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Sex Differences in Written Disclosure:

Implications for Differential Vulnerability to Post Traumatic Stress Disorder

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ABSTRACT

Research studies suggest that important differences exist between the sexes in terms vulnerability to developing PTSD. Further, qualitative differences have been found in the symptom constellation of males and females with PTSD. However, few studies exist that focus specifically on explanations for the gender effect, and theoretical models as yet fail to consider the operation of gender in PTSD processes.

The current study explored explanations for gender differences in PTSD within the context of current theoretical insights. Drawing from the literature it was hypothesised that differential vulnerability to PTSD may be related to sex differences in the cognitive contextualisation of emotional experience. Sex differences in cognitive and emotion word usage were therefore examined in a non-clinical sample of university students writing about a neutral and personally traumatic experience. It was found that while males and females did not differ in terms of total emotion words used across the conditions, men used more positive emotion words than did females and females used more anxiety and fear related words than did males. Further, females were found to use significantly more cognitive words than did males. The results of the study support the notion that sex differences may exist in the management of emotion and suggests interesting directions for future research attention.

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An exploration of sex differences in Post Traumatic Stress Disorder: A review of the literature

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Introduction

The conceptualization of Post Traumatic Stress Disorder in (1980) ignited psychiatry's long-standing interest in how stress leads to behavioural and biological changes, which ultimately lead to disorder (Wong & Yehuda, 2002). At this time, interest was mainly focused on documenting the impact of conflict on Vietnam veterans. More recently the field of traumatology has attempted to redress the gender imbalance in research representation by including women in PTSD investigations (Wong & Yehuda, 2002). Whilst research is still rather limited in terms of direct comparisons between men and women, epidemiological studies have identified that important differences may exist between the sexes in rate of exposure, type of trauma and vulnerability to developing PTSD (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Research findings also suggest that qualitative differences may exist in the expression and chronicity of PTSD in men and women (Fullerton et al., 2001; Kessler et al., 1995). Gaining a better understanding of the processes underlying observed differences between men and women is important in increasing the efficacy of existing assessment and treatment protocols.

The aim of this paper is to explore gender differences in PTSD within the context of current theoretical insights. Sex differences in exposure, trauma type, vulnerability,

symptom expression and chronicity will first be considered. Current theories of PTSD will then be discussed with particular reference to the processes of memory, emotion and meaning making. Possible explanations for sex differences outlined in the literature will then be explored, specifically related to research methodology, biology, personality, coping and emotion. Suggestions will be made for directing future research.

PTSD – Diagnostic Criteria and Prevalence Rates

Prior to the formal nosological classification systems, the idea that psychiatric illness could be triggered by stress in normal individuals was acknowledged. Freud, for example, initially proposed that hysteria had traumatic origins, and continued to assert that the responses to actual trauma were different from the product of developmental fixation (Yehuda & McFarlane, 1995). Further, Janet's observation of dissociative responses following trauma and Kardiner's description of physioneurosis in traumatic war neuroses also validated the idea that exposure to trauma may have mental health consequences (Yehuda & McFarlane, 1995).

As defined by the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition, Text Revision (American Psychiatric Association, 2000), PTSD symptoms follow the experience or witnessing of an event or events, which involve actual or threatened death or serious injury, or a threat to the physical integrity of self or others (Criterion A1). The individual's response to the trauma must involve intense fear, helplessness or horror (Criterion A2). Criterion A considers both the objective characteristics of an event and

the subjective response of the individual (Harvey & Yehuda, 1999). Characteristic symptoms include reexperiencing (Criterion B), persistent avoidance of trauma related reminders and a numbing of general responsiveness (Criterion C) and persistent increased arousal (Criterion D). Symptoms must be evident for a period of more than one month (Criterion E), and cause clinically significant distress or impairment in functioning (Criterion F).

A noteworthy shift occurred in the diagnostic criteria for PTSD between *DSM-III-R* (1987) and *DSM-IV* (1994) with reference to the stressor Criterion A and the new inclusion of Criterion F. *DSM-III-R* (1987) emphasized the extraordinary nature of traumatic events as outside the realm of normal human experience, and minimized the contribution of individual differences. Implicit in this conceptualization was the assumption that the traumatic event was the major causal factor in the etiology of PTSD. This assumption has been contradicted by accumulating empirical evidence, which suggests that trauma is a necessary, but insufficient condition for the development of PTSD. This point is demonstrated by the fact that community rates of exposure to traumatic events are much higher than community prevalence of PTSD. American epidemiological studies have found that 40-90% of the general population experience a traumatic event (Breslau, Davis, Andreski, & Peterson, 1991; Breslau et al., 1998; Kessler et al., 1995), while community prevalence of PTSD has been set at 7.6% by Kessler et al. (1995) and 9% by Breslau et al. (1991) and Breslau et al. (1998).

As with community level statistics, PTSD is not an inevitable response to trauma in either men or women. Interestingly, what does stand out is that the lifetime prevalence of PTSD, regardless of the overall prevalence rate in each study sample, has consistently been shown to be twice as high in women than in men (Wong & Yehuda, 2002). For example, in a sample of adults who had experienced a variety of different traumas, 11.3% of women developed PTSD and 6.0% of men (Breslau et al., 1991). Kessler et al. (1995) reported that 10.4% of women and 5.0% of men developed PTSD in response to a variety of different traumas. Both of these studies utilized the *DSM-III-R* (1987) diagnostic criteria and it has been suggested that use of the revised specification of Criterion A in *DSM-IV* (1994) and the inclusion of Criterion F, would lead to lower prevalence rates than those based on *DSM-III-R* (1987) (Breslau, 1998). A more recent survey on a Canadian community sample using DSM-IV criteria reported a *current* rate of PTSD for men and women as 1.2% and 2.7% respectively (Stein, Walker, Hazen, & Forde, 1997). Findings across studies are often difficult to compare due to the use of different methodologies, diagnostic criteria and the report of lifetime rates in some studies and current rates in others. Despite this, findings suggest higher rates of PTSD in women than men.

The differential vulnerability of trauma-exposed individuals to developing PTSD has been understood in terms of a stress-diathesis model. In this conceptualization, exposure to a stressor is hypothesized to interact with pre-existing personality characteristics and thereby to release or activate a 'diathesis' or predisposition towards a certain type of response. In the case of PTSD proposed diatheses have included gender together with

other factors that are measurable at a biological, cognitive or behavioural level and may include the presence of personality traits or other psychiatric diagnoses (Harvey & Yehuda, 1999). Characteristics of the stressor also need to be considered because traumatic events may vary in their ability to cause PTSD regardless of predisposition (Harvey & Yehuda, 1999).

One possible explanation for the higher prevalence of PTSD in women could be increased trauma exposure (Wong & Yehuda, 2002). However, it is men who are more likely to be exposed to objectively defined Criterion A1 events that are potentially traumatic, with the exception of sexual violence (Norris, Foster, & Weisshaar, 2002). Kessler et al. (1995) reported that 61% of men and 51% of women reported at least one traumatic event in their lives. It was further noted that 10% of men and 6% of women were exposed to four or more types of traumas, some of which involved multiple occurrences. Breslau et al. (1998) also found a significant difference in the number of distinct traumatic events reported by men and women. Therefore despite a lower rate of objective exposure, women have a higher prevalence of PTSD. Norris, Murphy, Baker, and Perilla, (as cited in Norris et al., 2002) conducted an epidemiological study in Mexico. Because *DSM-IV* (1994) criteria were used, they were able to examine both objective and subjective experience of trauma for men and women. It is interesting that measuring objective experience, men had higher rates of exposure than women, but on measures of subjective experience the pattern reversed with women experiencing high rates of helplessness and horror. This finding may help to explain why women experience higher rates of PTSD despite lower rates of objective exposure, as when

exposed, they may be more likely to experience higher rates of helplessness or horror. However the type of traumas that men and women are exposed to may differ in their likelihood of eliciting these subjective responses.

It has been found that men and women differ in the types of trauma they experience with more women than men reporting sexual molestation, sexual assault and child abuse and more men than women reporting fire/disaster, life-threatening accident, physical assault, combat, being threatened with a weapon, and being held captive (Kessler et al., 1995). Sexual violence is associated with a higher conditional risk for PTSD than physical violence or other forms of trauma, therefore the importance of exposure as the source of sex differences cannot be ruled out. However, Kessler et al. (1995) reported that even after controlling for the type of trauma, women had a higher probability of developing PTSD than men, with the exception of rape, which had the highest conditional risk among both men and women. For example, Kessler et al. (1995) found that men in the National Comorbidity Survey, were twice as likely as women to report being seriously attacked or assaulted (11.1% versus 6.9%). However, this type of trauma was 15 times more likely to result in PTSD in women, compared to men.

The evidence therefore suggests that men have a higher exposure rate to objectively defined traumatic events, women have a higher rate of exposure to subjective experiences of helplessness and horror and men and women differ in the types of trauma they experience. It is reasonable to suggest that trauma characteristics are likely to account for some of the variance in prevalence rate between the sexes. However, studies

have shown that even when trauma type is controlled for sex differences persist. It is therefore suggested that the source of sex differences in prevalence of PTSD may in part be due to different responses to traumatic events, rather then the traumatic event per se.

Anderson and Manuel (1994) assessed reactions of 108 male and 103 female college students to the Loma Prieta earthquake in California. After one day had passed women scored significantly higher than men on the Impact of Events Scale (IES) when describing their reactions of the past 24 hours, but they also estimated that the earthquake lasted significantly longer than did men, suggesting a subjective difference in perception of the trauma. Breslau et al. (1998) identified gender differences in the frequency of PTSD symptoms experienced, with women reporting more intense psychological distress in response to trauma stimuli, restricted affect and exaggerated startle response. These findings are consistent with those of Fullerton et al. (2001) who investigated gender differences in PTSD assessed one-month following motor vehicle accidents. In this study it was found that while men and women did not differ in meeting overall Criterion B for re-experiencing, women were at greater risk of developing, intense feelings of distress when in a trigger situation (i.e. a situation in which an element or number of elements closely resemble an aspect of the trauma experience) and physical reactivity to memories of the motor vehicle accident. Fullerton et al. (2001) also reported that women were more likely to meet the overall avoidance/numbing criterion than men and more frequently reported avoiding thoughts, feelings, activities or places associated with the trauma. Women were also more likely than men to meet the overall arousal criterion and more often reported trouble with sleep, concentration and

startle response. These gender differences were maintained even after controlling for prior trauma, major depression and anxiety.

It is interesting to see that gender differences may exist in the constellations of PTSD symptoms experienced by men and women. In addition, McFarlane (1997) has suggested that attention should be given to the individual's ability to modulate their acute responses. Since women have been found to more often experience a chronic disorder course than men (Breslau et al., 1998), it is possible that different factors are working to maintain or attenuate symptoms. Increased clarification of gender differences in processes driving PTSD would inform prevention, assessment and treatment approaches.

Theoretical Understandings of PTSD

In trying to understand how men and women may differ in vulnerability, expression, and maintenance of PTSD, it is necessary to examine the current theoretical understandings and the empirical support for processes thought to underlie the disorder. A number of theoretical models exist which address different features of PTSD. Increasingly it is being recognized that more integrative accounts are needed, which draw on both psychological and biological knowledge and are tested by examining a variety of data sources (Brewin, 2001a). The following discussion will focus on memory and emotion and meaning-making processes in PTSD as the central processes proposed by the theoretical literature. Three models will provide the backbone for the discussion, these

being the dual representation theory proposed by Brewin, Dalgleish, and Joseph (1996); a cognitive model of PTSD proposed by Ehlers and Clark (2000) and a cognitive neuroscience account of PTSD proposed by Brewin (2001a). During the discussion due attention will be given to the biological correlates associated with the psychological conceptualizations and other models will be used to supplement the discussion at appropriate points.

Memory Processes

It is commonly recognized that those suffering from PTSD have a disorganized and incomplete trauma memory (Brewin, 2001a, 2001b; Brewin et al., 1996; Ehlers & Clark, 2000) and lack a coherent narrative (Ehlers & Clark, 2000). According to Brewin et al. (1996) memories of personally experienced traumatic events are stored in two different representation formats. The *verbally accessible memory* (VAM) contains information that received sufficient conscious processing before, during and after the trauma. The information can be retrieved automatically or deliberately from the store of autobiographical experiences. Memories stored within this system interact with the rest of the autobiographical memory base, so the trauma is represented within a complete personal context comprising past, present and future (Brewin, 2001a). The information contained within the VAM can be deliberately and progressively edited and it is suggested that there will be an initial attempt to assign meaning to the trauma in terms of verbally accessible constructs and to consider the implications for valued life goals (Brewin et al., 1996). The amount of information contained within the VAM about a

trauma is thought to be restricted because of the adverse effects of high levels of arousal on mediational serial processes such as attention (Brewin, 2001a).

The *situationally accessible memory* (SAM) representation contains the more extensive non-conscious information and cannot be accessed voluntarily, but are triggered when the person is in a context be it internal or external, which contains some feature of the traumatic event (Brewin et al., 1996). This second type of representation supports the notable PTSD features of trauma-related dreams and flashbacks. The SAM system does not time code information and is also not subject to the same processing limitations as the VAM system. The SAM system contains a wealth of sensory, physiological and motor information as experienced at the time of the trauma, enabling the original event to be recreated. Reexperiencing symptoms are therefore more detailed and affect laden than ordinary memories (Brewin, 2001a). SAMs do not have a verbal code and so are difficult to communicate to others. Also SAMs do not necessarily interact with other autobiographical knowledge and thus are not modified in light of new learning. The meaning ascribed to events may therefore not correspond to verbally retrievable meanings in terms of consciously held goals and plans (Brewin et al., 1996). It is further suggested by Brewin et al. (1996) that other memory phenomena such as attentional narrowing and dissociation may create additional barriers to the registration and recall of verbal memory. Under these conditions it is proposed that the SAM system would remain intact despite impairment in the VAM.

Although the dual representation theory of PTSD is consistent with clinical observations it has as yet received limited empirical evaluation. However the field of cognitive neuroscience offers some useful insights. The amygdala is the brain structure central in initiating neurochemical and neuroanatomical circuitry of fear including startle response, activation of the sympathetic nervous system, release of stress hormones and behavioural responses such as fight/flight and freezing (Brewin, 2001a; LeDoux, 1998; Yehuda, 2000). Initial learning of which cues signal threat may involve sub-cortical pathways that rapidly transmit low-level feature based information from the sense organs (Brewin, 2001b). Memories formed in this way are not open to deliberate recall but are accessed automatically by perceptual cues similar to those recorded in the fear memory. Other slower higher cortical pathways involve a series of structures including the hippocampus, which permit increasingly more sophisticated processing of information (Brewin, 2001a). The hippocampus in particular is thought to specialize in the learning of context and the relational properties among stimuli, binding together the separate parts of an episode to make a coherent and integrated whole, available for deliberate recall (Brewin, 2001a). Conditioned emotional responses based on input from sub-cortical pathways cannot be unlearned, but subsequent learning that the defense response is no longer necessary in the current context can inhibit activation of the amygdala via projections from the hippocampus and from the prefrontal cortex (Brewin, 2001a, 2001b).

Recent research indicates that stress has very different effects on the hippocampus and the amygdala (Metcalfe & Jacobs, 1998). Hippocampal functioning has been found to

be impaired under high levels of stress (Metcalfe & Jacobs, 1998), whereas the functioning of the amygdala in general appears to be enhanced as stress increases, consistent with the formation of overly strong conditioned responses (Pitman, Shalev, & Orr, 2000). Brewin (2001a) posits that these memory systems and the effects of stress on them provide a plausible neural substrate for the VAM and SAM proposed by Brewin et al. (1996). More specifically, they account for the highly perceptual form of flashback memories that are elicited automatically, are under limited conscious control and are unchanging even after multiple recalls. Thus linguistically coding SAMs and incorporating them into the VAM is thought to allow sensory information to be processed spatially and temporally allowing for the restoration of a sense of safety. Further, the elaboration of the VAM assists the process whereby reminders of the trauma are inhibited from activating SAM, which does not discriminate between past and present time (Brewin, 2001a; Yehuda, 2000). In support of this, Smyth (1998) found that as clients' trauma narratives during exposure decrease in disorganization over time, PTSD symptoms improve. Further, Foa, Molnar, and Cashman (1995) observed that rape victims' narratives increased in length, perhaps due to decreases in anxiety during exposure and increased ability to engage with the trauma memory. Additionally they found that the percentage of thoughts and feelings increased, while the percentage of actions and dialogue decreased from the first to the last narrative. These findings may therefore demonstrate the processes of linguistically representing SAMs within the VAM system, thus increasing it's elaboration and ability to inhibit activation of the SAM in the presence of trauma reminders.

The dual representation theory of trauma memory implies that the goal of therapy is to incorporate within the VAM the set of detailed sensory information recorded in the SAM. The model therefore does not promote the need for a full trauma narrative to be established, but rather the goal of therapy would be to ensure that SAM information recorded during the most intense periods of emotional distress (hot spots) is linguistically represented with the VAM system. A further implication of the dual representation framework of memory is that the task of abolishing flashbacks is theoretically distinct from changing maladaptive cognitions or meanings associated with the event. The model does not fully explain the impact of appraisals on the trauma memory, yet there are likely to be interdependencies between these processes since maladaptive appraisals may in part be a function of an incomplete VAM and also motivate avoidance behaviour which impedes the integration of memory, because associated emotions may be too difficult to confront (Ehlers & Clark, 2000).

Emotion and Meaning Making Processes

Emotional Numbing

Individuals suffering from PTSD often experience deficits in emotional experience, otherwise referred to as emotional numbing (Tull & Roemer, 2003). Horowitz (1986) proposed a schema model for the emotional disturbances in PTSD, conceptualizing that trauma creates two opposing sets of internal processes, intrusion and denial. The individual is said to oscillate between a numbing and avoidant phase to an intrusion phase, until the trauma is accommodated into the person's internally organized view of

self and world. In the view of this model, PTSD reflects an inability to integrate the emotional experience of the trauma due to excessive denial that impedes the necessary emotional processing. Whilst the model has been heuristically valuable, the intrapsychic focus neglects the role of contextual cues and it is not clear which emotions are accessible to experience during the intrusive phase versus the denial phase (Litz, 1992). Further, it is not clear what affective mechanisms or processes operative in PTSD would be responsible for the emergence of emotional numbing problems.

Litz (1992) attempts to clarify some of the above issues and bases his conceptualization on the perceptual-motor theory proposed by Levanthal (1984). According to Levanthal (1984), emotion is the experiential product of a number of different information processing components. The expressive-motor component refers to the unconsciously activated primary emotional responses. The schematic subsystem, enables a link to be made between a current stimulus situation and prior knowledge of emotion experiences, and serves to organize the experience of emotion and emotion behaviour. The conceptual subsystem provides default assumptions, expectations and attributions that are used for information processing in uncertain or unfamiliar situations. Conceptual processing requires attentional resources and can inhibit or augment emotional behaviour. Thus, Litz (1992) suggests that emotional numbing is a multi-determined, selective emotional processing deficit, which is chiefly manifested during symptomatic states. It is said to entail a muting of positively valenced responses and a heightened reactivity to negative events. The ability to respond emotionally to a broad range of stimuli is hypothesized to be intact but largely inaccessible because of the activation of

trauma related cognitive processes that are antagonistic to the expression of non-trauma related emotions. For example, this may include the activation of rules at a schematic or conceptual level which contravene sustained positive emotional reactions, such as 'any form of arousal is to be avoided because it will trigger trauma memories' (Litz, 1992).

It is possible therefore that emotional numbing symptoms may be both a product of inhibited/limited expressive-motor responses as a result of trauma related cognitive labour and avoidance related to maladaptive appraisals of the experience of heightened arousal. Therefore it may be hypothesized that a positive relationship may exist between hyperarousal symptoms and emotional numbing. Indeed, Tull and Roemer (2003) found that symptoms of hyperarousal in female sex assault survivors predicted emotional numbing above and beyond the avoidance and intrusion symptoms of PTSD. Further hyperarousal symptoms remained a significant predictor when controlling for the relationship between emotional numbing and experiential avoidance (an attempt to alter the form or frequency of internal experiences including cognition and emotion). Interestingly, Feeny, Zoellner, Fitzgibbons, and Foa (2000) found that the severity of emotional numbing symptoms two weeks after a traumatic incident predicted severity of PTSD three months later. It is possible that emotional numbing is a marker for disordered emotional processing.

Emotional Processing

Brewin et al. (1996) suggest that emotional processing is a largely conscious process in which representations of past and future events, and awareness of accompanying bodily states are actively manipulated within working memory. They describe two elements to this processes, the first being the activation of the SAM whose function is to aid the cognitive readjustment to the trauma, and the second being the conscious attempt to accommodate the conflicting information supplied by the trauma and a search for meaning. The first of these processes will be discussed next.

Brewin et al. (1996) distinguished between primary and secondary emotions. Primary emotions are thought to be conditioned emotional responses recorded in SAM at the time of the trauma and mainly include fear. It was considered that these emotions would be responsive to exposure treatment. However, Grey, Young, and Holmes (2002) make a suggestion based on case report findings that any peri-traumatic emotion, however much conscious appraisal it requires is available to be encoded into SAM provided it occurs in the context of at least moderate fear. Thus individuals may experience affect without recollection of the cognitive appraisal or context (Ehlers & Clark, 2000). This is concordant with the perceptual-motor theory (Leventhal, 1984) if it is accurate to suggest that the expressive-motor level of processing is recorded within the SAM, while schematic and conceptual processing is missing due to the adverse effects of high arousal on higher order functions.

Grey et al. (2002) note that more diverse emotions may not be responsive to exposure treatment, but may require cognitive restructuring within reliving treatment sessions. During this process it is necessary to identify the context, emotion, intensity of emotion, thought and meaning attributed to the thought (Grey, Holmes, & Brewin, 2001). In this way internally experienced emotional states are labeled and made sense of according to contextual information. Once transformed into a verbal state, emotions felt at the time of the trauma and associated maladaptive cognitions are open to scrutiny, and can be evaluated within the wider framework of the more complete trauma experience (Ehlers & Clark, 2000). Changes in emotion are therefore also likely to be accompanied by changes in cognitive appraisal. This would suggest that mere venting of emotional states may not be helpful without a cognitive component to add context and meaning. With reference to the perceptual-motor theory (Leventhal, 1984) and that proposed by Litz (1992), this process would suggest that matching of the expressive-motor component to schematic and conceptual information, (making maladaptive cognitive appraisals available for restructuring) would reduce impact of trauma related emotional states and thus reduce hyperarousal and emotional numbing. Indeed within a non-clinical sample it was found that individuals who used either a very high or very low rate of negative-emotion words when writing about traumatic personal experiences, were the most likely to have continuing health problems after participating in the study (Pennebaker, Mayne, & Francis, 1997). High rate of negative emotion usage may have represented processing that had not fully contextualised emotional experiences, whilst a low rate of negative emotion usage may have reflected the inhibition of engaging with emotional experience, thus preventing contextualisation and resolution. In contrast, participants who evolved

in their writing style and moved from low usage of cognitive words to a high rate of usage on the final day of 3-5days writing, evidenced the greatest improvement in indexes such as health, grade point average and finding jobs after unemployment (Pennebaker et al., 1997), reflecting a progressive contextualisation of emotional experience.

Secondary emotions relate to appraisal of the implications or consequences of the trauma and include such emotions as sadness, guilt and remorse (Brewin et al., 1996). The Ehlers and Clark (2000) model elaborates this point by suggesting that the sense of current threat experienced by those with PTSD is in part related to idiosyncratic negative appraisals of the trauma and/or its sequelae. They propose that threat can be experienced as external e.g. the world is a more dangerous place, or as internal e.g. a threat to one's view of oneself as a capable/acceptable person. Appraisals of the traumatic event can involve overgeneralization of danger and exaggerated probability of further catastrophic events. Appraisals of the way in which the individual felt during the trauma can also have long-term threatening implications. Appraisals of the trauma sequelae create a sense of current threat and contribute to the maintenance of persistent PTSD. Appraisals may involve negative interpretation of one's initial PTSD symptoms, interpretation of the reactions of others in the aftermath of the event and appraisal of the consequences the trauma has in life domains. Such appraisals are thought to maintain PTSD by producing negative emotions. Indeed Ehlers and Clark (2000) note that the predominant emotional responses in persistent PTSD depend on the particular appraisal made. Resultant negative emotions are thought to motivate individuals to engage in dysfunctional coping strategies that paradoxically enhance PTSD symptoms by directly

producing PTSD symptoms, preventing change in negative appraisals and preventing change in the trauma memory. These behaviours include thought suppression, safety behaviours, not engaging with the emotional content of the event, avoiding reminders of the trauma and use of alcohol or certain medications (Ehlers & Clark, 2000). In reference to the conceptualization of emotional numbing put forward by Litz (1992), higher order maladaptive beliefs regarding the expression of emotion fit with the Ehlers and Clark's (2000) explanation of the role of appraisal in directly producing and maintaining PTSD symptoms.

Meaning Making

From a narrative perspective, the experience of a traumatic event is thought to shatter an individual's personal narrative structure throwing them into a crisis that is both psychological and existential (Janoff-Bulman & Frantz, 1997). In a dialectical-constructionist view, emotions are seen as the primary generator of personal meaning. Thus individuals not only live their lives - the first stream of consciousness, but are also compelled to evaluate and make meaning of their lives - the second stream, forming an ongoing narrative of what they are, as they become (Greenberg & Pascual-Leone, 1997). Thus, the initial stages of information and emotional processing in effect construct the 'first-stream' of consciousness, making it available for meaning making processes (the 'second-stream'). Without the formation of an integrated account of the experience, meanings derived may be maladaptive and destructive (e.g. characterlogical or

behavioural self-blame), further driving unhelpful behaviours which perpetuate PTSD symptoms.

However, even after an account of the trauma has been constructed, personal meanings may be difficult to derive if the experience is in extreme conflict with formerly held beliefs. In this state the world may still be perceived as meaningless. It is suggested that the facilitation of a shift from whether or not the world makes sense to whether the individual's life is meaningful or of value can create new meaning by the recognition of significance and worth in one's daily existence (Janoff-Bulman & Frantz, 1997). Thus it would be expected that a healthy narrative regarding a trauma experience would have an increasing degree of positive content, reflecting the individual's resolve that whilst the trauma was wholly unchosen, unexpected and deeply felt benefits had resulted (Janoff-Bulman & Frantz, 1997). This point may in part be demonstrated by the finding that individuals in a non-clinical sample writing about upsetting events evidenced the greatest health improvement when they used more positive emotion words and a moderate number of negative emotion words, and evolved in their writing style to use increasing levels of cognitive words such as 'because' and 'realise' (Pennebaker et al., 1997).

Possible Explanations for the Observed Gender Differences

Research Methodology

A prominent argument in feminist literature hypothesizes that gender differences observed in psychopathology are an artifact of the methodology employed (Gavranidou & Rosner, 2003). Hartung and Widiger (1998) consider that gender biases can be due to sampling procedures and biases within diagnostic criteria. This would affect the prevalence estimates of PTSD across the sexes. The National Comorbidity Survey (Kessler et al., 1995), which was quoted earlier in the review, used a stratified probability sampling procedure, which addresses some of the concerns regarding biased sampling. However, epidemiologic data will still be biased if the diagnostic criteria themselves bias in favour of one sex over another (Hartung & Widiger, 1998). Wong and Yehuda (2002) note that much that is known about the phenomenology and biology of PTSD is based on male combat veteran samples. This can contribute to male-biased descriptions of the disorder. Indeed, Gavranidou and Rosner (2003), note that the majority of events involved in survey instruments are situations that are more likely to happen to men than women. Thus objectively, men may report more traumatic events than women due to the research tools used. In contrast, it has been suggested that Criterion A2 (DSM-IV) refers to feelings and reactions that do not fit the male gender role (fear, helplessness) and may therefore be denied by male participants (Gavranidou & Rosner, 2003). Further, women are expected to more easily disclose 'weakness' according to social-role theory (Eagly, 1987) and therefore would be expected to more easily report symptoms than men. This pattern fits with the observed gender differences

in PTSD reported earlier, and the finding that in general women are more likely to endorse PTSD symptoms than men (Fullerton et al., 2001).

In furtherance of the methodological artifact argument, there is some suggestion that the diagnostic reliability of the investigator might be biased by the sex of the diagnostician and the patient's sex (Gavranidou & Rosner, 2003). Indeed Grayson et al. (1996) found interviewer effects in an epidemiological study of Australian Vietnam Veterans, that indicated that female interviewers adopted a lower severity threshold for diagnosis of PTSD than men, and therefore had higher prevalence estimates. However, because the sample only consisted of men, the study was not able to comment on the possible effect of same-sex versus opposite-sex interactions on disclose of symptoms. This is an important consideration since Dindia and Allen (1992) found in a meta-analysis, that sex differences in self-disclosure are moderated by the sex of the discloser and the target.

Inherent in the method of 'diagnosing' individuals with PTSD, is a power imbalance between the researcher and the researched. This is likely to differ according to the participant's sense of their own power and how they view the researcher. Power imbalance is thought to be most evident with disempowered groups (Carrick, Mitchell, & Lloyd, 2001) such as females according to the feminist perspective. As such, within the research context females may feel more disempowered than men, which may affect their responses and disclosures.

The above discussion suggests that research methodology used may account for some of the variance in gender differences in PTSD. To advance research in the area of gender differences in PTSD, improvements in methodology are first necessary. In particular it may be helpful to examine assessment tools used for the presence of a gender bias. Further it may be necessary to control for investigator gender on disclosure and PTSD diagnosis (Gavranidou & Rosner, 2003). Carrick et al. (2001) suggest that increasing participant's level of control in the experimental context can increase feelings of empowerment and decrease the impact of power dynamics.

Biological Explanations

Neurobiological correlates in PTSD have been one of the central foci of research during the last few years (Gavranidou & Rosner, 2003). Studies have yielded important data related to neurobiological changes in endocrinological and neurotransmitter systems and structural changes have been discussed (Wong & Yehuda, 2002; Yehuda, 2000). As yet few gender effects have been reported possibly due to the tendency for research samples to be single sex in order to reduce confounding effects, or because gender effects are not central to the analysis (Gavranidou & Rosner, 2003; Wong & Yehuda, 2002). Findings have however been consistent with regard to a hyperactive hypothalamic-pituitary-adrenal (HPA) axis, increased corticotrophin releasing factor (CRF) and decreased cortisol levels (Wong & Yehuda, 2002). Wong and Yehuda (2002) propose a working hypothesis for the effects of sex on PTSD, which suggests that if estrogen facilities the stress response as reflected by increased cortisol, then low estrogen levels, such as in the

follicular phase of the menstrual cycle in women, may favour a 'PTSD-like' response to stress. Women who are in their follicular phase during the time of exposure to trauma may therefore be at greater risk for the development of a PTSD-like response. However the hypothesis only explains increased vulnerability to trauma during half of the menstrual cycle. It has also been suggested that sex differences may impact on immune response functioning, as women have been found generally to have more active immune responses than men. Interactions between the immune and neuroendocrine systems with regard to stress are highly correlated (Wong & Yehuda, 2002). The above hypotheses are in need of empirical determination and further attention to the female neurobiological processes in the formation and maintenance of PTSD is needed in order to balance the historical focus on male processes (Gavranidou & Rosner, 2003; Wong & Yehuda, 2002).

Personality Explanations

The literature on PTSD and personality is complicated by a lack of consensus regarding the basic dimensions of personality, and personality models which differ widely with regard to the factor structure, and number and definition of specific traits (Paris, 2000). Further, prospective studies which measure personality prior to, and post trauma exposure are rare and difficult to carry out. The limited number of prospective studies that have been reported usually involve opportunistic assessment of men who later serve in the military, and thus generalizability to civilian and female populations is restricted (Paris, 2000; Holeva & Tarrier, 2001). There is however a substantial amount of

evidence linking personality and PTSD (Miller, 2003). Some of the cognitive-affective aspects of personality which may increase the risk of PTSD include differences in encoding information, expectancies and beliefs, and coping strategies (Schnurr & Vielhauer, 1999). More specifically, there is a striking degree of consistency in linking neuroticism and its component traits (e.g. trait anxiety, low hardiness, hostility, and pessimism/attributional style) to PTSD (Schnurr & Vielhauer, 1999). Miller (2003) finds support for the assertion that while neuroticism represents the primary personality risk factor for PTSD, low positive emotionality/extroversion and low constraint, moderate the expression of the PTSD response into an internalizing or externalizing form respectively.

Eysenck and Eysenck (1991) suggest that individuals scoring high on neuroticism tend to have high trait anxiety, and depression. They tend to react quickly to all sorts of stimuli and find it more difficult to return to baseline. They experience a tendency towards strong emotional reactions, which impedes proper adjustment and sometimes leads to irrationality and rigidity. Neuroticism is indicative of a quickly conditioned autonomic nervous system and poor coping ability under stress. With reference to the theoretical understandings, neuroticism may increase vulnerability to PTSD in a number of ways. Tendency towards increased emotional arousal in response to stimuli; increased threat appraisal and a quickly conditioned autonomic nervous system may increase the likelihood that cognitive processing is impaired during the trauma leading to greater discrepancies between the VAM and the SAM. Tendency to focus on threat stimuli associated with the event and its consequences may lead to maladaptive

appraisals, and an increased sense of current threat (Ehlers & Clark, 2000). Difficulty tolerating strong emotional reactions due to poor coping ability under stress may then lead to the maintenance of symptoms. There has been some suggestion that personality factors may account for some of the variance in PTSD prevalence between men and women. Indeed, in a study of 37 countries, Lynn and Martin (1997) found that women tended to score higher on neuroticism than men, which may increase the likelihood that women will be more reactive to, and cope less well with trauma exposure, and be more vulnerable to developing PTSD. Sex may also modify how various personality traits predict trauma exposure, for example borderline personality traits are more strongly associated with trauma exposure for men than women (Lauterbach & Vrana, 2001).

Attachment and Personality

Attachment theory provides a dynamic concept of personality (Bowlby, 1969), contributing to our understanding of how childhood experiences in perceiving and interpreting cues from the environment, and dealing with distress, affect responses to threat and danger in adulthood (Kanninen, Punamaki, & Qouta, 2003). Since the attachment system is triggered by dangerous and stressful situations (Mikulincer, Florian, & Weller, 1993), the role of attachment in traumatic conditions is thus particularly interesting. Individuals with different attachment patterns have been found to differ in ways of expressing emotions and showing affective memories, appraising and coping with threat and stressful life events and forming intimate relationships (Kanninen et al., 2003). Findings have suggested that a secure attachment style can reduce

vulnerability to PTSD and associated symptoms of depression, anxiety and somatization (Zakin, Solomon, & Neria, 2003). However, Kanninen et al. (2003) suggest that there may be situations in which the general hypothesis that secure attachment is protective, and that insecure attachment increases vulnerability, may be too simplistic. Indeed, in a study of 176 male Palestinian former political prisoners living in the Gaza Strip Kanninen et al. (2003) found that secure and insecurely attached men differed in their strengths and vulnerabilities depending on whether they had been exposed to psychological and interpersonal or physical adversities. Secure attachment styles were found to be protective when the individual was exposed to severe physical trauma, whereas the insecure attachment pattern was not. In contrast, when exposed to severe psychological trauma the securely attached men were more vulnerable to PTSD than the insecurely attached. It was concluded that psychological and physical trauma communicate different meanings to secure and insecure male survivors and create differing degrees of discrepancy between fundamental assumptions and experience (Janoff-Bulman, 1992; Kanninen et al., 2003).

It would be an interesting direction of research to investigate how attachment style affects reactions to trauma in females versus males, particularly as females have been described as more interpersonally orientated than men and may therefore perceive more threat than men in situations where assumptions regarding interpersonal relationships are threatened. Other studies have noted that the importance of attachment and other personality components may vary between the sexes. Hardiness for example, is a stable personality trait consisting of three basic components, commitment, control and

challenge and has been found to be inversely related to PTSD (Zakin et al., 2003). Zakin et al. (2003) suggest that high levels of hardiness can be protective for individuals with insecure attachment styles. However, a number of studies with mixed samples of men and women found that hardiness protects men more effectively than women (Wiebe, 1991). The discrepancy in finding has been explained by literature suggesting that men rely more on task orientated coping, which is represented by hardiness, while women employ more interpersonal coping, which is represented by attachment style (Schmidt, Conn, Greene, & Mesirow, 1982).

Coping

Since the way in which individuals cope with their traumatic experience can have a direct bearing on the elicitation of PTSD symptoms and symptom maintenance according to the Ehlers and Clark (2000) model, differential coping behaviour between the sexes may be a possible source of gender differences in PTSD. Coping has been defined as cognitive and behavioural efforts made in response to threat (Tamres, Janicki, & Helgeson, 2002). Coping processes are complex and evolve over time, involving ongoing appraisal of the threat (primary appraisal), and appraisal of one's resources to be able to cope with the threat (secondary appraisal) (Lazarus & Folkman, 1984). Coping methods utilized are therefore matched to the perceived demands placed on the individual by the stressor. Differences in coping may help mediate sex differences that have been observed in PTSD for a number of reasons. Sex differences in coping may be linked to differences in threat appraisal which influence the coping technique selected, or

a tendency for men and women to use different methods of coping, influenced by biological and socialization processes. Further, the nature of the trauma may directly affect the availability of coping resources differently for men and women. Coping methods adopted may be more or less adaptive, influencing the attenuation or maintenance of PTSD symptoms (Ehlers & Clark, 2000).

Literature on sex differences in coping with traumatic events is somewhat limited, but insights may be gained from examining sex differences in coping with stressful events, even though it is appreciated that the nature of the two are qualitatively different. Two global categories of coping have been identified by Lazarus and Folkman (1984), which have been popular classification systems in empirical studies, these being problem-focused coping and emotion-focused coping. According to the socialization hypothesis, men will tend to favour problem-focused techniques (aimed at altering the stressor), whereas women will be more likely to favour emotion-focused techniques (aimed at altering one's response to the stressor) (Ptacek, Smith, & Zanas, 1992). However, comparisons of how men and women cope using these global categories may be misleading as sex differences in the component parts may be masked by general analyses.

Tamres et al. (2002) conducted a meta-analytic review of recent studies of sex differences in coping, considering differences in the coping components that comprise problem and emotion-focused methods. When using absolute measures of coping, women were more likely than men to use most of the coping strategies encompassing

both global categories, and particularly sizeable effects revolved around emotion-focused methods of verbal expressions to others (seek emotional support) and to the self (rumination, positive self-talk). There was a single robust effect regarding women seeking more emotional social support than men. The finding that women expend more coping effort than men, most notably in regard to emotion-focused techniques, may be linked to the finding that in the majority of studies, women appraised the stressor as more severe than men. Women's tendency to perceive threat as more severe may overload coping resources in the face of a traumatic incident, leading to negative appraisals regarding their ability to cope. As demonstrated in the Ehlers and Clark (2000) model of PTSD, negative appraisals of ones' ability to cope with the experience of a trauma can lead to maintenance of symptoms through the adoption of maladaptive coping methods. The meta-analysis did not address the effectiveness of the coping techniques used, and it could be suggested that women used a greater diversity of coping methods because they were less skilled at using the techniques. Further, higher rates of ruminative thinking in women than men has been linked to longer and more severe periods of depression (Nolen-Hoeksema, 1995), and has been shown to predict chronic PTSD (Ehlers, Mayou, & Bryant, 1998). Interestingly, an analysis of relative coping by Tamres et al. (2002) (comparing how much an individual uses one strategy compared to other strategies) revealed findings more consistent with lay theories of coping in men and women. Men engaged in relatively more problem-focused coping methods than emotion-focused methods than women. This difference in balance may have a part to play in sex differences in PTSD.

Hobfoll (1989) proposes an alternative model to Lazarus and Folkman (1984), based on the idea that people strive to retain, protect, and build resources and potential or actual loss of these resources is threatening. Objects and resources are strongly associated with gender, and in most societies women have more restricted resources than men (Gavranidou & Rosner, 2003). It is therefore suggested that traumatic events would impact on women more than men, leading eventually to symptomatology. A greater tendency for women to use social support as a coping resource may also lead to vulnerability, particularly in the aftermath of traumatic events that shatter beliefs regarding the trustworthiness of others.

Emotion

Emotional experience associated with traumatic event exposure and subsequent processing of emotion are central components of PTSD conceptualizations (Ehlers & Clark, 2000). Recent studies suggest that males and females express and cope with emotions differently (Brody, 1993), thus sex differences in PTSD may partly be accounted for by sex differences in emotion.

Data on gender differences in emotional expressiveness have been the most widely studied, and indicate that females are more intensely expressive of a wide number of emotions than are males when using a variety of measures such as self-report of expression and observer ratings of non-verbal behaviour (Kring & Gordon, 1998). Males have been reported to be are more intensely emotionally expressive through

actions and behaviours than females, whereas females have been found to be more verbally and facially expressive (Brody, 1993). Sex differences in verbal emotional expression are more marked for emotions that are adaptive for stereotypic gender roles (Brody, 1993). Findings suggest that from an early age females are socialized to express more emotions than men, with the exception of anger. It has also been noted that females are better encoders and decoders of emotion than men. Of particular note is the observation that girls learn language skills earlier than boys, which may critically predispose them to put feelings into words, (Gleason, Hay, & Cain, 1989), whereas boys may learn to express feelings through actions and behaviours. It is likely that sex differences in emotion result from a complex series of interactions between early neuropsychological, genetic, and hormonal differences between boys and girls (especially the propensity for expressive language), which reciprocally affect the quality of caretaker and peer affective responsivity. Gender differences in peer and caretaker socialization are influenced not only by innate response and temperamental tendencies but also by expectations about gender roles (Brody, 1993). Whilst there is evidence that women express more emotion than men, it is not clear whether women experience more emotion than men, or whether their experience of emotion is qualitatively different from men's experience of emotion (Tamres et al., 2002).

Pennebaker and Roberts (1992) propose that men and women may have fundamentally different emotional psychology, using different strategies to perceive emotion. Drawing on visceral perception research, Pennebaker and Roberts (1992) suggest that men appear to perceive emotion in accordance with James' peripheralist theory (as cited by

Pennebaker & Roberts, 1992), which assumes that different emotions are associated with unique patterns of autonomic nervous system activity which are perceived when individuals accurately detect physiological changes. In contrast, they suggest that the strategy used by women is thought to be more concordant with cognitive appraisal emotion theories such as Schachter and Singer's (1962) cognitive labelling theory. Evidence in support of this proposal originates from studies comparing men's and women's ability to detect physiological changes when in laboratory settings where situational cues were controlled, and in naturalistic settings where external, contextual cues were available. Men were found to be significantly more accurate than women at detecting physiological changes in the absence of contextual cues, but in naturalistic settings where contextual cues were available, no gender differences were observed (Cox et al., 1985; Pennebaker & Watson, 1988). The findings from these studies suggest that men and women may rely on different sources of information in defining their internal states (Pennebaker & Roberts, 1992). Further support for two theories of emotion comes from findings that women are more sensitive to subtle situational cues relevant to emotion than men (Brody, 1993). According to Pennebaker and Robert's (1992) proposition women would be more accurate at detecting their own and other people's emotion when situational cues are available which affect them both. In contrast men would be accurate in knowing their own emotional state based on detecting physiological changes, but would have difficulty defining the emotional state of others (Pennebaker & Roberts, 1992). A dual approach to understanding emotion in men and women also fits with the findings that males more often discharge emotion through physical action (concordant with physiological perception of emotion) and women

through expression verbally (concordant with perceiving and defining emotion by verbal contextualization).

According to Brewin et al. (1996) and Ehlers and Clark (2000), two memory systems are involved in the encoding of trauma information, the VAM and SAM. If men and women perceive emotion in different ways as suggested by Pennebaker and Robert's (1992) proposition, emotional processing in PTSD may involve different mechanisms for men and women. Women's method of verbalizing and contextualising emotional experience may be immobilized by the fact that much of the rich affective and situational data regarding the trauma is recorded in a non-verbal form. Further a decreased ability to detect and label internal experience in the absence of situational information may impair their ability to begin the process of information and emotional processing, increasing maladaptive appraisals of the impact of the trauma and their ability to cope, thus increasing a sense of current threat. Whilst men tend to express emotion verbally less than women, evidence suggests that they are more skilled at perceiving physiological changes in the absence of situational information. In the direct aftermath of the trauma, perceptions regarding their ability to cope with the emotional experience may be less threatened due to intact ability to read physiological signs and make sense of their internal world, in the absence of a full verbal account. This may lead to a decreased likelihood of maladaptive appraisals regarding the impact of the trauma on their sense of self and ability to cope, thus decreasing a sense of current threat, decreasing arousal and increasing ability to cope with intrusions and re-experiencing, leading to natural recovery.

Gidron et al. (2004, in preparation) conducted a study examining the effects of a memory structuring intervention (MSI) on PTSD symptoms. The intervention aimed to shift traumatic memory processing from implicit to explicit processing. The intervention involved individuals describing the traumatic event and every time they said a word that reflected sensory, somatic or emotional symptoms, the therapist stopped the individual to provide verbal elaboration and causality for the symptoms. The therapist repeated back the description of the event in chronological order, including explicit labels for affective and sensory symptoms, together with their causal link. The individual then repeated back the event in a similar manner and the patient was asked to rehearse the structured narrative with family and friends. Gidron et al. (2004, in preparation) found that while women in the MSI reported less frequent PTSD and avoidance symptoms than female control (who received supportive counselling), men in the MSI reported significantly more PTSD and arousal symptoms than male controls. The experimental and control intervention were carried out 24-48 hours after patients experienced a road traffic accident and therefore a baseline measure of PTSD was not possible. The results may therefore be due to different patterns of natural recovery, rather than the intervention per se. However, it could be suggested that the MSI provided an important structure by which females could start to order their experience and define and contextualise internal processes, thus decreasing potential feelings of chaos and threat, and providing protection against the development of PTSD. The intervention may therefore have acted in accordance with female emotional psychology. In contrast, the intervention may have

acted against male emotional psychology, potentially increasing emotional arousal and distress by labeling internal processes, and disrupting the natural process of recovery.

Adopting two theories of emotion also fits with Litz's (1992) conceptualization of emotional numbing and the finding that women more often develop emotional numbing symptoms than men (Fullerton et al., 2001). It could be argued that women's greater need to contextualise emotion leads to increased unproductive trauma related cognitive labour, perhaps in the form of ruminative style thinking, which is antagonistic to the expression of non-trauma related emotions. It may be possible for men to initially reduce emotional arousal through physiological action, without giving it a verbal label. This may then reduce the adversity of confronting the experience in a verbal state. Further, it has been found that women with peritraumatic dissociation are more likely than men with peritraumatic dissociation to develop PTSD (Fullerton et al., 2001). Earlier in the review it was suggested that peritraumatic dissociation can create an additional barrier to the registration and recall of verbal memory (Brewin et al., 1996). Dissociation may therefore have a more severe impact on female emotional processing than men's because of a greater reliance on defining emotional experience by verbal contextualisation.

It has been suggested that the way in which people use words is a meaningful marker of natural social and personality processes (Pennebaker, Mehl, & Niederhoffer, 2003). If men and women differ in their emotional psychology, specifically in terms of their use of verbalization, this would be expected to be reflected in their use of language. Empirical

studies have endeavored to identify exactly what the differences are in male and female language use, but comparisons between studies have been difficult due to lack of standardised units of measure (Groom, Stone, Newman, & Pennebaker, 2003 in preparation). Further, the impact of possible moderators on language use of males and females have not been systematically examined. This is important since personality factors and female tendency to perceive more threat may influence language use, rather than sex itself. Further, few attempts have been made to study how context influences the size and direction of linguistic sex differences.

Conclusions

This literature review aimed to explore sex differences in PTSD. While PTSD is not an inevitable response to trauma in either sex, epidemiological studies have shown that the prevalence rate of PTSD in women is consistently higher than in men. Moreover, higher rates of PTSD in women have not been fully accounted for by characteristics of the trauma such as rate or type of exposure. Interestingly, although men have been found to have a higher rate of exposure to objectively defined Criterion A1 events, when measuring subjective experience (Criterion A2), women were found to experience higher rates of helplessness or horror. Therefore the source of sex differences in prevalence of PTSD may in part be due to subjective differences in perception of the trauma. Further, empirical studies have demonstrated that gender differences exist in the constellations of PTSD symptoms. This suggests that sex differences may exist in trauma response trajectories. Attention paid to individual differences in ability to modulate acute trauma

responses may be profitable in discerning underlying sex differences in factors working to maintain or attenuate symptoms.

Theoretical accounts suggest that memory processes and emotion and meaning making processes are central to conceptualizations of PTSD, however there is a distinct lack of discussion regarding the operation of gender in these processes. In order to extend and develop therapeutic approaches to more effectively meet the needs of both sexes, workable hypotheses are required to guide empirical investigation. Improvements in research methodology are paramount to obtaining more robust information regarding gender and PTSD. Further, examination of female neurobiological processes would balance and add substance to existing findings which have been derived predominantly from male populations. Examination of how different personality traits particularly neuroticism interact with sex to increase vulnerability to trauma exposure, trauma reactivity and coping style may be informative. It would also be an interesting direction of research to investigate how attachment style affects reactions to trauma in females versus males, considering that females tend to be more interpersonally orientated than males. Further, consideration of sex differences in the availability of coping resources in the aftermath of trauma, and the types of appraisals made regarding coping ability would be informative considering that negative appraisals of one's ability to cope with the experience of trauma can lead to the maintenance of symptoms through the adoption of maladaptive coping methods and the production of negative emotion. The idea that men and women may use different strategies to express and cope with emotion is particularly interesting. More specifically, the suggestion that men and women may use different

sources of information in perceiving emotion has important implications for current models of PTSD, because emotional processing in PTSD may involve different mechanisms for men and women. In conclusion, this review demonstrates that there are a number of interesting and exciting avenues for furthering knowledge with regard to sex differences in PTSD.

REFERENCES

Anderson, K., & Manuel, G. (1994). Gender differences in reported stress responses to the Loma Prieta earthquake. *Sex Roles, 30,* 725-733.

American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: American Psychiatric Association.

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

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington DC: American Psychiatric Association.

Bowlby, J. (1969). *Attachment and loss: Attachment.* New York: Wiley.

Breslau, N. (1998). Epidemiology of trauma and posttraumatic stress disorder. In R. Yehuda (Ed.), *Psychological trauma* (pp. 1-29). Washington, DC: American Psychiatric Press.

Breslau, N., Davis, G. C., Andreski, P., & Peterson, E. (1991). Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Archives of General Psychiatry, 48,* 216-222.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The Detroit area survey of trauma. *Archives of General Psychiatry, 55,* 626-632.

Brewin, C. R. (2001a). A cognitive neuroscience account of posttraumatic stress disorder and its treatment. *Behaviour Research and Therapy, 39,* 373-393.

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

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

Brody, L. R. (1993). On understanding gender differences in the expression of emotion: Gender roles, socialization, and language. In S. L. Ablon, D. Brown, E. J. Khantzian, & J. E. Mack (Eds.), *Human feelings: Explorations in affect development and meaning* (pp. 87-121). Hillsdale, NJ: The Analytic Press.

Carrick, R., Mitchell, A., & Lloyd, K. (2001). User involvement in research: Power and compromise. *Journal of Community and Applied Social Psychology, 11,* 217-255.

Cox, D. J., Clarke, W. L., Gonder-Frederick, L. A., Pohl, S., Hoover, C., Snyder, A. et al. (1985). Accuracy of perceiving blood glucose in IDDM. *Diabetes Care, 8,* 529-535.

Dindia, K., & Allen, M. (1992). Sex differences in self-disclosure: A meta-analysis. *Psychological Bulletin, 112,* 106-124.

Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation.* Hillsdale, NJ: Erlbaum.

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

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

Eysenck, H. J., & Eysenck, S. B. G. (1991). *Manual of the Eysenck Personality Scales.* London: Hodder & Stoughton.

Feeny, N. C., Zoellner, L. A., Fitzgibbons, L. A., & Foa, E. B. (2000). Exploring the roles of emotional numbing, depression, and dissociation in PTSD. *Journal of Traumatic Stress, 13,* 489-498.

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

Fullerton, C. S., Ursano, R. J., Epstein, M. D., Crowley, B., Vance, K., Kao, T. et al. (2001). Gender differences in posttraumatic stress disorder after motor vehicle accidents. *American Journal of Psychiatry, 158,* 1486-1491.

Gavranidou, M., & Rosner, R. (2003). The weaker sex? Gender differences in post-traumatic stress disorder. *Depression and Anxiety, 17,* 130-139.

Gidron, Y., Reuven, G., Givati, G., Lauden, A., Snir, Y., & Binjamin, J. (2004). Interactive effects of memory structuring and gender on preventing posttraumatic stress symptoms. Manuscript submitted for publication.

Gleason, J., Hay, D., & Cain, L. (1989). Social and affective determinants of language acquisition. In M. L. Rice & L. Schiefelbusch (Eds.), *The teachability of language* (pp. 171-186). Baltimore: Brookes.

Grayson, D. A., O'Toole, B. I., Marshall, R. P., Schureck, R. J., Dobson, M., Ffrench, M. et al. (1996). Interviewer effects on epidemiologic diagnoses of posttraumatic stress disorder. *American Journal of Epidemiology, 144,* 589-597.

Greenberg, L. S., & Pascual-Leone, J. (1997). Emotion in the creation of personal meaning. In M. Power & C. R. Brewin (Eds.), *The transformation of meaning in psychological therapies: Integrating theory and practice* (Vol. 1, pp. 91-106). Chichester, UK: Wiley.

Grey, N., Holmes, E., & Brewin, C. R. (2001). Peritraumatic emotional "hot spots" in memory. *Behavioural and Cognitive Psychotherapy, 29,* 367-372.

Grey, N., Young, K., & Holmes, E. (2002). Cognitive restructuring within reliving: A treatment for peritraumatic emotional "hotspots" in posttraumatic stress disorder. *Behavioural and Cognitive Psychotherapy, 30,* 37-56.

Groom, C. J., Stone, L. D., Newman, M. L., & Pennebaker, J. W. (2003). Sex differences in language use: An analysis of text samples from 70 studies. Manuscript submitted for publication.

Hartung, C. M., & Widiger, A. (1998). Gender differences in the diagnosis of mental disorders: Conclusions and controversies of the DSM-IV. *Psychological Bulletin, 123,* 260-278.

Harvey, P. D., & Yehuda, R. (1999). Strategies to study risk for the development of PTSD. In R. Yehuda (Ed.), *Risk factors for posttraumatic stress disorder* (pp. 1-22). Washington, DC: American Psychiatric Association.

Hobfoll, S. E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *American Psychologist, 44,* 513-524.

Holeva, V., & Tarrier, N. (2001). Personality and peritraumatic dissociation in the predication of PTSD in victims of road traffic accidents. *Journal of Psychosomatic Research, 51,* 687-692.

Horowitz, M. J. (1986). *Stress response syndromes.* New York: Jason Aronson.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma.* New York: Free Press.

Janoff-Bulman, R., & Frantz, C. M. (1997). The impact of trauma on meaning: From meaningless world to meaningful life. In M. Power & C. R. Brewin (Eds.), *The transformation of meaning in psychological therapies: Integrating theory and practice,* (Vol. 1, pp. 91-106). Chichester, UK: Wiley.

Kanninen, K., Punamaki, R. L., & Qouta, S. (2003). Personality and trauma: Adult attachment and posttraumatic distress among former political prisoners. *Peace and Conflict: Journal of Peace Psychology, 9,* 97-126.

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,* 1048-1060.

Lauterbach, D., & Vrana, S. (2001). The relationship among personality variables, exposure to traumatic events, and severity of posttraumatic stress symptoms. *Journal of Traumatic Stress, 14,* 29-45.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.

LeDoux, J. E. (1998). *The emotional brain.* London, UK: Weidenfeld & Nicolson.

Levanthal, H. (1984). A perceptual-motor theory of emotion. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 271-291). New York: Academic Press.

Litz, B. T. (1992). Emotional numbing in combat-related post-traumatic stress disorder: A critical review and reformulation. *Clinical Psychology Review, 12,* 417-432.

Lynn, R., & Martin, T. (1997). Gender differences in extroversion, neuroticism, and psychoticism in 37 nations. *The Journal of Social Psychology, 137,* 369-373.

McFarlane, A. C. (1997). The prevalence and longitudinal course of PTSD: Implications for the neurobiological models of PTSD. *Annals New York Academy of Science, 821,* 10-23.

Metcalfe, J., & Jacobs, W. J. (1998). Emotional memory: The effects of stress on 'cool' and 'hot' memory systems. In D. L. Medin (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 38, pp. 187-222). San Diego, CA: Academic Press.

Mikulincer, M., Florian, V., & Weller, A. (1993). Attachment styles, coping strategies, and posttraumatic psychological distress: The impact of the gulf war in Israel. *Journal of Personality and Social Psychology, 64,* 817-826.

Miller, M. W. (2003). Personality and the etiology and expression of PTSD: A three-factor model perspective. *Clinical Psychology: Science and Practice, 10,* 373-393.

Nolen-Hoeksema, S. (1995). Epidemiology and theories of gender differences in unipolar depression. In M. V. Seeman (Ed.), *Gender and Psychopathology* (pp. 63-87). Washington, DC: American Psychiatric Association.

Norris, F. H., Foster, J. D., & Weisshaar, D. L. (2002). The epidemiology of sex differences in PTSD across developmental, societal, and research contexts. In R. Kimerling, P. Ouimette, & J. Wolfe (Eds.), *Gender and PTSD* (pp. 3-42). New York: The Guilford Press.

Paris, J. (2000). Predispositions, personality traits, and posttraumatic stress disorder. *Harvard Review of Psychiatry, 8,* 175-183.

Pennebaker, J. W., Mayne, T. J., & Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology, 72,* 863-871.

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology, 54,* 547-577.

Pennebaker, J. W., & Roberts, T. A. (1992). Towards a his and hers theory of emotion: Gender differences in visceral perception. *Journal of Social and Clinical Psychology, 11,* 199-212.

Pennebaker, J. W., & Watson, D. (1988). Blood pressure estimation and beliefs among normotensives and hypertensives. *Health Psychology, 7,* 309-328.

Pitman, R. K., Shalev, A. Y., & Orr, S. P. (2000). Posttraumatic stress disorder: Emotion, conditioning, and memory. In M. S. Gazzaniga (Ed.), *The new cognitive neurosciences* (2nd ed., pp. 1133-1147). Cambridge, MA: The MIT Press.

Ptacek, J. T., Smith, R. E., & Zanas, J. (1992). Gender, appraisal, and coping: A longitudinal analysis. *Journal of Personality, 60,* 747-770.

Schachter, S., & Singer, J. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379-399.

Schmidt, D. E., Conn, M. K., Greene, L. D., & Mesirow, K. E. (1982). Social alienation and social support. *Personality and Social Psychology Bulletin, 8,* 515-521.

Schnurr, P. P., & Vielhauer, M. J. (1999). Personality as a risk factor for PTSD. In R. Yehuda (Ed.), *Risk factors for posttraumatic stress disorder* (pp. 191-222). Washington, DC: American Psychiatric Association.

Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types and moderating variables. *Journal of Consulting and Clinical Psychology, 66,* 174-184.

Stein, M. B., Walker, J. R., Hazen, A. L., & Forde, D. R. (1997). Full and partial posttraumatic stress disorder: Findings from a community survey. *American Journal of Psychiatry, 154,* 1114-1119.

Tamres, L. K., Janicki, D., & Helgeson, V. S. (2002). Sex differences in coping behavior: a meta-analytic review and an examination of relative coping. *Personality and Social Psychology Review, 6,* 2-30.

Tull, M. T., & Roemer, L. (2003). Alternative explanations of emotional numbing of posttraumatic stress disorder: An explanation of hyperarousal and experiential avoidance. *Journal of Psychopathology and Behaviour Assessment, 25,* 147-154.

Wiebe, D. J. (1991). Hardiness and stress moderation: A test of proposed mechanisms. *Journal of Personality and Social Psychology, 60,* 89-99.

Wong, C. M., & Yehuda, R. (2002). Sex differences in posttraumatic stress disorder. In F. Lewis-Hill, T. S. Williams, J. A. Panetta, & J. M. Herrera (Eds.), *Psychiatric illness in women: Emerging treatments and research* (pp. 57-96). Washington, DC: American Psychiatric Publishing.

Yehuda, R. (2000). Biology and posttraumatic stress disorder. *Journal of Clinical Psychiatry, 61*(Suppl. 7), 14-21.

Yehuda, R., & McFarlane, A. C. (1995). Conflict between current knowledge about posttraumatic stress disorder and its original conceptual basis. *American Journal of Psychiatry, 152,* 1705-1713.

Zakin, G., Solomon, Z., & Neria, Y. (2003). Hardiness, attachment style, and long term psychological distress among Israeli POWs and combat veterans. *Personality and Individual Differences, 34,* 819-829.

Sex differences in written disclosure: Implications for differential vulnerability to Post Traumatic Stress Disorder

Journal Guide:

Psychology and Psychotherapy: Theory, Research and Practice

INTRODUCTION

Epidemiological studies have identified that important differences may exist between the sexes with regard to rate of trauma exposure, type of trauma experienced, and vulnerability to developing Post Traumatic Stress Disorder (PTSD) (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Research findings also suggest that qualitative differences may exist in the expression and chronicity of PTSD in men and women (Fullerton et al., 2001; Kessler et al., 1995). Since women have been found to experience a chronic disorder course more often than men (Breslau et al., 1998), it is possible that different factors are working to maintain or attenuate symptoms.

Few studies exist that focus specifically on explanations for the gender effect in PTSD and although theoretical models of PTSD are useful in providing general information regarding underlying processes, there is a distinct lack of discussion regarding gender differences (Gavranidou & Rosner, 2003). This study proposes that fundamental differences between men and women in emotional psychology may give rise to sex differences in vulnerability to developing persistent PTSD. Research in this area is important in order to refine existing theoretical models so that gender issues are more adequately taken into account. A greater understanding of sex differences in PTSD would be important in developing treatment protocols sensitive to the needs of both sexes. Contemporary models propose that memory, and emotion and meaning making are central processes in the presentation and maintenance of PTSD, each of these processes will be discussed in turn before considering sex differences as they specifically relate to emotional processing.

Memory Processes

Biological models have identified the amygdala as the brain structure central in initiating neurochemical and neuroanatomical circuitry of fear (Brewin, 2001a; LeDoux, 1998; Yehuda, 2000). Initial learning of threat cues is thought to involve rapid low-level feature based information from the sense organs, forming memories that are not open to deliberate recall, but are accessed automatically by perceptual cues similar to those recorded in the fear memory (Brewin, 2001a). Other slower higher cortical pathways involve a series of structures which permit more sophisticated processing of information (Brewin, 2001b). The hippocampus in particular is thought to specialise in the learning of context and the relational properties among stimuli, thus making a coherent whole available for deliberate recall, by binding individual components of an episode (Brewin, 2001b). Recent research indicates that stress differentially affects the hippocampus and amygdala. Hippocampal functioning has been found to be impaired under high levels of stress, whereas the amygdala in general appears to be enhanced as stress increases (Metcalfe & Jacobs, 1998).

Brewin (2001b) posits that these memory systems and the effects of stress on them provide a plausible neural substrate for the *verbally accessible memory* (VAM) and *situationally accessible memory* (SAM) representations proposed by Brewin, Dalgleish, and Joseph (1996) in the dual representation theory. The VAM is thought to contain information that received sufficient cognitive processing before, during and after the trauma, and can be retrieved voluntarily. Memories stored within this system interact with the rest of the autobiographical memory base, so the trauma is

represented within a complete personal context comprising past, present and future (Brewin, 2001b). Consistent with the biological models, the information contained within the VAM about the trauma is thought to be restricted because of the adverse effects of high arousal on mediational serial processes such as attention (Brewin, 2001b). The SAM representation is thought to contain more extensive, non-conscious processing of sensory, physiological and motor information as experienced at the time of the trauma. The memories are not under voluntary control, but are triggered in a context which contains some feature of the traumatic event (Brewin et al., 1996). Re-experiencing symptoms are therefore more detailed and affect laden and lack a time code, unlike ordinary memories (Brewin, 2001b). SAM do not have a verbal code and do not necessarily interact with other autobiographical knowledge, and thus are not modified in the light of new learning (Brewin et al., 1996).

According to the dual representation theory (Brewin et al., 1996), the goal of therapy is to incorporate within the VAM the detailed information from the SAM. However, the model does not fully explain the impact of appraisals on the trauma memory, yet there are likely to be interdependencies between these processes. Maladaptive appraisals may in part be a function of an incomplete VAM, and also motivate avoidance behaviour which impedes the integration of memory, because associated emotions may be too difficult to confront (Ehlers & Clark, 2000). The implication of the dual representation theory is that individual differences in arousal at the time of the trauma would give rise to differences in the encoding of the trauma memory. It is possible therefore, that this could be a point of differentiation in vulnerability between men and women. Interestingly in a meta-analytic review by Tamres, Janicki, and Helgeson (2002), it was found that in the majority of studies women

appraised stressors as more severe than men. Further, in a study of 37 countries, Lynn and Martin (1997) found that women tended to score higher on measures of neuroticism than men, which may increase the likelihood that women will be more reactive to, and cope less well with trauma exposure.

Emotion and Meaning Making Processes

Emotional Numbing

Individuals suffering from PTSD often experience deficits in emotional experience, otherwise referred to as emotional numbing (Tull & Roemer, 2003). According to Levanthal (1984), emotion is the experiential product of a number of different information processing components. The expressive-motor component refers to the unconsciously activated primary emotional responses; the schematic subsystem links the current stimulus situation and prior knowledge of emotional experiences, and the conceptual subsystem provides default assumptions, expectations and attributions that are used for information processing in unfamiliar situations. Drawing from Levanthal's (1984) theory, Litz (1992) suggests that emotional numbing is a multi-determined, selective emotional processing deficit, which is chiefly manifested during symptomatic states. The ability to respond emotionally to a broad range of emotions is thought to be intact, but largely inaccessible because of the activation of trauma related cognitive processes that are antagonistic to the expression of non-trauma related emotions. For example, this may include the activation of rules at a schematic or conceptual level which contravene sustained positive emotional reactions, such as 'any form of arousal is to be avoided because it will trigger trauma memories' (Litz, 1992). Feeny, Zoellner, Fitzgibbons, and Foa (2000) found that the

severity of emotional numbing symptoms two weeks after a traumatic incident predicted severity of PTSD three months later. Fullerton et al. (2001) reported that women were more likely to meet overall avoidance/numbing criterion than were men. It is possible that the increased vulnerability of women to develop emotional numbing and avoidance symptoms may reflect sex differences in response to intense emotional experience.

Emotional Processing

Emotional processing involves the activation of the SAM to aid cognitive readjustment to the trauma, and accommodation of the trauma experience with formerly held beliefs and a search for meaning (Brewin et al., 1996; Ehlers & Clark, 2000). Grey, Young, and Holmes (2002) suggest that any peri-traumatic emotion, however much cognitive processing it requires, is available to be encoded in the SAM, provided it occurs in the context of at least moderate fear. Thus individuals may experience a range of affect without recollection of the cognitive appraisal or context (Ehlers & Clark, 2000). This is concordant with the perceptual-motor theory (Leventhal, 1984) in that the expressive-motor level of processing maybe recorded within the SAM, while the schematic and conceptual processing is missing due to the adverse affects of high arousal on higher order functions. Grey et al. (2002) note that more diverse emotions may not be responsive to exposure treatment, but may require cognitive restructuring within reliving treatment sessions. Identifying the context, emotion, thought and meaning attributed to the thought facilitates the contextualisation of internally experienced emotional states (Grey, Holmes, & Brewin, 2001). In essence this may represent the matching of expressive-motor

components to schematic and conceptual information, making available maladaptive appraisals for restructuring within the wider framework of the more complete trauma experience (Ehlers & Clark, 2000). Changes in emotion are therefore likely to be accompanied by changes in cognitive appraisal (Ehlers & Clark, 2000). It is suggested that contextualising emotional experience and modifying maladaptive appraisal would serve to reduce the impact of trauma-related cognition and emotion, in turn reducing hyperarousal and emotional numbing symptoms. Thus mere ventilation of emotion may not be helpful in the absence of cognition to add context and meaning. Indeed, within a non-clinical sample it was found that individuals who used a very high rate of negative-emotion words when writing about traumatic personal experiences, were the most likely to have continuing health problems after participation (Pennebaker, Mayne, & Francis, 1997), perhaps reflecting incomplete contexualisation of emotion. In contrast, participants who evolved in their writing style and moved from low usage of cognitive words to a high rate of usage on the final day of 3-5 days writing, evidenced the greatest improvement in indexes such as health, grade point average and finding jobs after unemployment (Pennebaker et al., 1997), possibly reflecting a progressive contextualisation of emotional experience.

In addition to primary emotional states encoded at the time of the trauma, Ehlers and Clark (2000) suggest that the sense of current threat experienced by those with PTSD is in part related to idiosyncratic negative appraisals regarding the trauma and/or its sequelae. These are thought to maintain PTSD by producing negative emotions which motivate dysfunction coping strategies that paradoxically enhance PTSD symptoms.

Meaning Making

Emotions are seen as the primary generator of personal meaning. Individuals not only live their lives, but are also compelled to evaluate and make meaning of their lives forming an ongoing narrative of what they are as they become (Greenberg & Pascual-Leone, 1997). The experience of a traumatic event is thought to shatter an individual's narrative resulting in a psychological and existential crisis (Janoff-Bulman & Franz, 1997). Without the formation of an integrated account of the experience, meanings derived may be maladaptive and destructive (e.g. characterlogical or behavioural self-blame), further driving unhelpful behaviours which perpetuate PTSD symptoms. Even after an account of the trauma has been constructed, personal meanings may be difficult to derive if the experience is in extreme conflict with formerly held beliefs. Facilitation of a conceptual shift from the world as meaningless, to the individual's life as meaningful and of value, can create new meaning by recognition of the significance and worth in one's daily existence (Janoff-Bulman & Frantz, 1997). Thus it would be expected that a healthy narrative regarding a trauma experience would have an increasing degree of positive content, reflecting the individual's resolve that whilst the trauma was wholly unchosen, unexpected and deeply felt benefits had resulted (Janoff-Bulman & Frantz, 1997). Indeed in a non-clinical sample, those who evidenced the greatest improvement in health following writing about upsetting events, used more positive emotion words and a moderate number of negative emotion words, and used increasing degrees of cognitive words (Pennebaker et al., 1997).

Sex Differences, Emotional Processing and PTSD

Recent studies suggest that males and females express and cope with emotions differently (Brody, 1993), thus sex differences in PTSD may partly be accounted for by sex differences in emotion psychology. With few exceptions, results indicate that women are more emotionally expressive than men (Kring & Gordon, 1998). Sex differences in emotion are likely to result from complex interactions between early neuropsychological, genetic, hormonal and socialisation processes (Brody, 1993). It is suggested that from an early age females are socialised to express more emotion than males. Further, a tendency for girls to acquire language skills earlier than boys may critically predispose them to put feelings into words, whereas boys may learn to express feelings through actions (Gleason, Hay, & Cain, 1989). Whilst there is evidence that women express more emotion than men, it is not clear whether women experience more emotion than men, or whether their experience of emotion is qualitatively different from men's experience of emotion (Tamres et al., 2002).

Pennebaker and Roberts (1992) propose that men and women may have fundamentally different emotional psychology, using different strategies to perceive emotion. Drawing on visceral perception research, men appear to perceive emotion in accordance with James' peripheralist theory (as cited in Pennebaker & Roberts, 1992), which assumes that different emotions are associated with unique patterns of autonomic nervous system activity, which are perceived when individuals accurately detect physiological changes. In contrast, women are thought to use a strategy more consistent with cognitive appraisal emotion theories such as Schachter and Singer's

(1962) cognitive labelling theory. Evidence in support of this proposal originates from studies comparing men and women's abilities to detect physiological changes when contextual cues were and were not available. Men were found to be consistently more accurate than women at detecting physiological changes in the absence of contextual cues, but in naturalistic settings no gender differences were observed (Cox et al., 1985; Pennebaker & Watson, 1988). The findings from these studies suggest that men and women rely on different sources of information in defining their internal states (Pennebaker & Roberts, 1992). According to Pennebaker and Roberts (1992), women would be more accurate at detecting their own and other people's emotion when contextual cues are available which affect them both. In contrast men would be accurate in knowing their own emotional state based on detecting physiological changes, but would have difficulty determining the emotional state of others. The observation that females are better encoders and decoders of emotion than men is consistent with this proposition (Brody, 1993).

If men and women perceive emotion in different ways, emotional processing in PTSD may involve different mechanisms for men and women. The suggestion that women may be more reactive to traumas and tend to appraise stressors as more severe than men (Eysenck & Eysenck, 1991; Tamres et al., 2002), may lead to greater discrepancy in VAM and SAM during initial encoding. Women's method of verbalizing and contextualising emotional experience may be immobilized by the fact that much of the rich affective and situational data regarding the trauma is recorded in a non-verbal form. Further a decreased ability to detect and label internal experience in the absence of situational information may impair their ability to begin the process of information and emotional processing, increasing maladaptive

appraisals of the impact of the trauma and their ability to cope, thus increasing a sense of current threat. Further, the tendency for women to cope by seeking emotional support from others may be disabled by difficulty putting the experience into words (Tamres et al., 2002). Whilst men tend to express emotion verbally less than women, evidence suggests that they are more skilled at perceiving physiological changes in the absence of situational information. In the direct aftermath of the trauma, perceptions regarding their ability to cope with the emotional experience may be less threatened due to an intact ability to read physiological signs and make sense of their internal world, in the absence of a full verbal account. This may lead to a decreased likelihood of maladaptive appraisals regarding the impact of the trauma on their sense of self and ability to cope, thus decreasing a sense of current threat, decreasing arousal and increasing ability to cope with intrusions and re-experiencing, leading to natural recovery.

Adopting two theories of emotion also fits with Litz's (1992) conceptualization of emotional numbing and the finding that women more often develop emotional numbing symptoms than men (Fullerton et al., 2001). It could be argued that women's greater need to contextualise emotion leads to increased unproductive trauma related cognitive labour, perhaps in the form of ruminative style thinking, which is antagonistic to the expression of non-trauma related emotions. It may be possible for men to initially reduce emotional arousal through physiological action, without giving it a verbal label. This may then reduce the adversity of confronting the experience in a verbal state. Further, it has been found that women with peritraumatic dissociation are more likely than men with peritraumatic dissociation to develop PTSD (Fullerton et al., 2001). Peritraumatic dissociation can create an

additional barrier to the registration and recall of verbal memory (Brewin et al., 1996). Dissociation may therefore have a more severe impact on female emotional processing than men's, because of a greater reliance on defining emotional experience by verbal contextualisation.

Gidron et al. (2004, in preparation) conducted a study examining the effects of a memory structuring intervention (MSI) (involving verbal elaboration of the trauma memory to include perceptual features) on PTSD symptoms. It was found that while women in the MSI reported less frequent PTSD and avoidance symptoms than female controls (who received supportive counselling), men in the MSI reported significantly more PTSD and arousal symptoms than male controls. The experimental and control intervention were carried out 24-48 hours after patients experienced a road traffic accident and therefore a baseline measure of PTSD was not possible. The results may therefore be due to different patterns of natural recovery, rather than the intervention per se. However, it could be suggested that the MSI provided an important structure by which females could start to order their experience and define and contextualise internal processes, thus decreasing potential feelings of chaos and threat, and providing protection against the development of PTSD. The intervention may therefore have acted in accordance with female emotional psychology. In contrast, the intervention may have acted against male emotional psychology, potentially increasing emotional arousal and distress by labelling internal processes, and disrupting the natural process of recovery.

This Study

It has been suggested that the way in which people use words is a meaningful marker of natural social and personality processes (Pennebaker, Mehl, & Niederhoffer, 2003). If men and women differ in their emotional psychology, specifically in terms of their use of verbalization, this would be expected to be reflected in their use of language. Empirical studies have endeavoured to identify exactly what the differences are in male and female language use, but comparisons between studies have been difficult due to lack of standardised units of measure (Groom, 2003 in preparation). Further, the impact of possible moderators on language use of males and females have not been systematically examined. This is important since personality factors and female tendency to perceive more threat may influence language use, rather than sex itself. Further, few attempts have been made to study how context influences the size and direction of linguistic sex differences. As yet no studies have specifically addressed sex differences in language use as related to PTSD. The primary aim of this study therefore is to examine sex differences in language use in a non-clinical population in order to investigate how men and women may express and contextualise emotional experience differently. Specifically, sex differences in the use of emotion and cognitive words will be examined, as these components appear to be central to PTSD conceptualisations. Further, the impact of context on word usage will be manipulated by asking participants to complete two writing conditions. The first condition will involve writing about both a neutral subject (the internet) and the second condition will involve writing about a personally experienced traumatic event.

Research Hypotheses

Drawing on the information presented in the theoretical models and empirical research reviewed, a number of research hypotheses are proposed.

Referring to the literature pertaining to sex differences in emotional expression, it is thought that females will use a greater proportion of emotion words across the writing conditions than will males. This effect may be particularly apparent under conditions of stress induced by writing about a personally experienced traumatic event. Further, it is proposed that females will use a greater proportion of negative emotion words across the conditions than will males. This is because the literature suggests that women tend appraise stressors as more severe than men and the expression of negative emotions may be more gender role concordant for females than for males. Again, this effect may be expected to be particularly evident under conditions of stress in the traumatic event writing condition.

It is thought that females will use a greater proportion of cognitive words across the conditions than will males. This is because the literature reviewed suggests that women more than men may detect and understand their emotion experiences by examining the situational context and attributing the cause and meaning of their experience. It is thought that this effect will be more apparent in the traumatic event writing condition because of the greater emotional loading of the experience.

In accordance with the literature suggesting that women are more inclined to put their experience into words, it is thought that females will use more words in total than will males.

It is proposed that the writing condition will have an effect on cognitive and emotion word usage, with both sexes using more emotion and cognitive words in the traumatic event writing condition. This is drawn from the idea presented in the literature that context may impact on word usage.

METHODOLOGY

Design

A mixed design was used to investigate whether men and women differ in their use of cognitive and emotion words when writing about neutral and traumatic topics. Sex (male and female) was a between-subjects factor and writing condition (neutral and traumatic) was a within-subjects factor. The dependent measure was proportion of emotion and cognitive words used.

Participants

Ethical approval for the study was granted by the Department of Psychology, Southampton University (see Appendix A for correspondence). Participants were initially recruited from the undergraduate psychology participant pool at the University of Southampton, using the psychology department database Psychobook. The database advertises studies and enables students to book time slots for those they wish to participate in. Due to difficulty recruiting male participants from the psychology participant pool, poster advertisements were placed in other university departments. Potential participants from these departments contacted the experimenter by email and a time slot was booked. Potential participants were excluded if English was not their first language and if they suffered from dyslexia. Undergraduate psychology students received research participation credits for taking part, and students enlisted from the other departments were paid £8 for their time.

A sample of 32 males and 32 females was obtained. Of the male participants, 11 were recruited from the undergraduate participant pool, and 21 from poster advertisements. Of the female participants 28 were recruited from the undergraduate participant pool and 4 from poster advertisements. Of those excluded from the study due to not meeting screening criteria (see later), 3 were male and 5 were female. The age range of the sample was 18-49 years ($M = 20.83$, $SD = 4.72$). There was no significant difference between the ages of the male and female participants ($t(62) = 0.13$, $p = .90$). Table 1 shows the sample characteristics in terms of ethnicity, handedness, degree subject and year of study.

Table 1

Frequency counts for male and female participants with each characteristic.

Characteristic	Males (n = 32)	Females (n = 32)
Ethnicity		
White	26	30
Other background	6	2
Handedness		
Right	29	28
Left	3	4
Degree Subject		
Psychology	11	28
Geography	4	0
Medicine/Nursing	1	3
Physics/Chemistry	9	0
Other	7	1
Year of Study		
First	15	9
Second	9	19
Third	4	3
Post Graduate	4	1

Measures

Due to the potential for distress during and following participation in the study, care was taken to minimise risk. The following three measures: Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996), Beck Anxiety Inventory (BAI; Beck & Steer, 1990) and the Subjective Units of Distress (SUD) Scales, were used as part of a risk management procedure. The first two measures were used to screen participants in order to ensure that individuals who were severely depressed or anxious were excluded from participation. This was because participation in the study could cause emotional upset, and therefore individuals who were already vulnerable may have been caused undue distress. Further, pre-writing levels of anxiety and depression may impact on writing style, thus having a confounding effect. The third measure was used in order to monitor distress throughout participation, and to check that participants did not leave the experiment distressed.

1. BDI-II (Beck et al., 1996).

This is a 21-item self-report instrument designed to detect the severity of depression in adults and adolescence. Scores for depression can be divided into *minimal range* (0-13), *mild range* (14-19), *moderate range* (20-28), and *severe range* (29-63). The scale has good reported psychometric properties (Beck et al., 1996).

2. BAI (Beck & Steer, 1990).

This is a 21-item self-report instrument, designed to detect the severity of anxiety in adults and adolescence. Scores for anxiety can be divided into *minimal range* (0-7),

mild range (8-15), *moderate range* (16-25) and *severe range* (26-63). The scale has good reported psychometric properties (Beck & Steer, 1990).

3. SUD Scales.

Four SUD scales were administered at different time points during the experiment (see Appendix B for an example copy). The SUD scale used was a visual analogue scale ranging from 0 (*not at all distressed*), to 10 (*extremely distressed*).

4. Eysenck Personality Questionnaire- Revised (EPQ-R; Eysenck & Eysenck, 1991).

This is a 106-item self-report personality inventory which consists of three personality dimensions of Neuroticism, Extraversion, and Psychoticism and a Lie scale. The participant is required to answer *yes* or *no* to each of the inventory questions which include items such as '*Does your mood often go up and down?*' and '*Are you a talkative person?*' This measure was included in order to be able to clarify experimental results in terms of individual differences in personality traits. The questionnaire has good psychometric properties with reported alpha-coefficients ranging from .76 to .90 for each of the three dimensions and the lie scale (Eysenck & Eysenck, 1991). It has been identified in the literature that men and women differ with regard to personality (Lynn & Martin, 1997). Specifically higher levels of neuroticism in women may account for sex differences observed in threat appraisal, emotional expression and coping (Tamres et al., 2002). The EPQ-R was therefore used in order to control for personality as a source of variance in sex difference in word use.

5. Daily Hassles Scale (Lazarus & Folkman, 1989).

This is a 117-item self-report scale which measures the Frequency and Severity of individuals' transactions with the environment, which are considered to be stressful events in a set time period (in this study the time scale was set at one week). The participant is required to rate each stressor on a four-point scale from 0 (*no stress, or did not occur*) to 3 (*extremely severe stress*). Items included hassles such as misplacing or losing things and concerns about owing money. The scale is primarily intended as a research instrument that can be used to investigate appraisals of stress. Normative data is available for college students and adults. Hassles Frequency scores have been found to be stable over time (alpha-coefficient .79) suggesting that hassles scores have both trait and state characteristics (Kanner, Coyne, Schaefer, & Lazarus, 1981; Lazarus & Folkman, 1989). It has proven more difficult to evaluate the Severity scale suggesting that caution is needed in interpreting results from this scale. A measure of stress appraisal was used in order to control for possible differential appraisal style on word usage, since women have been found to appraise stressors as more severe than men (Tamres et al., 2002).

6. Traumatic Event Fact Sheet (TEFS).

Information was collected regarding the upsetting event written about (see Appendix C for a copy). This was in order to compare the impact of the traumatic events between participants. Information included: the length of time since the event, whether the participant had spoken to others about the event and whether they tried to avoid thinking about the event. The fact sheet also included four rating scales, two regarding SUD felt at the time of the trauma and currently, and two Thought rating scales regarding how much they thought about the trauma at the time and currently.

7. Linguistic Inquiry and Word Count (LIWC2001; Pennebaker, Francis, & Booth, 2001).

LIWC2001 is a computer software programme designed to analyse text on a word-by-word basis, calculating the percentage of words in the text that match up to each of 82 language dimensions. The default LIWC2001 dictionary is comprised of 2,300 words and word stems, and each of these defines one or more word categories. Many of the word categories are arranged hierarchically, for example all anger words by definition will also be categorised as negative emotion and overall emotion words. Output is generated as a tab-delimited file that can be directly read into SPSS. The external validity of the scale has been established with independent judge ratings and LIWC2001 output being highly correlated, particularly with regard to positive and negative emotion categories and cognitive word categories (Pennebaker & Francis, 1996). The software was selected as the most appropriate means of measuring the dependent variable, proportion of word usage. This is because it allows for consistent coding of material, promotes the accuracy of future study replication, and facilitates the ability to make comparisons between studies using the same mode of analysis.

8. Demographic Information

Demographic information was collected, including name, age, degree subject, university year of study, handedness and ethnicity. This was in order to be able to comment on the homogeneity of the research sample.

Procedure

Experimental Context

Two quiet research cubicles in the Psychology Department at Southampton University were used. One cubicle was used for introductions, screening questionnaire completion, standardised instructions, mood induction and debriefing. The other cubicle was used by participants to write in, complete the EPQ-R and Daily Hassles Scales, and to submit their work at the end of the experiment. Two rooms were used in order to promote an atmosphere of anonymity conducive to disclosure of intimate thoughts and feelings (Pennebaker, 1994).

Experimental Procedure

All participants were given an information sheet (see Appendix D) before completing a written consent form (see Appendix E). Once written consent was obtained, participants were escorted to the department office where they were given a participant code sticker in exchange for their contact details. This was part of a risk management procedure, whereby if information was disclosed by participants which suggested that they were at risk of harming themselves or others, the experimenter could contact them by post addressed by the department administrator, who was blind to the nature of the study. Participant demographic information was then collected and the second phase of screening completed using the BDI-II and BAI questionnaires. At this point participants were excluded if either of their scores on these measures were in the severe range.

Participants completed two writing conditions relating to a neutral topic (the internet) and a traumatic topic (their most traumatic and upsetting experience). The neutral condition was carried out first in order to prevent possible contamination from the traumatic writing condition. Prior to each condition participants were read a set of standardised instructions (see Appendix F). The instructions for each condition asked that the participant write continuously for the entire 20 minutes and to repeat what they had already said if they ran out of things to write. Participants were told not to worry about grammar, spelling or sentence structure. The instructions for the traumatic writing condition asked that participants write about the most traumatic/upsetting experience of their entire life, delving into their deepest emotions and thoughts. After each set of instructions participants were escorted to a room in which they were alone to write. Participants were also asked to complete the SUD scale before and after the first condition and after the second condition. Scores on these measures were checked after each condition in order to monitor the participants' levels of distress. After the second condition participants were also asked to complete the TEFS.

Following the writing conditions participants completed a mood induction task which involved watching a comedy sequence and listening to uplifting music. Participants completed a SUD scale and were escorted back to the writing room to complete the EPQ-R and Daily Hassles Scales. Participants were asked to put their work into an envelope on which they placed their code sticker before posting it into a box. Participants were debriefed, given information regarding university support services and were informed that a more in-depth explanation of the experiment would be emailed to them following data collection (see Appendix G).

RESULTS

Data Preparation

Handwritten essays were transcribed using a word processing programme, before being analysed using LIWC2001. The LIWC2001 output categories of interest in this study are shown in Table 2. Kolmogorov Smirnov tests demonstrated that most of the data for analysis was normally distributed and met parametric test criteria. The rating scales on the TEFS regarding SUD and Thought did not meet parametric test criteria for normal distribution. Data transformations were attempted, but were unsuccessful, therefore nonparametric statistics were used for computations using these scales.

Table 2

LIWC2001 categories used in the data analysis.

LIWC2001 Dimension	Examples
Affective or Emotional Processes	happy, abandon, smother
Positive emotion	pretty, good, agree
Negative emotion	hate, worthless, abandon
Anxiety or fear	nervous, tense, bewilder
Cognitive Processes	cause, ought, barrier, but
Word Count	

Data Analysis

Traumatic Condition Characteristics

Characteristics of the traumatic events written about by participants were first examined in order to ascertain whether any important sex differences existed which should be taken into account when investigating the research hypotheses. Table 3 displays a number of characteristics related to the traumatic event written about by male and female participants derived from the TEFS. Table 3 shows that the majority of males and females wrote about the death of a friend/relative, or a relationship breakdown. Females, but not males, wrote about psychological disorders and abuse, and males but not females wrote about sexuality and drugs. More males than females reported not currently avoiding thinking about the trauma, while more females than males reported avoiding thinking about the trauma. Females were found to have a higher rate of disclosure regarding the trauma than males.

An independent samples *t*-test was used to investigate whether there was a sex difference in the length of time in years since the traumatic event written about occurred ($M = 6.18$, $SD = 6.00$ and $M = 5.78$, $SD = 6.90$ for males and females respectively). This was important to ascertain as length of time since the trauma may have impacted on the proportion of words used. No significant difference was found ($t(62) = 0.252$, $p = .80$).

Table 3

Characteristics of the traumas written about by male and female participants.

Category	Male %	Female %
Traumatic event written about		
Death of relative/friend	25	25
Relationship breakdown	56.3	37.5
Psychological disorders	0	12.5
Sexuality	6.3	0
Accident	3.1	9.4
Abuse	0	3.1
Drugs	3.1	0
Other	6.3	12.5
Current avoidance		
Did not avoid thinking about it	50	21.9
Sometimes avoided thinking about it	12.5	15.6
Avoided thinking about it	37.5	62.5
Previous disclose of event to others	71.9	100

The Mann-Whitney U test was used to investigate whether significant differences existed between males and females on scores derived from the SUD and Thought scales on the TEFS. The results are shown in Table 4. Women reported significantly more distress than did men both at the time of the trauma and when thinking about it currently. Women also reported thinking about the trauma significantly more than men both at the time of the trauma and currently.

Table 4

Mann-Whitney U results comparing males and females on TEFS scales.

	Males		Females		Analysis			
Rating Scale on TEFS	*M*	*SD*	*M*	*SD*	*U*	N_1	N_2	*p*
SUD								
Time of Trauma	7.75	2.38	9.12	1.36	326.50	32	32	.01**
Currently	4.41	2.37	6.06	1.98	300.50	32	32	.01**
Thought								
Time of Trauma	7.78	2.74	9.19	1.78	340.50	32	31	.02*
Currently	2.84	2.50	4.84	2.50	272.50	32	32	.01**

* = $p < .05$. ** = $p < .01$.

Standardised Measures

All participants were asked to complete the Daily Hassles Scales and the EPQ-R. In order to establish whether scores on the measures differed for males and females, independent samples *t*-tests were conducted. The results are shown in Table 5. Inspection of Table 5 reveals that females scored significantly higher than did males on Frequency, but no sex difference was found with regard to Severity. Females scored significantly higher than did males on the EPQ-R subscale Neuroticism, however, significant sex differences were not found for the EPQ-R subscales Extroversion, Psychoticism and Lie.

Table 5

Independent samples t-test results for sex differences in standardised measures.

	Men		Women		Analysis		
Measure	*M*	*SD*	*M*	*SD*	*df*	*t*	*p*
Daily Hassles Scale							
Frequency	25.37	12.82	32.16	12.73	62	2.12	.04*
Severity	1.28	0.22	1.35	0.30	62	1.04	.30
EPQ-R							
Extroversion	16.78	3.64	15.59	4.88	62	1.10	.27
Neuroticism	9.88	5.40	15.22	3.72	55	4.61	.01**
Psychoticism	7.41	3.51	6.44	2.72	62	1.23	.22
Lie	6.97	3.81	8.25	3.67	62	1.37	.18

* = p< .05. ** = p< .01.

Examination of Hypotheses

Table 6 shows the word category descriptive statistics. In order to examine the hypotheses the data was subjected to 2 x 2 mixed design ANOVAs and ANCOVAs, where sex (male and female) was the between-subjects factor, and condition (neutral and traumatic) was the within-subjects factor. The subscales Neuroticism and Frequency were considered as covariates in the ANCOVA analyses because it was found that males and females scored significantly differently on these scales. The ANOVA and ANCOVA results can be viewed in Appendix H.

Table 6

Mean and Standard Deviation scores for the word categories used.

Word Category	Condition 1 (Neutral)				Condition 2 (Traumatic)			
	Male		Female		Male		Female	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Affect or Emotional Process	3.56	1.09	3.67	0.76	5.23	1.36	5.08	1.07
Positive Emotion	2.50	0.82	2.17	0.84	2.11	0.88	1.54	0.55
Negative Emotion	1.08	0.72	3.48	1.06	3.07	1.02	3.48	1.06
Anxiety or Fear	0.15	0.24	0.16	0.26	0.76	0.47	1.11	0.62
Cognitive Process	5.46	1.68	6.18	1.65	7.54	2.10	8.52	1.81
Word Count	431.38	82.92	461.22	92.83	455.19	108.72	559.38	95.75

Pearson's *r* correlations were used to examine whether the subscales of the standardised measures correlated with the word categories. This was in order to further ascertain whether any of the subscales should be considered as covariates. A significant negative correlation was found between Frequency on the Daily Hassles Scale and Positive Emotion ($r = -.28, p < .05$). A significant negative correlation was found between Severity on the Daily Hassles Scale and Positive Emotion ($r = -.33, p < .01$). A significant negative correlation was found between Neuroticism on the EPQ-R and Positive Emotion ($r = -.33, p < .05$). A significant positive correlation was found between Neuroticism on the EPQ-R and Word Count ($r = .27, p < .05$). No other significant correlations were found.

Hypotheses 1: Women will use a greater proportion of emotion words across the conditions than will men.

The main effect of Sex was examined with regard to the global LIWC2001category Affective or Emotional Processes ($M = 8.79$ $SD = 1.80$ and $M = 8.45$, $SD = 1.07$ for males and females respectively). No significant difference was found between the sexes on overall emotion word usage ($F(1.62) = 0.82, p = .37$). This difference remained non significant when examining Frequency and Neuroticism as covariates ($F(1.60) = 0.63, p = .43$). When examining the main effect Sex for the word category Positive Emotion ($M = 4.61$, $SD = 1.67$ and $M = 3.71$, $SD = 0.97$ for males and females respectively), males were found to use significantly more Positive Emotion words than did females ($F(1.62) = 11.21, p < .01$). This difference remained significant after controlling for Frequency and Neuroticism as covariates. Males were found to use significantly more Positive Emotion words than did females ($F(1.60) = 5.87, p < .05$). No significant interaction effects were found for the main effects of Sex and Condition for Affective or Emotional Processes or Positive Emotion words.

Hypothesis 2: Women will use a greater proportion of negative emotion words across the conditions than will men.

The main effect of Sex was examined with regard to the LIWC2001 category Negative Emotion ($M = 4.15$, $SD = 1.41$ and $M = 4.67$, $SD = 1.16$ for males and females respectively). No significant difference was found between the sexes on overall Negative Emotion word usage ($F(1.62) = 2.61, p = .11$). This difference remained non significant when examining Frequency and Neuroticism as covariates ($F(1.60) = 1.05, p = .31$).

When examining the main effect of Sex for the word category Anxiety or Fear (M = 0.91, SD = 0.58 and M = 1.28, SD = 0.69 for males and females respectively) females were found to use significantly more Anxiety or Fear words than did males (F(1.62) = 5.29, $p < .05$). When Frequency and Neuroticism were considered as covariates this difference was no longer significant (F (1.60) = 2.68, $p = .12$). The covariates were considered separately in order to ascertain if one had more influence than the other. When Frequency was considered, females were found to use significantly more Anxiety or Fear words than did males (F (1.61) = 4.64, $p < .05$). When Neuroticism was considered, no significant difference was found between the sexes for use of Anxiety or Fear words (F (1.61) = 2.74, $p = .10$).

A significant interaction was found between the main effects of Sex and Condition for Anxiety or Fear words (F(1.62) = 6.07, $p < .05$). The interaction remained significant after Frequency and Neuroticism were considered as covariates (F (1.60) = 5.58, $p < .05$). Increased clarification of the interaction was achieved by performing independent samples t-tests in order to ascertain whether the sexes differed in the proportion of Anxiety or Fear used in condition one (neutral) and condition two (traumatic). No difference was found between the sexes with regard to the proportion of Anxiety or Fear words used in the condition one (t(62) = 0.16, p = .87). However a significant difference was found between the sexes with regard to the proportion of Anxiety or Fear words used in condition two with females using more of these words than did males (t(62) = 2.60, $p < .01$). Paired t –tests were used to examine whether a significant differences existed between condition one and condition two for male and female participants regarding Anxiety or Fear word

usage. Significant differences were found between condition one and condition two for male and female participants ($t(31) = 7.45, p < .01$ and $t(31) = 8.18, p < .01$ respectively), with significantly more Anxiety or Fear words being used in condition two than in condition one.

Hypotheses 3: Women will use a greater proportion of cognitive words across the conditions than will men.

The main effect of Sex was examined with regard to the LIWC2001 category Cognitive Processes ($M = 12.99$, $SD = 2.80$ and $M = 14.71$, $SD = 2.57$ for males and females respectively). Women were found to use significantly more Cognitive Processes words than did men ($F(1.62) = 6.50, p < .01$). This significant difference was maintained after Frequency and Neuroticism were considered as covariates ($F(1.60) = 4.42, p < .05$). No significant interaction effects were found for the main effects, Sex and Condition.

Hypothesis 4: Women will have a higher total word count than will men.

The main effect of Sex was examined for the LIWC2001 dimension Word Count ($M = 886.56$, $SD = 181.94$ and $M = 1020.59$, $SD = 176.78$ for males and females respectively). Women used significantly more words than did men ($F(1.62) = 8.93$, $p < .01$). When Frequency and Neuroticism were considered as covariates, the significant difference in Word Count was maintained ($F(1.60) = 4.59, p < .05$). A significant interaction was found for the main effects of Sex and Condition for Word Count ($F(1.62) = 20.55, p < .01$). The significant interaction was maintained after controlling for Frequency and Neuroticism as covariates ($F(1.60) = 10.57, p < .01$).

Increased clarification of the interaction was achieved by performing independent samples *t*-tests in order to ascertain whether the sexes differed in Word Count for condition one (neutral) and condition two (traumatic). No significant difference was found between the sexes regarding Word Count for condition one ($t(62) = 1.36, p = .18$). A significant difference was found between the sexes regarding Word Count for condition two ($t(62) = 4.07, p < .01$), with females using more words than did males. Paired *t* –tests were used to examine whether significant differences existed between condition one and condition two for male and female participants regarding Word Count. Significant differences were found between condition one and condition two for both males and females ($t(31) = 2.06, p < .05$ and $t(31) = 8.45, p < .01$ for male and female participants respectively), with more words being used in condition two than in condition one.

Hypothesis 5: Writing condition will have an effect on cognitive and emotion word usage.

The main effect of Condition was examined with regard to each of the word categories. For word category Affective or Emotional Processes ($M = 3.46$, $SD = 0.94$ and $M = 5.16$, $SD = 1.22$ for condition one and condition two respectively), a significant difference was found with significantly more Affective and Emotional Processes words used in condition two, than condition one ($F(1.62) = 71.27, p < .01$). This difference was maintained after controlling for Frequency and Neuroticism as covariates ($F(1.60) = 8.35, p < .01$).

With regard to the word category Positive Emotion ($M = 2.33$, $SD = 0.84$ and $M = 1.82$, $SD = 0.78$ for condition one and condition two respectively), significantly more

Positive Emotion words were used in condition one than condition two ($F(1.62) = 12.76, p < .01$). However, when considering Frequency and Neuroticism as covariates, the significant difference was not maintained ($F(1.60) = 0.48, p = .49$). The covariates were considered separately in order to ascertain if one had more influence than the other. When Frequency was considered, no significant difference was found between the conditions with regard to the use of Positive Emotion words ($F(1.61) = 0.87, p = .36$). When Neuroticism was considered, no significant difference was found between the conditions for use of Positive Emotion words ($F(1.61) = 0.79, p = .38$).

For word category Negative Emotion ($M = 1.13$, $SD = 0.60$ and $M = 3.28$, $SD = 1.05$ for condition one and condition two respectively), significantly more Negative Emotion words were used in condition two than condition one ($F(1.62) = 239.43, p < .01$). This difference was maintained after controlling for Frequency and Neuroticism as covariates ($F(1.60) = 23.02, p < .01$).

For the word category Anxiety or Fear ($M = 0.16$, $SD = 0.24$ and $M = 0.93$, $SD = 0.58$ for condition one and condition two respectively), significantly more Anxiety or Fear words were used in condition two than condition one ($F(1.60) = 120.41, p < .01$). This difference was maintained after controlling for Frequency and Neuroticism as covariates ($F(1.60) = 16.97, p < .01$).

For word category Cognitive Processes ($M = 5.82$, $SD = 1.69$ and $M = 8.03$, $SD = 2.01$ for condition one and condition two respectively), significantly more Cognitive Processes words were used in condition two than condition one ($F(1.62) = 51.74, p$

< .01). However, after controlling for Frequency and Neuroticism as covariates, the difference was no longer significant (F (1.60) = 3.82, p = .06). The covariates were considered separately in order to ascertain if one had more influence than the other. When Frequency was considered, a significant difference was found between the conditions with regard to the use of Cognitive Processes words (F (1.61) = 6.18, p < .05). When Neuroticism was considered, no significant difference was found between the conditions with regard to the use of Cognitive Processes words (F (1.61) = 4.88, p < .05).

For word category Word Count (M = 446.30, SD = 88.60 and M = 507.28, SD = 114.39 for condition one and condition two respectively), significantly more words were used in condition two than in condition one (F (1.62) = 55.30, p < .01). However, after controlling for Frequency and Neuroticism as covariates, the difference was no longer significant (F (1.60) = 0.66, p = .42). The covariates were considered separately in order to ascertain if one had more influence than the other. When Frequency was considered, no significant difference was found between the conditions with regard to Word Count (F (1.61) = 2.40, p = .13). When Neuroticism was considered, no significant difference was found between the conditions with regard to Word Count (F (1.61) = 1.50, p = .23).

Summary of Results

The results of this study did not support hypothesis one. Women were not found to use a greater proportion of emotion words across conditions than did men. Interestingly, men were found to use significantly more Positive Emotion words than

did women across conditions and this difference was maintained after controlling for Frequency and Neuroticism as covariates. Referring to hypothesis two, women were not found to use a greater proportion of Negative Emotion words across conditions than did men. Women were found to use significantly more Anxiety or Fear words than did men, but when Frequency and Neuroticism were considered as covariates this difference was no longer found to be significant. Specifically, the findings suggested that the personality dimension Neuroticism may have accounted for the difference in Anxiety or Fear word usage, rather than Sex . A significant interaction for the main effects of Sex and Condition for Anxiety or Fear words was found. While no significant difference was found between the sexes with regard to the proportion of Anxiety or Fear words used in condition one, a significant difference was found for condition two, with women using more of these words than did men. Both men and women used significantly more Anxiety or Fear words in condition two than in condition one.

Women were found to use significantly more cognitive words across conditions than did men. This difference was maintained after controlling for Frequency and Neuroticism as covariates, thus supporting hypothesis three. A significant difference was also found between the sexes on overall Word Count, with women using significantly more words than did men. This difference was maintained after controlling for Frequency and Neuroticism as covariates, thus supporting hypothesis four. A significant interaction for the main effects of Sex and Condition for Word Count was found. While no significant difference was found between the sexes with regard to Word Count for condition one, a significant difference was found for

condition two, with women using more words than did men. Both men and women used significantly more words in condition two than in condition one.

A main effect of Condition was found for the word categories Affective or Emotional Processes, Negative Emotion and Anxiety or Fear, significantly more words were used in condition two than in condition one. For the word category Positive Emotion, significantly more words were used in condition one than in condition two, but this difference was not maintained after controlling for the covariates Frequency and Neuroticism. For the word category Cognitive Processes, significantly more words were used in condition two than in condition one, but this difference was not maintained after controlling for Neuroticism as a covariate. For the word category Word Count, significantly more words were used in condition two than condition one, but this difference was not maintained after controlling for the covariates Frequency and Neuroticism.

DISCUSSION

Previous findings suggest that females are the more emotionally expressive sex (Brody, 1993). However, there is some disagreement in the literature as to whether women are more expressive of all emotions, or whether the sexes differ in the expression of different emotions (Kring & Gordon, 1998). The findings from this study are more concordant with the latter assumption. Males and females were not found to differ significantly in terms of total emotion word usage when examining the global word category Affective or Emotional Processes, however a significant sex differences was found between males and females for the subcategory Positive Emotion.

The use by males of a significantly greater proportion of Positive Emotion words compared to females may be partly accounted for by a number of factors other than sex. Neuroticism was found to negatively correlate with Positive Emotion, and females scored significantly higher on this dimension than did males which is consistent with the findings of Lynn and Martin (1997). Further the Frequency subscale of the Daily Hassles Scale was found to correlate negatively with the word category Positive Emotion and females were found to score significantly higher than did males on this subscale. The greater use of Positive Emotion words by males may therefore have been due to differences in personality or stressor appraisal, rather than sex per se. However, when Frequency and Neuroticism were controlled for as covariates in the analysis the significant difference remained. The sex difference in Positive Emotion word usage may also have been due to the fact that males reported significantly lower mean distress ratings than females, regarding SUD felt at the time

of the trauma written about, and SUD when currently thinking about the trauma. Unfortunately the study is unable to comment on whether the difference between the sexes in distress rating was a function of the upsetting experience per se, or differential subjective reactions of the sexes. However, it is of note that no significant difference was found between the sexes on the time since the traumatic event written about occurred, and the majority of males and females wrote about either the death of a relative/friend or a relationship breakdown. It is thought that SUD regarding the trauma were not affected by current stress levels, as although females endorsed more items on the Daily Hassles Scales than did males, there was no difference between the sexes with regard to average severity of stress experienced. It could be tentatively suggested that the sex difference in SUD rating may be reflective of female tendency to perceive threat as more severe than males, particularly with regard to the traumatic event (Anderson & Manuel, 1994; Tamres et al., 2002).

Females were found to use more Anxiety or Fear words than did males. However, this sex difference was not maintained following controlling for Neuroticism as a covariate. It can therefore be suggested that the personality dimension Neuroticism accounts for an important part of the variance in Anxiety or Fear word use other than sex. This is consistent with the assertions of Eysenck and Eysenck (1991) who suggest that individuals who score higher on Neuroticism tend to also have higher trait anxiety, which would perhaps lead them to use more anxiety or fear words. A significant interaction was found for the main effects of Condition for Anxiety or Fear words and Sex. The interaction was maintained after controlling for Neuroticism. Specifically, no significant difference was found between the sexes

with regard to the proportion of Anxiety or Fear words used in condition one, while a significant sex difference was found for condition two, with females using more of these words than did males. Both men and women used significantly more Anxiety or Fear words in condition two than in condition one. This demonstrates that while the main effect of Condition had a significant effect on both sexes, this was more marked for females than males.

The topic for discussion maybe important here, with men and women disclosing Anxiety or Fear words at a similar rate within the context of a less personal subject, the internet. However, within the context of writing about a personally experienced traumatic event women may have been more comfortable disclosing 'weak' emotions than men due to gender role constraints (Kring & Gordon, 1998). It should also be considered that the interaction effect may have been influenced by the fact that women reported that the traumatic event experienced was more distressing both at the time and when thinking about it currently.

It is perhaps limited to discuss the expression of emotion purely with reference to emotion word usage, divorced from cognitive contextualisation components, particularly as conceptualisations of emotion suggest that the two are intrinsically linked (Leventhal, 1984). Females were found to use significantly more cognitive words than did males, suggesting that the constellation of the emotional package may differ between the sexes. This is in agreement with Pennebaker and Robert's (1992) assertion that men and women may differ in terms of the sources of information used to define their internal experience. In this study it was demonstrated that in writing, women cognitively contextualised their emotional experience to a greater degree

than did the men. This is concordant with Pennebaker and Robert's (1992) proposition that women adhere more than men to Schachter and Singer's (1962) cognitive labelling theory of emotion. Thus females may experience more cognitive labour than men when attempting to make sense of their emotional experience.

Both males and females used significantly more words in condition two than condition one. However, while no significant difference was found between the sexes with regard to Word Count for condition one, women were found to use more words than did males in condition two. This finding is concordant with Gleason et al. (1989) who suggest that earlier language acquisition in females may predispose them to more readily put experience into words.

A significant main effect of Condition was found for the word categories Affective or Emotional Processes, Negative Emotion and Anxiety or Fear. This has important implications for the comparability of sex difference results across studies and may account for conflicting findings (Kring & Gordon, 1998). Further, Pennebaker and Lay (2002) suggest that different features of personality can be expressed depending on the situation, and that during particularly stressful or unique times, underlying traits may be expressed which under normal circumstances may not be detectable. Interestingly, a significant main effect of condition was not found for the word categories Positive Emotion, Cognitive Processes and Word Count after controlling for the covariates Frequency and Neuroticism, suggesting that for these word groups, personality and stressor appraisal accounted for an important part of the variance other than condition.

The finding that more women than men had previously disclosed the trauma experience is consistent with the findings of Tamres et al. (2002). Further, in this study it was found that more women than men reported currently actively avoiding thinking about the trauma they had experienced, which is concordant with observations that women more than men endorse avoidance coping methods in PTSD (Fullerton et al., 2001).

Study Limitations

Caution is necessary in the interpretation of these results. The small sample size used in this study precluded the investigation of more numerous smaller word subcategories because of the risk of Type II errors. Characteristics of the study sample may also have had a confounding effect on the results. The majority of the female participants were psychology students, whereas the male population was drawn from a wider variety of degree subjects including physics, chemistry and geography. Sex differences in word usage may therefore have been a function of degree subject rather than sex, as psychology students are thought to be particularly analytical and introspective. Repetition of the study with a larger more homogenous sample is needed in order to increase the robustness of the results, and consideration of more word subcategories would increase the sensitivity of the results.

In hindsight it may have been useful to have included a number of additional measures. Gender role has been posited as a possible contributor to biological sex differences (Brody & Hall, 1993). It may be posited that gender identity may contribute to the risk of developing PTSD. This study in unable to comment on the

contribution of gender identity on differences in word usage. In future studies the inclusion of measures such as the Bem Sex-Role Inventory (Bem, 1974) and Personal Attriibutes Questionnaire (Spence, Helmreich, & Stapp, 1974) may be informative. It may also have been useful to have gathered information on men's and women's experience of the internet, so that comment could have been made with regard to the interaction of Condition for Anxiety or Fear words and Sex.

LIWC2001 enabled text samples to be analysed using a standardised method allowing coding consistency and increasing the reliability of study comparisons and ability to replicate the analysis. However it is appreciated that other levels of text analysis are available such as sentence-analysis or phase-level analysis. Further, it is considered that emotion content is not just communicated in the use of emotion words. The subtleties of emotion communication may not have been fully captured by the method of analysis used.

Clinical Implications

Refining existing theoretical models so that gender issues are more adequately accounted for is important in deepening understanding of sex differences in PTSD and developing intervention protocols sensitive to the needs of both sexes. The clinical implications that can be drawn from a study conducted on a non-clinical population are restricted. However, this study can offer a number of interesting, if tentative proposals for re-conceptualising PTSD to include a gender component. The female method of verbalizing and contextualising emotional experience may be impaired in the aftermath of a trauma by the inaccessibility of rich affective and

situational data recorded in a non-verbal form in the SAM (Brewin et al., 1996). Normal methods of emotional coping may therefore not be effective in the acute aftermath of a trauma, leading to maladaptive appraisals of one's responsibility for the trauma, and one's ability to cope with the situation (Ehlers & Clark, 2000; Janoff-Bulman & Frantz, 1997). Ongoing attempts to make sense of the experience in the absence of a complete trauma memory are likely to be persistent, yet ineffectual in bringing resolution. Increased tendency towards cognitive labour may account for the increased prevalence of emotional numbing symptoms in women than men (Fullerton et al., 2001; Litz, 1992). Thus while both men and women may experience acute post trauma symptoms, women's initial handling of the emotional experience may increase the likelihood of symptom maintenance. In terms of preventative interventions, this conceptualisation offers one possible hypothesis for the differential effectiveness of the memory structuring invention for males and females described in the introduction (Gidron et al., 2004, in preparation). Further the effectiveness of psychological debriefing following trauma continues to be debated (Rose, Bisson, & Wessely, 2003) and may be informed by examination of sex differences in the management of emotion.

Directions for Future Research

Replication of this study with a larger more homogenous sample is needed before expanding on the study findings. In particular, further attention to subcategories of words would be helpful to increasing the sensitivity and specificity of the results. Additionally, clarification of the role of gender identity on word usage may be informative in discerning biological sex difference from socialization processes.

To improve the ecological validity of the hypotheses proposed, examination is needed of sex differences in emotion management in the initial period post trauma. This would aid understanding of the processes which lead to symptom exacerbation and attenuation. It would be of particular interest to examine sex differences in cognitive appraisal development in the first months post trauma in those suffering from post trauma stress, in order to establish possible sex differences in appraisal themes, and in order to ascertain whether particular appraisals are more likely to be linked to the development of persistent PTSD. According to the above conceptualisation it can be suggested that females may expend more cognitive resources than males and may evidence more maladaptive appraisals related to responsibility (in an attempt to contextualise the experience in the absence of a full trauma narrative) and coping ability.

Conclusion

The results of this study support the notion that sex differences may exist in the management of emotion, with females more than males showing an increased tendency to cognitively contextualise their emotional experience. This finding must be accepted with some caution due to study limitations, particularly related to the sample size and homogeneity. The study does however offer some interesting insights with regard to why females may be at greater risk of developing PTSD than males. Specifically the findings fit well within existing frameworks for the understanding of PTSD (Brewin et al., 1996; Ehlers & Clark, 2000).

REFERENCES

Anderson, K., & Manuel, G. (1994). Gender differences in reported stress responses to the Loma Prieta earthquake. *Sex Roles, 30,* 725-733.

Beck, A. T., & Steer, R. A. (1990). *Manual for the Beck Anxiety Inventory.* San Antonio, TX: The Psychological Corporation.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory* (2nd ed.). San Antonio, TX: The Psychological Corporation.

Bem, S. L. (1974). The measurement of psychological androgyny. *Journal of Consulting and Clinical Psychology, 42,* 155-162.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The Detroit area survey of trauma. *Archives of General Psychiatry, 55,* 626-632.

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

Brewin, C. R. (2001b). A cognitive neuroscience account of posttraumatic stress disorder and its treatment. *Behaviour Research and Therapy, 39,* 373-393.

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

Brody, L. R. (1993). On understanding gender differences in the expression of emotion: Gender roles, socialization, and language. In S. L. Ablon, D. Brown, E. J. Khantzian, & J. E. Mack (Eds.), *Human feelings: Explorations in affect development and meaning* (pp. 87-121). Hillsdale, NJ: The Analytic Press.

Brody, L. R., & Hall, J. A. (1993). Gender and emotion. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp.447-460). New York: Guilford Press.

Cox, D. J., Clarke, W. L., Gonder-Frederick, L. A., Pohl, S., Hoover, C., Snyder, A. et al. (1985). Accuracy of perceiving blood glucose in IDDM. *Diabetes Care, 8,* 529-535.

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

Eysenck, H. J., & Eysenck, S. B. G. (1991). *Manual of the Eysenck Personality Scales.* London: Hodder & Stoughton.

Feeny, N. C., Zoellner, L. A., Fitzgibbons, L. A., & Foa, E. B. (2000). Exploring the roles of emotional numbing, depression, and dissociation in PTSD. *Journal of Traumatic Stress, 13,* 489-498.

Fullerton, C. S., Ursano, R. J., Epstein, M. D., Crowley, B., Vance, K., Kao, T. et al. (2001). Gender differences in posttraumatic stress disorder after motor vehicle accidents. *American Journal of Psychiatry, 158,* 1486-1491.

Gavranidou, M., & Rosner, R. (2003). The weaker sex? Gender differences in post-traumatic stress disorder. *Depression and Anxiety, 17,* 130-139.

Gidron, Y., Reuven, G., Givati, G., Lauden, A., Snir, Y., & Binjamin, J. (2004). Interactive effects of memory structuring and gender on preventing posttraumatic stress symptoms. Manuscript submitted for publication.

Gleason, J., Hay, D., & Cain, L. (1989). Social and affective determinants of language acquisition. In M. L. Rice & L. Schiefelbusch (Eds.), *The teachability of language* (pp. 171-186). Baltimore: Brookes.

Greenberg, L. S., & Pascual-Leone, J. (1997). Emotion in the creation of personal meaning. In M. Power & C. R. Brewin (Eds.), *The transformation of meaning in psychological therapies: Integrating theory and practice* (Vol. 1, pp. 91-106). Chichester, UK: Wiley.

Grey, N., Holmes, E., & Brewin, C. R. (2001). Peritraumatic emotional "hot spots" in memory. *Behavioural and Cognitive Psychotherapy, 29,* 367-372.

Grey, N., Young, K., & Holmes, E. (2002). Cognitive restructuring within reliving: A treatment for peritraumatic emotional "hotspots" in posttraumatic stress disorder. *Behavioural and Cognitive Psychotherapy, 30,* 37-56.

Groom, C. J., Stone, L. D., Newman, M. L., & Pennebaker, J. W. (2003). Sex differences in language use: An analysis of text samples from 70 studies. Manuscript submitted for publication.

Janoff-Bulman, R., & Frantz, C. M. (1997). The impact of trauma on meaning: From meaningless world to meaningful life. In M. Power & C. R. Brewin (Eds.), *The transformation of meaning in psychological therapies: Integrating theory and practice,* (Vol. 1, pp. 91-106). Chichester, UK: Wiley.

Kanner, A. D., Coyne, J. C., Schaefer, C., & Lazarus, R. S. (1981). Comparisons of two modes of stress measurement: Daily hassles and uplifts versus major life events. *Journal of Behavioral Medicine, 4,* 1-39.

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,* 1048-1060.

Kring, A. M., & Gordon, A. H. (1998). Sex differences in emotion: Expression, experience, and physiology. *Journal of Personality and Social Psychology, 74,* 686-703.

Lazarus, R. S., & Folkman, S. (1989). *Manual: Hassles and Uplifts Scales.* Redwood City, CA: Mind Garden.

LeDoux, J. E. (1998). *The emotional brain.* London, UK: Weidenfeld & Nicolson.

Levanthal, H. (1984). A perceptual-motor theory of emotion. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 271-291). New York: Academic Press.

Litz, B. T. (1992). Emotional numbing in combat-related post-traumatic stress disorder: A critical review and reformulation. *Clinical Psychology Review, 12,* 417-432.

Lynn, R., & Martin, T. (1997). Gender differences in extroversion, neuroticism, and psychoticism in 37 nations. *The Journal of Social Psychology, 137,* 369-373.

Metcalfe, J., & Jacobs, W. J. (1998). Emotional memory: The effects of stress on 'cool' and 'hot' memory systems. In D. L. Medin (Ed.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 38, pp. 187-222). San Diego, CA: Academic Press.

Pennebaker, J. W. (1994). Hints on running a writing experiment. Unpublished manual. Retrieved January 8, 2003, from University of Texas, Psychology Faculty Web site: http://homepage.psy.utexas.edu/hompage/faculty/Pennebaker/Reprints.

Pennebaker, J. W., & Francis, M. E. (1996). Cogntive, emotional, and language processes in disclosure. *Cognition and Emotion, 10,* 601-626.

Pennebaker, J. W., Francis, M. E., & Booth, R. J. (2001). Linguistic Inquiry and Word Count (LIWC2001): A computerized text analysis program [Computer software and manual]. Mahwah NJ: Elbaum.

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,* 271-282.

Pennebaker, J. W., Mayne, T. J., & Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology, 72,* 863-871.

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology, 54,* 547-577.

Pennebaker, J. W., & Roberts, T. A. (1992). Towards a his and hers theory of emotion: Gender differences in visceral perception. *Journal of Social and Clinical Psychology, 11,* 199-212.

Pennebaker, J. W., & Watson, D. (1988). Blood pressure estimation and beliefs among normotensives and hypertensives. *Health Psychology, 7,* 309-328.

Rose, S., Bisson, J., & Wessely, S. (2003). A systematic review of single-session psychological interventions (debriefing) following trauma. *Psychotherapy and Psychosomatics, 72,* 176-184.

Schachter, S., & Singer, J. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379-399.

Spence, J. T., Helmreich, R., & Stapp, J. (1974). The personal attributes questionnaire: A measure of sex-role stereotypes and masculinity and femininity. *Journal of Personality and Social Psychology, 32,* 29-39.

Tamres, L. K., Janicki, D., & Helgeson, V. S. (2002). Sex differences in coping behavior: a meta-analytic review and an examination of relative coping. *Personality and Social Psychology Review, 6,* 2-30.

Tull, M. T., & Roemer, L. (2003). Alternative explanations of emotional numbing of posttraumatic stress disorder: An explanation of hyperarousal and experiential avoidance. *Journal of Psychopathology and Behaviour Assessment, 25,* 147-154.

APPENDICES

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APPENDIX A: Proof of Ethical Approval

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27 May 2004

Hannah Falvey
Department of Clinical Psychology
University of Southampton
Highfield
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Dear Hannah,

Re: Gender differences in written disclosure: An evaluation of emotional and cognitive word usage

I am writing to confirm that the above titled ethics application was approved by the School of Psychology Ethical Committee in June 2003.

Should you require any further information, please do not hesitate in contacting me on 023 8059 3995.

Please quote approval reference number CLN/03/20.

Yours sincerely,

KMLucas

Kathryn Lucas
Secretary to the Ethics Committee

APPENDIX B: Subjective Units of Distress Scale

INSTRUCTION SHEET FOR SCALES

You will asked to rate your current level of distress on a scale like the one below, at points during the experiment.

For example

If you feel you are not at all distressed circle towards the left-hand end of the scale.

0 (1) 2 3 4 5 6 7 8 9 10

Not at all distressed — Extremely distressed

If you are somewhat distressed, circle somewhere in the middle

0 1 2 3 4 (5) 6 7 8 9 10

Not at all distressed — Extremely distressed

If you feel you are really quite distressed, mark towards the right-hand end of the scale

0 1 2 3 4 5 6 7 8 (9) 10

Not at all distressed — Extremely distressed

Pre-writing condition 1

Please rate your current level of distress on the following scale

0	1	2	3	4	5	6	7	8	9	10
Not at all distressed									Extremely distressed	

APPENDIX C: Traumatic Event Fact Sheet

TRAUMATIC EVENT FACT SHEET

Please answer the following questions in relation to the traumatic event you have just written about.

1. How long ago did this event happen/start being a problem?_____

2. Have you spoken to anyone else about it?_____

3. Do you try and avoid thinking about the event?_____

4. On the following scale indicate how distressed you were at the time of the event.

0	1	2	3	4	5	6	7	8	9	10
Not at all distressed									Extremely distressed	

5. On the following scale indicate how distressed you feel when you think about the event now.

0	1	2	3	4	5	6	7	8	9	10
Not at all distressed									Extremely distressed	

6. On the following scale indicate how much you thought about the event at the time

0	1	2	3	4	5	6	7	8	9	10
Not at all									Very much indeed	

7. On the following scale, indicate how much you currently think about the event

0	1	2	3	4	5	6	7	8	9	10
Not at all									Very much indeed	

APPENDIX D: Information Sheet for Participants

AN INVESTIGATION INTO HOW PEOPLE WRITE ABOUT LIFE EVENTS

Information Sheet for Research Participants

Information sheet

I am Hannah Falvey, a Trainee Clinical Psychologist at Southampton University. I am requesting your participation in a study investigating the way in which people write about life events. This will involve two writing tasks of 20 minutes.

You will initially be asked to complete anxiety and depression scales, as the experiment requires only participants who are in a neutral mood.

You will then be asked to complete two short writing tasks, which will involve reviewing a neutral event and an event that you find upsetting. The study should take up approximately one and a half hours of your time. Following completion of the experiment the researcher will provide you with an explanation of the purpose of the study. You will also be given an information sheet on support services available following participation.

Personal information will not be released to or viewed by anyone other than the researcher and the results will not include your name or any other identifying characteristics. By using a participant code the researcher will be able to identify essays written by the same individual, but will not know the name of the participant. Should you disclose information that suggests that you are at risk of harming yourself or others, or if you disclose sexual abuse, the researcher will write to you advising on avenues by which you can receive help or support should you choose to. In order to ensure that you remain anonymous to the researcher during this process, a member of the secretarial support team who will not know the reason for the correspondence will address letters to you. They will match your participant code to the contact information you supply.

Your participation is voluntary and you may withdraw your participation at any time without giving a reason. This includes withdrawing your essays from analysis after writing. In either case, or if you choose not to participate at all, there will be no consequences to your grades or to your treatment as a student at the university. If you have any questions please ask me now, or contact me, Hannah Falvey at the following e-mail address: hmf101@soton.ac.uk. You can also contact my supervisor Dr Anne Waters: A.J.Waters@soton.ac.uk.

Signature Date

Name Hannah Falvey

APPENDIX E: Consent Form for Participants

Statement of Consent

I _____ have read the participant information sheet.
(Participants name)

I understand that participating in this investigation may cause me distress.

I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself. I understand that data collected as part of this research project will be treated confidentially, and that published results of this research project will maintain my confidentiality. In signing this consent form, I am not waiving my legal claims, rights or remedies. A copy of this consent letter will be offered to me.

(Circle Yes or No)
I give consent to participate in the above study. Yes No

Signature Date
Name
(Participants name)

I understand that if I have questions about my rights as a participant in this research, or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, Department of Clinical Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: (023) 8059 3995

APPENDIX F: Standardised Instructions

STANDARDISED INSTRUCTION SHEET 1

This study is an extremely important project looking at writing. Over the next hour or so you will be asked to write for 20 minutes on two different topics. I will show you into a small room where you will be alone to write. On the table you will find a piece of paper titled "Instruction sheet for scales" which you will be asked to read and you will be asked to rate your mood at various points during the experiment.

When I close the door, that will be your signal to rate your mood and to begin writing. At the end of the 20 minutes, I will knock on the door to let you know that the 20 minutes are up. At this point you should finish your sentence and stop writing, place your writing sample into the envelope provided and rate your mood. I will give you a minute to do this before knocking on the door before, checking your mood ratings and bring you back to this room for the next set of instructions.

The only rule that I have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. In your writing, don't worry about grammar, spelling, or sentence structure. Just write. In order to reduce undue influence in the experimental procedure I ask that you do not talk with anyone other participants about the experiment because different people will write about different things. Also, I can't tell you about the nature or predications of the study at this point, but I will give you a brief summary at the end and a more detailed description will be set to you by email.

Your writing is completely anonymous and confidential. At the end of the experiment I ask you to put your participant code sticker on the envelope provided which will contain your writing samples. Some people feel that they do not what anyone else to read what they have written. If you don't feel comfortable submitting your writing samples, you may keep them, however, I would prefer it if you did submit them, because I am interested in what people write. I can assure you that I will not be able to link your writing sample to you.

Do you have any questions?

In today's first writing task, I want you to write about your views/experience and perspective regarding the Internet.

STANDARDISED INSTRUCTION SHEET 2

Next I would like you to write for 20 minutes about the most traumatic, upsetting experience of your entire life, something that when you think about you still find upsetting. In your writing, I want you to really let go and explore your deepest emotions and thoughts. In addition to a traumatic experience you can also write about major conflicts or problems that you have experienced or are experiencing now. Whatever you choose to write about however, it is critical that you really delve into your deepest emotions and thoughts. Ideally I would like you to write about significant experiences or conflicts that you have not discussed in great depth with others. You might relate your experiences to other parts of your life, how it is related to your childhood, parents, people you love, who you are, who you want to be. Again, in your writing examine you deepest emotions and thoughts.

If you find that you are getting extremely upset when writing, simply stop or change topics.

I will take you back to the writing room and again, when I shut the door, that is your cue to begin writing. As before try and write continuously for the entire time. If you run out of things to say, just repeat what you have already written. In your writing, don't worry about grammar, spelling, or sentence structure. Just write.

After 20 minutes I will knock on the door which is your signal to finish your sentence, stop writing and to place your writing sample into the envelope. Then rate your post writing condition 2 mood level on the appropriate score sheet. You will also find a sheet entitled "Traumatic event fact sheet" to fill out. After filling it out, place it into the envelope with your condition 2 writing sample. I will give you a few minutes to do this before knocking on the door, checking your score sheet and escorting you back to this room.

STANDARDISED INSTRUCTION SHEET 3

I will now be asking you to watch a short video extract. You will then be asked to listen to an extract of music for a few minutes whilst thinking about a positive memory. I will leave you alone to do this. When the music stops rate your mood as you have done before and wait for me to return to the room. This will take about 6 minutes.

STANDARDISED INSTRUCTION SHEET 4

I will now take you back into the other room to complete two questionnaires. To submit your work, please ensure you place both of your writing samples, the upsetting event fact sheet, the four mood scale sheets and the two questionnaires into the envelope provided. There is a checklist in order to help you to make sure you place the correct sheets into the envelope. In order to submit your work, post it into the box provided in the room. Again, you can choose not to submit it if you do not feel comfortable doing so. When you have finished come back to this room to find me.

APPENDIX G: Post Experiment Participant Information

POST EXPERIMENT PARTICIPANT INFORMATION SHEET

Thank you for participating in my research study earlier this year which involved you writing about two different topics, and filling in some questionnaires. I have now collected all of my data and can therefore tell you what the experiment was about.

PTSD is characterised by persistent re-experiencing of a traumatic event in the form of nightmares and flashbacks, behavioural avoidance of trauma reminders, high levels of anxiety and functional impairment. Research studies suggest that women are more vulnerable to developing Post Traumatic Stress Disorder (PTSD) than are men. I was therefore interested in exploring why this might be the case. The way in which individuals manage and cope with the emotional experience of severe trauma is thought to influence the development of PTSD. It has been suggested that men and women may experience, express and cope with emotion in different ways, and that these differences may increase the vulnerability of females to develop the disorder. By asking male and female students to write about a neutral and a traumatic event, I was able to analyse how males and females used emotion words and cognitive words (words implying causation and insight).

The results of the study revealed that while men and women did not differ in the proportion of emotion words that they used, men used more positive emotion words than did females, and females used more anxiety and fear words than did men. Also, women were found to use significantly more cognitive words than did males, suggesting that women may have a greater tendency towards placing their emotional experience within a context of cause and effect and drawing insights from the

experience. The findings have a number of interesting implications for current conceptualisations of PTSD. If women do have a greater need to contextualised their emotional experience, this mechanism may be impaired in the aftermath of a trauma experience (influenced by the fact that trauma memories behave differently from 'normal' memories).

If you have any further questions regarding the study, or would like further information, please do not hesitate to contact me.

Many thanks for you help with this study.

Hannah Falvey

Third Year Clinical Psychology Trainee

APPENDIX H: **Table of results for the 2 x 2 (Sex x Condition) mixed design ANOVA and ANCOVA analyses**

Results from 2 X 2 (Sex x Condition) mixed design ANOVA analyses.

Word Count Category	*F* (1.62)	*p*
(between subjects factor = sex (S))		
Affective or Emotional Processes	0.82	.37
Positive Emotion	11.21	.01**
Negative Emotion	2.61	.11
Anxiety or Fear	5.29	.03*
Cognitive Processes	6.50	.01**
Word Count	8.93	.01**
(within subjects factor = Condition (C))		
Affective or emotional processes (AE)	71.27	.01**
AE, C x S	0.01	.91
Positive emotion (P)	12.76	.01**
P, C x S	0.73	.40
Negative emotion (N)	239.43	.01**
N, C x S	1.22	.27
Anxiety and fear (AF)	120.41	.01**
AF, C x S	6.07	.02*
Cognitive processes (CP)	51.74	.01**
CP, C x S	0.18	.67
Word count (WC)	55.30	.01**
WC, C x S	20.55	.01**

* = $p < .05$. ** = $p < .01$.

Results from 2 X 2 (Sex x Condition) mixed design ANCOVA analyses where Neuroticism and Frequency were considered as covariates

Word Count Category	*F* (1.60)	*p*
(between subjects factor = sex (S))		
Affective or Emotional Processes	0.63	.43
Positive Emotion	5.87	.02*
Negative Emotion	1.05	.31
Anxiety or Fear	2.68	.12
Cognitive Processes	4.42	.04*
Word Count	4.59	.04*
(within subjects factor = Condition (C))		
Affective or emotional processes (AE)	8.35	.01**
AE, C x S	0.10	.89
Positive emotion (P)	0.48	.49
P, C x S	0.32	.57
Negative emotion (N)	23.02	.01**
N, C x S	0.76	.39
Anxiety and fear (AF)	16.97	.01**
AF, C x S	5.58	.02*
Cognitive processes (CP)	3.82	.06
CP, C x S	0.06	.81
Word count (WC)	0.66	.42
WC, C x S	10.57	.01**

* = $p < .05$. ** = $p < .01$.

Results from 2 X 2 (Sex x Condition) mixed design ANCOVA analyses where Frequency was considered as a covariate

Word Count Category	F (1.61)	p
(between subjects factor = sex (S))		
Affective or Emotional Processes	0.42	.52
Positive Emotion	8.19	.01**
Negative Emotion	2.17	.15
Anxiety or Fear	4.64	.04*
Cognitive Processes	5.70	.02*
Word Count	6.84	.01**
(within subjects factor = Condition (C))		
Affective or emotional processes (AE)	13.75	.01**
AE, C x S	0.05	.83
Positive emotion (P)	0.87	.36
P, C x S	0.46	.50
Negative emotion (N)	37.36	.01**
N, C x S	1.10	.30
Anxiety and fear (AF)	24.81	.01**
AF, C x S	6.45	.01**
Cognitive processes (CP)	6.18	.02*
CP, C x S	0.09	.76
Word count (WC)	2.40	.13
WC, C x S	16.11	.01**

* = $p < .05$. ** = $p < .01$.

Results from 2 X 2 (Sex x Condition) mixed design ANCOVA analyses where Neuroticism was considered as a covariate

Word Count Category	*F* (1.61)	*p*
(between subjects factor = sex (S))		
Affective or Emotional Processes	0.59	.45
Positive Emotion	5.68	.02*
Negative Emotion	1.07	.30
Anxiety or Fear	2.74	.10
Cognitive Processes	4.47	.04*
Word Count	4.56	.04*
(within subjects factor = Condition (C))		
Affective or emotional processes (AE)	8.72	.01**
AE, C x S	0.22	.82
Positive emotion (P)	0.79	.38
P, C x S	0.31	.58
Negative emotion (N)	26.28	.01**
N, C x S	0.78	.38
Anxiety and fear (AF)	18.02	.01**
AF, C x S	5.72	.02*
Cognitive processes (CP)	4.88	.03*
CP, C x S	0.58	.81
Word count (WC)	1.50	.23
WC, C x S	10.40	.01**

* = $p < .05$. ** = $p < .01$.