *Consciousness and Cognition*, *20*(3), 857-865

Rubin, D.C., Berntsen, D., & Bohni, M.K. (2008). A memory-based model of posttraumatic stress disorder: Evaluating basic assumptions underlying PTSD diagnosis. *Psychological Review*, *115*, 985-1011.

Rubin, D. C., Dennis, M. F., & Beckham, J. C. (2011). Autobiographical memory for stressful events: The role of autobiographical memory in posttraumatic stress disorder. *Consciousness and Cognition*, *20*(3), 840-856.

Rubin, D. C., Feldman, M. E., & Beckham, J. C. (2004). Reliving, emotions, and fragmentation in the autobiographical memories of veterans diagnosed with PTSD. *Applied Cognitive Psychology*, *18*(1), 17-35.

Rubin, D.C., Schrauf, R.W., & Greenberg, D.L. (2003). Belief and recollection of autobiographical memories. *Memory and Cognition, 31*, 887-901.

Salkovskis, P.M. (1996). The cognitive approach to anxiety: Threat beliefs, safety-seeking behaviour, and the special case of health anxiety and obsessions. In PM Salkovskis (Ed.), *Frontiers of Cognitive Therapy* (pp. 48-74). New York: Guilford Press.

Salmond, C. H., Meiser‐Stedman, R., Glucksman, E., Thompson, P., Dalgleish, T., & Smith, P. (2011). The nature of trauma memories in acute stress disorder in children and adolescents. *Journal of Child Psychology and Psychiatry*, *52*(5), 560-570.

Sapolsky, R. M., Uno, H., Rebert, C. S., & Finch, C. E. (1990). Hippocampal damage associated with prolonged glucocorticoid exposure in primates. *The Journal of Neuroscience*, *10*(9), 2897-2902.

Schnurr, P. P., & Green, B. L. (2004). *Trauma and health: Physical health consequences of exposure to extreme stress*. Washington, DC: American Psychological Association.

Schuettler, D., & Boals, A. (2011). The path to posttraumatic growth versus posttraumatic stress disorder: Contributions of event centrality and coping. *Journal of Loss and Trauma, 16,* 180-194.

Seidler, G. H., & Wagner, F. E. (2006). Comparing the efficacy of EMDR and trauma-focused cognitive-behavioural therapy in the treatment of PTSD: A meta-analytic study. *Psychological Medicine*, *36*(11), 1515-1522.

Shaffer, J. P. (1995). Multiple hypothesis testing. *Annual Review of Psychology*, *46*(1), 561-584.

Shamai, M., & Levin-Megged, O. (2006). The myth of creating an integrative story: The therapeutic experience of Holocaust survivors. *Qualitative Health Research, 16*(5), 692-712.

Shapiro, F., & Maxfield, L. (2002). Eye movement desensitization and reprocessing (EMDR): Information processing in the treatment of trauma. *Journal of Clinical Psychology, 58*(8), 933-946.

Sheeran, T., & Zimmerman, M. (2002). Screening for posttraumatic stress disorder in a general psychiatric outpatient setting. *Journal of Consulting and Clinical Psychology, 70*(4), 961-966.

Shin, L. M., Rauch, S. L., & Pitman, R. K. (2006). Amygdala, medial prefrontal cortex, and hippocampal function in PTSD. *Annals of the New York Academy of Sciences*, *1071*(1), 67-79.

Shin, L. M., Orr, S. P., Carson, M. A., Rauch, S. L., Macklin, M. L., Lasko, N. B., ... & Pitman, R. K. (2004). Regional cerebral blood flow in the amygdala and medial prefrontal cortex during traumatic imagery in male and female Vietnam veterans with PTSD. *Archives of General Psychiatry*, *61*(2), 168-176.

Singer, J. A., & Salovey, A. P. (1993). *The remembered self*. New York: The Free Press.

Smeets, T., Giesbrecht, T., Raymaekers, L., Shaw, J., & Merckelbach, H. (2010). Autobiographical integration of trauma memories and repressive coping predict post‐traumatic stress symptoms in undergraduate students. *Clinical Psychology & Psychotherapy*, *17*(3), 211-218.

Speckens, A. E., Ehlers, A., Hackmann, A., & Clark, D. M. (2006). Changes in intrusive memories associated with imaginal reliving in posttraumatic stress disorder. *Journal of Anxiety Disorders*, *20*(3), 328-341.

Speckens, A. E., Ehlers, A., Hackmann, A., Ruths, F. A., & Clark, D. M. (2007). Intrusive memories and rumination in patients with post-traumatic stress disorder: A phenomenological comparison. *Memory*, *15*(3), 249-257.

Spitzer, R. L., Williams, J. B., Gibbon, M., & First, M. B. (1992). The Structured Clinical Interview for DSM-III-R (SCID) I: History, rationale, and description. *Archives of General Psychiatry*, *49*(8), 624-629.

SPSS 21 (IBM Statistical Package for the Social Sciences) for Windows. Rel. 2012. Armonk, NY: IBM Corp. 2012

Stein, D. J., Ipser, J., & McAnda, N. (2009). Pharmacotherapy of posttraumatic stress disorder: a review of meta-analyses and treatment guidelines. *Cns Spectr*, *14*(1), 25-31.

Sutherland, K., & Bryant, R.A. (2005). Self-defining memories in posttraumatic stress disorder. *British Journal of Clinical Psychology*, *44*, 591-598.

Sutherland, K., & Bryant, R. A. (2008). Autobiographical memory and the self-memory system in posttraumatic stress disorder. *Journal of Anxiety Disorders*, *22*(3), 555-560.

Tachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics (5th edition)*. Boston: Pearson Education.

Talarico, J. M., LaBar, K. S., & Rubin, D. C. (2004). Emotional intensity predicts autobiographical memory experience. *Memory & Cognition*, *32*(7), 1118-1132.

Tausczik, Y.R., & Pennebaker, J.W. The psychological meaning of words: LIWC and computerised text analysis methods. *Journal of Language and Social Psychology, 29*, 24-54.

Taylor, S. (2006). *Clinician's guide to PTSD: A cognitive-behavioural approach*. New York: Guilford Press.

Toffolo, M. B., Smeets, M. A., & van den Hout, M. A. (2012). Proust revisited: Odours as triggers of aversive memories. *Cognition & Emotion*, *26*(1), 83-92.

Uddin, M., Aiello, A. E., Wildman, D. E., Koenen, K. C., Pawelec, G., de Los Santos, R., ... & Galea, S. (2010). Epigenetic and immune function profiles associated with posttraumatic stress disorder. *Proceedings of the National Academy of Sciences*, *107*(20), 9470-9475.

Van der Kolk, B. A., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: Overview and exploratory study. *Journal of Traumatic Stress*, *8*(4), 505-525.

Van der Kolk, B. A., McFarlane, A. C., & Weisaeth, L. (Eds.). (2007). *Traumatic stress: The effects of overwhelming experience on mind, body, and society*. New York: Guilford Press.

Van der Kolk, B. A., Roth, S., Pelcovitz, D., Sunday, S., & Spinazzola, J. (2005). Disorders of extreme stress: The empirical foundation of a complex adaptation to trauma. *Journal of Traumatic Stress*, *18*(5), 389-399.

Van Hooff, M., McFarlane, A. C., Baur, J., Abraham, M., & Barnes, D. J. (2009). The stressor Criterion-A1 and PTSD: A matter of opinion?. *Journal of Anxiety Disorders*, *23*(1), 77-86.

Van Minnen, A., Wessel, I., Dijkstra, T., & Roelofs, K. (2002). Changes in PTSD patients' narratives during prolonged exposure therapy: A replication and extension. *Journal of Traumatic Stress*, *15*(3), 255-258.

Vermetten, E., & Bremner, J. D. (2003). Olfaction as a traumatic reminder in posttraumatic stress disorder: Case reports and review. *Journal of Clinical Psychiatry*, *64*, 202-207.

Wang, Q., & Conway, M. A. (2004). The Stories We Keep: Autobiographical Memory in American and Chinese Middle‐Aged Adults. *Journal of Personality*, *72*(5), 911-938.

Waters, T. E., Shallcross, J. F., & Fivush, R. (2013). The many facets of meaning making: Comparing multiple measures of meaning making and their relations to psychological distress. *Memory*, *21*(1), 111-124.

Webb, H., & Jobson, L. (2011). Relationships between self-consistency, trauma-centred identity, and posttraumatic adjustment. *Clinical Psychologist*, *15*, 103-111.

Weik, M. (1996). *Communications and standard dictionary (3rd ed.)*. New York: Chapman & Hall.

Williams, H.L., Conway, M.A., & Cohen, G. (2008). Autobiographical Memory. In G. Cohen & M.A. Conway (eds.), *Memory in the Real World (3rd Ed.)* (pp. 21-90*)*. London: Psychology Press.

Williams, L. M., Kemp, A. H., Felmingham, K., Barton, M., Olivieri, G., Peduto, A., ... & Bryant, R. A. (2006). Trauma modulates amygdala and medial prefrontal responses to consciously attended fear. *Neuroimage*, *29*(2), 347-357.

Wright, S. P. (1992). Adjusted p-values for simultaneous inference. *Biometrics*, 1005-1013.

Yehuda, R., McFarlane, A., & Shalev, A. (1998). Predicting the development of posttraumatic stress disorder from the acute response to a traumatic event. *Biological Psychiatry*, *44*(12), 1305-1313.

Young, K. E. (2000). Cognitive and emotional processing in women with posttraumatic stress disorder for child sexual abuse. *Unpublished doctoral dissertation*, Stanford University.

Zoellner, L. A., Alvarez-Conrad, J., & Foa, E. B. (2002). Peritraumatic dissociative experiences, trauma narratives, and trauma pathology. *Journal of Traumatic Stress, 15*(1), 49-57.

Zoellner, L. A., & Bittenger, J. N. (2004). On the uniqueness of trauma memories in PTSD. In G. Rosen (Ed.). (2004). *Posttraumatic stress disorder: Issues and controversies* (pp.147-162). Hoboken, NJ, US: John Wiley & Sons.

Appendices

Appendix A

Letter of Ethical Approval from UEA Faculty of Medicine and Health Sciences Research Ethics Committee

Faculty of Medicine and Health Sciences Research Ethics Committee

University of East Anglia

Emma Ronayne
School of Medicine
University of East Anglia
Norwich Research Park
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27th March 2013

Dear Emma,

Project title: Trauma-centred identity and autobiographical memory in post-traumatic stress disorder
Reference: 2012/2013 - 23

The amendments to your above proposal have been considered by the Chair of the Faculty Research Ethics Committee and we can confirm that your proposal has been approved.

Please could you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

The Committee would like to wish you good luck with your project.

Yours sincerely,

Yvonne Kirkham

Yvonne Kirkham
Project Officer

Appendix B

Advertisement to Recruit Participants

Invitation to Participate in a Research Study looking at Memory for Significant Life Events

University of East Anglia

Would you like to participate in research on how we remember significant life events?

The study is looking at how we remember these events and how they affect our identity and sense of self. It will explore memories of important life events, such as memories of trauma, as well as other, everyday, non-traumatic events.

The study is looking for adults from the general population, male or female, aged between 18 and 65 years, whose English is fluent enough to complete the questionnaires.

Volunteering will take approximately 45-60 minutes and requires filling in some questionnaires and completing two memory writing (typing) tasks. You can fill in the questionnaires online on a secure webpage.

Participants will be entered into a prize draw to win £80 Amazon.co.uk vouchers!

If you are interested in taking part and would like some more information, then please contact me using the details below, or click on this link http://www.surveymonkey.com/s/Memory_for_Life_Events_Study to learn more about what taking part would involve.

Thank you for taking the time to read this information. I look forward to hearing from you soon.

Emma Ronayne
Trainee Clinical Psychologist
School of Medicine, Health Policy and Practice
University of East Anglia
Email: E.Ronayne@uea.ac.uk **Phone:** 07725 031486

Appendix C

Participant Information Sheet

Primary Researcher: Emma Ronayne
Trainee Clinical Psychologist
Norwich Medical School
University of East Anglia, Norwich NR4 7TJ
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Primary supervisor: Dr Laura Jobson
Norwich Medical School
University of East Anglia, Norwich NR4 7TJ
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Participant Information Sheet

A Study Investigating Memories of Significant Life Events

I would like to invite you to take part in a research study. Before you decide, I would like to explain why the research is being carried out and what it will involve for you. Please read the following information carefully. Take time to decide whether or not you wish to take part.

1. What is the purpose of the study?

The aim of this study is to investigate how people remember events in their lives, including trauma (events such as serious accidents, sexual assault, natural disasters, combat). I would like to find out how people relate these events to their identity and sense of self. I am therefore looking for adults aged between 18 and 65 years from the general population to participate. I am interested in seeing how memories for different types of events, both traumatic and non-traumatic, differ, and how these differences relate to psychological adjustment following trauma. The study is being carried out by a trainee clinical psychologist, Emma Ronayne, and a clinical lecturer, Dr Laura Jobson, at the University of East Anglia.

2. Why have I been invited?

You have been invited as you have indicated an interest in the research by responding to the advertisement for it. I am hoping to include a total of 67 participants in the study.

3. Do I have to take part?

No. It is up to you to decide whether or not to take part. Your participation is totally voluntary. After you have read this information, you will be asked to complete a consent form to show that you are happy to take part.

4. What will happen if I take part?

After reading this information sheet, you will be directed to a consent form. You will be asked to take your time to consider your participation before clicking on 'NEXT' at the bottom of the consent form screen. You can save the form, close it, think about whether you want to take part and open it again later. By completing the consent form and clicking on 'NEXT', you are agreeing to take part. If you choose to take part, you will then be directed to an online link with the study questionnaires. The questionnaires will

take approximately 45-60 minutes to complete. Please note that some tasks ask you to think and write about a trauma event. The other tasks relate to other types of memory. Participants must be able to complete the tasks in English.

5. Can I stop taking part if I change my mind?

If you decide to take part in the study you can change your mind about participating and withdraw from the study at any point. There will be a 'WITHDRAW' option at the bottom of every screen. If you choose to withdraw from the study you do not have to provide a reason and there will be no consequences. If you choose to withdraw, the information you have already provided will be destroyed and not used in the research.

6. **Will my taking part in this study be anonymous and kept confidential?**

Yes. All collected data will be anonymous and treated as confidential. This means that I will not ask you to provide your name or address on the questionnaires you complete. The questionnaires completed by you will be password-protected on a secure webpage. Once the study is completed, the information will be stored on an encrypted memory stick in a locked drawer at the University of East Anglia for 5 years, in line with current policy. The consent form information will be stored on a separate memory stick and destroyed on completion of the research. It will not be possible to link the consent forms to your questionnaires.

7. What will happen to the results of the research study?

The information collected will be written into articles and may be published in a relevant journal. You will not be identified in any of these articles. If you are interested in finding out about the results from the study you will be given a chance at the end of the study to leave your email or postal address. These details will be kept separate from your completed questionnaires and it will not be possible to link the two in any way. After I have sent you information about what I have found, your email/postal addresses will be destroyed.

8. What are the possible disadvantages or risks of taking part?

The study does include some questions about trauma. Research shows that, in general, questions about trauma are not harmful to participants' well-being; in fact, several studies have even shown that writing about traumatic events can improve how people feel about the events in question. It is possible, however, that you may feel some distress during or following the task. If you feel upset during the study, you may withdraw at any point. If you feel distressed during or after the research, then I would encourage you to contact me (Emma Ronayne, Trainee Clinical Psychologist), your local General Practitioner (GP) or a mental health support service, such as: MIND (UK) [Phone: 08457 660 163] or the Samaritans (UK) [Phone: 08457 909 090], Samaritans (ROI) [Phone: 1850 60 90 90], Samaritans (US) [Phone: 1(800) 273-8255].

9. What are the possible benefits of taking part?

There are no direct benefits in taking part, however it is hoped that this research will improve our understanding of memory and adjustment to trauma. It may help to develop better interventions for people who are suffering from post-traumatic stress.

10. **Complaints**
If you have any further concerns about any aspect of the study you should contact Dr Laura Jobson, Clinical Psychologist, EFRY 2.17, University of East Anglia, Norwich NR4 7TJ (Email: laura.jobson@uea.ac.uk Tel.: 01603 591158) or Professor David Crossman, Head of Norwich Medical School, MED 1.07A, University of East Anglia, Norwich NR4 7TJ (Email: d.crossman@uea.ac.uk Tel.: 01603 593971)

11. **Who is organising and funding the research?**
This research is organised by Emma Ronayne and Dr Laura Jobson and is funded by the University of East Anglia Doctoral Programme in Clinical Psychology.

12. Has this study been approved?
Ethical approval for this study was granted by the UEA Faculty of Medicine and Health Sciences Research Ethics Committee.

13. **Further information**
If there is anything that is not clear, or if you would like more information, please ask me.

Thank you for taking time to read this information sheet, please click here if you would like to save this information for your records.

Appendix D

Participant Consent Form

PARTICIPANT CONSENT FORM

Title of the project:
A study investigating memory for significant life events

Researchers and contact details:
Emma Ronayne (E.Ronayne@uea.ac.uk / 07725 031486)
Dr Laura Jobson (l.jobson@uea.ac.uk / 01603 591158)

Please click on each box if you agree to participate.

1. I have read the Participant Information Sheet relating to this study. I understand what my role will be in this research, and all of my questions have been answered to my satisfaction. ☐
2. I understand that I am free to withdraw from the research for any reason and without prejudice. ☐
3. I have been informed that the confidentiality of the information I provide will be safeguarded. ☐
4. I understand that relevant sections of my data collected during the study may be looked at by individuals from regulatory authorities where it is relevant to my taking part in this research. ☐
5. I understand that I am free to ask any questions at any time before and during the study, and have the contact details of the researcher should I wish to discuss any aspect of the study. ☐
6. I am an adult, aged between 18 and 65 years. ☐
7. I understand that by reading the participant information sheet, this consent form, and clicking on "Next" to take me to the online link with the study questionnaires, I am giving my consent to participate. ☐

Please save a copy of this for your own records (click here)

Appendix E

Demographic Information Form

INSTRUCTIONS:

Please complete the following information

Age:_____ years old

Gender (please click to highlight): MALE FEMALE

What is your ethnicity? _____

What is your religious affiliation? _____

How many years have you spent in education? _____ years

Have you ever been given a diagnosis of PTSD from a medical or mental health professional? (please click)

YES **NO**

How difficult did you find filling in these questionnaires?

1	2	3	4	5	6	7	8	9	10
Not at all				Moderately				Extremely	

Appendix F

Post-traumatic Diagnostic Scale (PDS)

Task 1: INSTRUCTIONS

Part 1
Many people have lived through or witnessed a very stressful and traumatic event at some point in their lives. Below is a list of traumatic events. Click on the box next to ALL of the events that have happened to you or that you have witnessed.

1	Serious accident, fire, or explosion (for example, an industrial, farm, car, plane, or boating accident)	☐
2	Natural disaster (for example, cyclone, flood, tornado, hurricane, flood, or major earthquake)	☐
3	Non-sexual assault by a family member or someone you know (for example, being mugged, physically attacked, shot, stabbed, or held at gunpoint)	☐
4	Non-sexual assault by a stranger (for example, being mugged, physically attacked, shot, stabbed, or held at gunpoint)	☐
5	Sexual assault by a family member or someone you know (for example, rape or attempted rape)	☐
6	Sexual assault by a stranger (for example, rape or attempted rape)	☐
7	Military combat or war zone	☐
8	Sexual contact when you were younger than 18 with someone who was 5 or more years older than you (for example, contact with genitals, breasts)	☐
9	Imprisonment (for example, prison inmate, prisoner of war, hostage)	☐
10	Torture	☐
11	Life threatening illness	☐
12	Other traumatic event	☐
13	If you marked item 12, specify the traumatic event below:	

_____

_____

_____

_____

_____

Part 2.

14 If you marked more than one traumatic event in Part 1, click on the box next to the event *that bothers you the most*. If you only clicked one traumatic event in Part 1, click the same one below.

- Accident ☐
- Disaster ☐
- Non-sexual assault by a family member or someone you know ☐
- Non-sexual assault by a stranger ☐
- Sexual assault by a family member or someone you know ☐
- Sexual assault by a stranger ☐
- Combat ☐
- Sexual contact when you were younger than 18 with someone who was 5 or more years older ☐
- Imprisonment ☐
- Torture ☐
- Life threatening illness ☐
- Other ☐

Now please think about the traumatic event you just selected. Please write about this event in as much detail as you can. All of your writing will be completely confidential. As you type, do not worry about punctuation or grammar, just write as much as you can and include thoughts, feelings, reflections etc.

Below are some questions about the traumatic event you just described above.

15 How long ago did the traumatic event happen? (click on ONE)

1	Less than 1 month	☐
2	1 to 3 months	☐
3	3 to 6 months	☐
4	6 months to 3 years	☐
5	3 to 5 years	☐
6	More than 5 years	☐

For the following questions, click Yes or No.

During this traumatic event:

16	Were you physically injured?	**YES**	**NO**
17	Was someone else physically injured?	**YES**	**NO**
18	Did you think your life was in danger?	**YES**	**NO**
19	Did you think someone else's life was in danger?	**YES**	**NO**
20	Did you feel helpless?	**YES**	**NO**
21	Did you feel terrified?	**YES**	**NO**

Part 3.

Below is a list of problems that people sometimes have after experiencing a traumatic event. Read each one carefully and click on the number (0-3) that best describes how often that problem has bothered you IN THE PAST MONTH. Rate each problem with respect to the traumatic event you described in Item 14.

0	Not at all or only one time
1	Once a week or less/once in a while
2	2 to 4 times a week/half the time
3	5 or more times a week/almost always

22	Having upsetting thoughts or images about the traumatic event that came into your head when you didn't want them to	0	1	2	3
23	Having bad dreams or nightmares about the traumatic event	0	1	2	3
24	Reliving the traumatic event, acting or feeling as if it was happening again	0	1	2	3
25	Feeling emotionally upset when you were reminded of the traumatic event (for example, feeling scared, angry, sad, guilty, etc.)	0	1	2	3
26	Experiencing physical reactions when you were reminded of the traumatic event (for example, breaking out in a sweat, heart beating fast)	0	1	2	3
27	Trying not to think about, talk about, or have feelings about the traumatic event	0	1	2	3
28	Trying to avoid activities, people, or places that remind you of the traumatic event	0	1	2	3
29	Not being able to remember an important part of the traumatic event	0	1	2	3
30	Having much less interest or participating much less often in important activities	0	1	2	3
31	Feeling distant or cut off from people around you	0	1	2	3
32	Feeling emotionally numb (for example, being unable to cry or unable to have loving feelings)	0	1	2	3

33	Feeling as if your future plans or hopes will not come true(for example, you will not have a career, marriage, children, or a long life)	0	1	2	3
34	Having trouble falling or staying asleep	0	1	2	3
35	Feeling irritable or having fits of anger	0	1	2	3
36	Having trouble concentrating (for example, drifting in and out of conversation, losing track of a story on television, forgetting what you read)	0	1	2	3
37	Being overly alert (for example, checking to see who is around you, being uncomfortable with your back to the door, etc.)	0	1	2	3
38	Being jumpy or easily startled (for example, when someone walks up behind you)	0	1	2	3

39 How long have you been experiencing the problems that you reported above? (click on ONE)

1 Less than 1 month ☐

2 1 to 3 months ☐

3 More than 3 months ☐

40 How long after the traumatic event did these problems begin? (click on ONE)

1 Less than 6 months ☐

2 6 or more months ☐

Part 4

Indicate below if the problems you rate in Part 3 have interfered with any of the following areas in your life DURING THE PAST MONTH. Click YES or NO.

41	Work	**YES**	**NO**
42	Household chores and duties	**YES**	**NO**
43	Relationships with friends	**YES**	**NO**
44	Fun and leisure activities	**YES**	**NO**
45	Schoolwork	**YES**	**NO**
46	Relationships with your family	**YES**	**NO**
47	Sex life	**YES**	**NO**
48	General satisfaction with life	**YES**	**NO**
49	Overall level of functioning in all areas of your life	**YES**	**NO**

Appendix G

Autobiographical Memory Questionnaire (AMQ)

Task 2: INSTRUCTIONS

Please indicate in the appropriate box a response to each statement in relation to the memory you wrote about in Task 1 (the 'event that bothers you the most'). Click on the box to indicate your choice.

1. As I remember the event, I feel as though I am reliving the original event.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

2. As I remember the event, I can hear it in my mind.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

3. As I remember the event, I can see it in my mind.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

4. As I remember the event, I or other people are talking.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

5. As I remember the event, I know its spatial layout.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

6. As I remember the event, I can feel now the emotional intensity that I felt then.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

7. As I remember the event, I can recall the setting where it occurred.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

8. Sometimes people know something happened to them without being able to actually remember it. As I think about the event, I can actually remember it rather than just knowing that it happened.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

9. As I remember the event, it comes to me in words.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

10. As I remember the event, I feel that I travel back to the time when it happened, that I am a subject in it again, rather than an outside observer tied to the present.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

11. As I remember the event, it comes to me in words or in pictures as a coherent story or episode and not as an isolated fact, observation, or scene.

1	2	3	4	5	6	7
Not at all		**Vaguely**				**Distinctly**

12. My memory of the event is fragmented into specific details with missing bits.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

13. My memory for the event is only as detailed as the general knowledge of this type of event that I would expect most people to have.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

14. My memory of the event has a personal coherence: it fits easily into a story I would tell about that part of my life.

1	2	3	4	5	6	7
Not at all		**Vaguely**		**Distinctly**		**As clearly as if it were happening right now**

15. Please rate the emotional valence of the memory:

1	2	3	4	5	6	7
100% Negative			**Neutral**			**100% Positive**

16. I believe the event in my memory really occurred in the way I remember it and that I have not imagined or fabricated anything that did not occur.

1	2	3	4	5	6	7
100% Imaginary			**Neutral**			**100% Real**

17. Since it happened, I have thought or talked about this event.

1	2	3	4	5	6	7
Not at all						**As often as any event in my life**

Appendix H

Centrality of Event Scale (CES)

Task 3: INSTRUCTIONS

Please think about the event you just wrote about and answer the following questions by clicking on a number from 1 to 5.

1. This event has become a reference point for the way I understand new experiences.

   Totally disagree 1 2 3 4 5 Totally agree

2. I automatically see connections and similarities between this event and experiences in my present life.

   Totally disagree 1 2 3 4 5 Totally agree

3. I feel that this event has become part of my identity.

   Totally disagree 1 2 3 4 5 Totally agree

4. This event can be seen as a symbol or mark of important themes in my life.

   Totally disagree 1 2 3 4 5 Totally agree

5. This event is making my life different from the life of most other people.

   Totally disagree 1 2 3 4 5 Totally agree

6. This event has become a reference point for the way I understand myself and the world.

   Totally disagree 1 2 3 4 5 Totally agree

7. I believe that people who haven't experienced this type of event think differently than I do.

   Totally disagree 1 2 3 4 5 Totally agree

8. This event tells a lot about who I am.

   Totally disagree 1 2 3 4 5 Totally agree

9. I often see connections and similarities between this event and my current relationships with other people.

Totally disagree 1 2 3 4 5 Totally agree

10. I feel that this event has become a central part of my life story.

Totally disagree 1 2 3 4 5 Totally agree

11. I believe that people who haven't experienced this type of event, have a different way of looking upon themselves than I have.

Totally disagree 1 2 3 4 5 Totally agree

12. This event has coloured the way I think and feel about other experiences.

Totally disagree 1 2 3 4 5 Totally agree

13. This event has become a reference point for the way I look upon my future.

Totally disagree 1 2 3 4 5 Totally agree

14. If I were to weave a carpet of my life, this event would be in the middle with threads going out to many other experiences.

Totally disagree 1 2 3 4 5 Totally agree

15. My life story can be divided into two main chapters: one is before and one is after this event happened.

Totally disagree 1 2 3 4 5 Totally agree

16. This event permanently changed my life.

Totally disagree 1 2 3 4 5 Totally agree

17. I often think about the effects this event will have on my future.

Totally disagree 1 2 3 4 5 Totally agree

18. This event was a turning point in my life.

Totally disagree 1 2 3 4 5 Totally agree

19. If this event had not happened to me, I would be a different person today.

Totally disagree 1 2 3 4 5 Totally agree

20. When I reflect upon my future, I often think back to this event.

Totally disagree 1 2 3 4 5 Totally agree

Appendix I

Instructions for Writing about a Negative, non-traumatic Event

Task 4: INSTRUCTIONS

Now please think about a negative, everyday event that took place in your life. It needs to be a negative, but non-traumatic event. Please write about this event in as much detail as you can. All of your writing will be completely confidential. As you type, do not worry about punctuation or grammar, just write as much as you can and include thoughts, feelings, reflections etc**.**

Appendix J

Centre for Epidemiological Studies – Depression Scale (CES-D)

Ces D in separate doc

Appendix K

Participant Opt-in Form for Prize Draw and/or Summary of Results

If you are interested in finding out about **the results of the study**, please type your email address here _____

(Remember, your email address will be kept separate from your completed questionnaires and it will not be possible to link the two in any way. After I have sent you information about what I have found, your email address will be destroyed.)

- If you would like to take part in the **prize draw for £80 Amazon.co.uk vouchers**, please type your email address here _____

(Remember, your email address will be kept separate from your completed questionnaires and it will not be possible to link the two in any way.)

If you choose to participate in the prize draw, but **do not wish to receive information about the results of the study**, please click here _____ (If you choose this option, your email address will be destroyed after the prize draw has been held.)

OR

If you choose to participate in the prize draw, and **also wish to receive information about the results of the study**, please click here _____ (If you choose this option, your email address will be destroyed after I have sent you information about what I have found.)

If you would like to talk about anything regarding the study, please contact:

Emma Ronayne **email:** E.Ronayne@uea.ac.uk

Appendix L

Debriefing Sheet for Participants

THANK YOU FOR YOUR TIME IN PARTICIPATING IN THIS RESEARCH

Thank you for participating in this research. The aim of the study is to further our understanding of the way that people process and remember trauma – by taking part you have helped us with this important task.

As part of the study you answered questionnaires about difficult experiences and low mood. I hope that it is not the case, but it would be understandable if these questionnaires caused you some distress at the time of completing them. If you did experience distress, it may take a little while for you to feel better. Again, this would be wholly understandable.

If, however, you continue to experience distress on an ongoing basis after taking part in this study, it is very important that you contact someone who can help. Below is some information on different ways of getting help. In addition, this online link (click here) contains these same details so that you can save them and access them more readily at a later date.

People/services you can contact if you feel you need some help:

- Researcher: Emma Ronayne, Trainee Clinical Psychologist, University of East Anglia

Email: E.Ronayne@uea.ac.uk
Phone: 07725 031 486

- Your GP or GP Out of Hours Service (Phone: 01603 488488 for Norwich/Norfolk area)

- A mental health support service, such as:

- MIND (UK) Phone: 08457 660 163

- Samaritans (UK) Phone: 08457 909 090

- Samaritans (ROI) Phone: 1850 60 90 90

- Samaritans (US) Phone: 1(800) 273-8255

Again, many thanks for participating in this study.

Appendix M

Examples of lexical items from LIWC categories used in study

LIWC Category Item Examples

Category	Examples	Number of Words in Category
Linguistic Processes		
Word Count		
Past Tense	Went, ran, had	145
Present Tense	Is, does, hear	169
Conjunctions	And, but, whereas	28
Psychological Processes		
Positive Emotion	Love, nice, sweet	406
Negative Emotion	Hurt, ugly, nasty	499
Anxiety	Worried, fearful, nervous	91
Anger	Hate, kill, annoyed	184
Sadness	Crying, grief, sad	101
Cognitive Process	Believe, thus, understand	730
Insight	Think, know, consider	195
Causation	Because, effect, hence	108

Sensory/Perceptual Processes	Taste, see, smell, odour	273
See	View, look, blind	72
Hear	Listen, hear, noise	51
Feel	Feel, touch, smooth	75
Space	Down, in, thin, setting	220
Time	End, until, season	239

Appendix N

Details of Types of Trauma reported by Participants

	Number of Participants	Percentage of overall sample
Type of trauma		
Accident	14	17.1
Disaster	3	3.7
Non-sexual assault by a family member or someone you know	6	7.3
Non-sexual assault by a stranger	5	6.1
Sexual assault by a family member or someone you know	6	7.3
Sexual assault by a stranger	5	6.1
Combat	3	3.7
Sexual contact when you were younger than 18 with someone who was 5 or more years older	6	7.3
Torture	1	1.2
Life-threatening illness	12	14.6
Other Trauma*	21	25.6
Total	82	100

* Participants classed traumas such as domestic violence, traumatic childbirth, learning of a suicide of a close friend or family member, and life-threatening illness of a close friend or family member as ‘other.’

Appendix O

Variant of Bonferroni adjustment applied to critical values to account for multiple testing

Variant of traditional Bonferroni correction method (see Shaffer, 1995; Wright, 1992)

1. Rank *p* values from smallest to largest
2. Accept smallest as it is, with no correction
3. Divide the position in rank by number of analyses
4. Multiply result by alpha (0.05)
5. Then do same with all of the *p* values

Example:

You have 5 *p* values of 0.001, 0.0125, 0.04, 0.05 and 0.06

0.001 stays as significant, no correction
0.0125 multiply 0.05 by 2/5 which=0.02; still significant (because 0.0125 is < 0.02)
0.04 multiply 0.05 by 3/5 which = 0.03; not significant (0.04 is >0.03)
0.05 multiply 0.05 by 4/5 which=0.040; not significant (0.05 is >0.04)
0.06 not significant anyway

If the traditional Bonferroni correction had been applied (required $p = 0.01$), there would be only one significant result.

This variant of the Bonferroni adjustment gives a good balance between finding significant effects and controlling for Type 1 errors. It takes into account not just the number of analyses performed, but also the order of the *p* values obtained.