Attentional bias effects following trauma exposure: comparison of emotional Stroop and emotional lexical decision task paradigms

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ABSTRACT

Attentional bias effects for threat and emotional words were investigated, using both the emotional Stroop and emotional lexical decision paradigms. Twenty-eight controls and twenty-eight survivors of sexual assault participated in this study, which comprised three key comparisons. First, key predictions of the threat and emotionality hypotheses were compared, in particular specific and general threat effects, and positive and negative emotionality effects. Second, two separate group comparisons were conducted, specifically controls versus survivors of sexual assault overall, and a matched subset of controls versus PTSD positive survivors of sexual assault versus PTSD negative survivors of sexual assault. Third, performance on the emotional Stroop task and emotional lexical decision task paradigms were compared directly. Slowed colour naming responses (i.e. interference) were observed for both threat effects and emotionality effects in the emotional Stroop task. For the emotional lexical decision task, slowed lexical decisions (i.e. interference) were observed for threat effects, whereas speeded lexical decisions (i.e. facilitation) were observed for emotionality effects. The findings of the current study indicate that threat and emotionality effects may co-exist in both control and survivor populations. The relationship between the presence or absence of PTSD symptoms and threat and emotionality effects requires further investigation with larger sample sizes. There may be a relationship between the presence of PTSD symptoms and specific threat effects, however the findings of the current study for general threat information were inconclusive. No relationship was evident between the presence of absence of PTSD symptoms and positive or negative emotionality effects. The current findings suggest that the emotional Stroop task may be better suited to quantifying threat effects but not emotionality effects, whereas the emotional lexical decision task appears to be able to quantify both threat and emotionality effects.
DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma, except where due reference is made in the text of the thesis. To the best of my knowledge, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Dated …………………………………………………
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Table 45
Lexical decision task interference and facilitation findings for emotionality effects, general threat effects and specific threat effects
1. Introduction & Background

Chapter Overview

This chapter begins with a foreword, that is, a brief introduction to the relevant literature, theories and background to the current thesis. This is followed by a description of the overall structure of the current thesis, after which the literature review begins. The literature review begins with a discussion of sexual assault definitions and sexual assault prevalence in Australia, and a review of the relationship between the effects of sexual assault (psychological and physical) and traumatic stress reactions. The chapter then moves on to discuss cognitive models of anxiety, specifically memory bias models and attentional bias models, cognitive theories of anxiety and attentional biases, and cognitive theories of traumatic stress and attentional biases. These theoretical accounts are followed by a review of the pre-eminent experimental paradigms used to measure attentional biases, attentional bias effects in word processing paradigms, as well as known confounds and methodological issues associated with word processing tasks of attentional biases. The chapter concludes with a discussion of the thesis aims and hypotheses.

1.1. Foreword

The study reported in this thesis focused on specific cognitive characteristics associated with posttraumatic stress reactions following sexual assault trauma. Specifically, the study investigated information processing for threat and emotional words by comparing trauma survivors and non-traumatised controls. The general aim of this study was to investigate attentional biases in survivors of sexual assault trauma, and non-traumatised controls, testing predictions of both the threat and emotionality hypotheses, using both the emotional Stroop and emotional lexical decision task paradigms.

One of the most disabling symptoms that can follow a traumatic event, such as sexual assault, is an enduring preoccupation with and inability to forget the trauma. The attentional bias model suggests that trauma exposure renders the victim hypervigilant, or overly sensitive to environmental cues that constantly reinforce the preoccupation and preclude forgetting it (Cassiday, McNally & Zeitlin, 1992; Foa, Feske, Murdock, Kozak & McCarthy, 1991; Freeman & Beck, 2000).
There remains some disagreement however, whether attentional biases in this context reflect specific threat salience effects, or whether they may be attributed to more general emotionality effects. The threat hypothesis predicts that anxious individuals selectively process threat stimuli that are salient or consistent with the focus of their anxiety (e.g. Foa et al., 1991). In contrast, the emotionality hypothesis is predicated on a more general emotionality effect, whereby anxious individuals may show comparable attentional biases for the emotionality of emotional stimuli, regardless of valence (e.g. Martin, Williams & Clark, 1991).

There are also inconsistencies in the literature on the question of whether attentional biases are associated specifically with clinical symptomatic status, or whether the presence of psychopathology simply intensifies the magnitude of attentional bias effects (i.e. a continuum across normal to symptomatic). For example, Foa et al. (1991) reported evidence of clinical threat specificity in a group of rape victims diagnosed with Posttraumatic Stress Disorder (PTSD), but not in asymptomatic rape victims. In contrast, Freeman and Beck (2000) reported specific threat related attentional biases for sexual abuse victims with and without PTSD, as well as controls.

Following observations that rape victims experience acute emotional stress reactions and long-term fear and anxiety effects (e.g. Burgess & Holstrom, 1974; Kilpatrick, Veronen & Resick, 1979), rape trauma syndromes have frequently been characterised as a form of PTSD (Foa & Rothbaum, 1998). PTSD is characterised by a triad of symptom clusters that subsume re-experiencing, avoidance / numbing and arousal reactions (APA, 1994).

1.1.1. Structure of the Current Thesis

This thesis begins with a review of the relevant background literature, explanation of aims and hypotheses, and operationalisation of hypothesised effects. This is followed by a description of the participants recruited for the study, namely controls and survivors of sexual assault, and a detailed explanation of the methodologies and procedures used.

The method section is followed by the results section of the thesis. Here, the thesis investigates group dichotomisations, demographic data, group anxiety and affect measures and word stimuli ratings. The thesis then moves on to describe the primary analyses of the word processing paradigms, beginning with an investigation of the classical Stroop effect.
This is followed by the emotional Stroop task analyses and the emotional lexical decision task analyses. Due to the large volume of findings presented, each word processing paradigm is presented separately. Within each word processing paradigm section, findings are presented first for controls overall versus survivors of sexual assault overall, and then separately for a matched subset of controls versus PTSD positive survivors of sexual assault versus PTSD negative survivors of sexual assault.

The subsequent discussion begins with a brief recapitulation of the background information relevant to the study, followed by discussion and interpretation of the representativeness of the sexual assault survivors, group anxiety and affect measures, and experimental word stimuli ratings. The discussion section then moves on to consider attentional bias effects in the word processing paradigms, beginning with the classical Stroop paradigm, followed by the experimental word processing paradigms. A discussion of the emotional Stroop task findings precedes a discussion of the emotional lexical decision task findings. The discussion then compares the emotional Stroop and emotional lexical decision task paradigms, followed by a discussion of the relationship of PTSD symptoms and attentional bias effects, theoretical, experimental and clinical implications, limitations and future research directions. The thesis ends with a summary of the critical strengths of the thesis, and a summary of conclusions.

1.2. Sexual Assault

The following review focuses on cognitive processes associated with posttraumatic reactions resulting from sexual assault trauma. The review begins by defining “sexual assault”, and this is followed by a brief discussion of the prevalence of sexual assault in Australia.

1.2.1. Defining Sexual Assault

According to the Australian Bureau of Statistics (ABS) (2003), there is no single national or international agreement on how to define “sexual assault”. There are generally two types of definition: broad definitions based on the experiences of victims / survivors of sexual assault, and narrower definitions based on offenders’ behaviours that constitute criminal offences under the law. In addition, legislative definitions vary across different jurisdictions within Australia. Some legislation does not recognise adult male victims / survivors of sexual assault, some do not recognise child victims, and others do not recognise sexual assault between spouses or partners. Accordingly, it is often the case that
community definitions and legal definitions are not consistent (ABS, 2003). Generally speaking, sexual assault involves the use of force, injury and violence (including attempts or threats) of a sexual nature upon an individual.

The current study employs a broad conceptual definition of “sexual assault”, consistent with the following description from the “Sexual Assault Information Development Framework” paper by the ABS (2003): “Sexual assault may be located on a continuum of behaviours, from sexual harassment to life threatening rape. These behaviours may include lewdness, stalking, indecent assault, date rape, drug assisted sexual assault, child sexual abuse, incest, exposure of a person to pornography, use of a person in pornography, and threats or attempts to sexually assault” (ABS, p.9, 2003). While “sexual assault” is the preferred terminology in this thesis, in the event that authors have used different terminology (e.g. “rape”), their terminology will be used verbatim.

1.2.2. Sexual Assault Prevalence in Australia

According to the ABS (2003), there are many limitations to the reliability and accuracy of sexual assault data. Limitations include issues of perception and self-classification by victims / survivors and offenders, under-reporting and recording, as well as hidden reporting and recording. The Victorian Law Reform Commission Sexual Offences Interim Report (2003) suggested that sexual offence statistics should be treated with caution because the majority of sexual assaults are neither reported nor prosecuted. Accordingly, statistics of reported sexual offences must be assumed to underestimate the extent of the problem. It is appropriate therefore to acknowledge that the true incidence of sexual assault may never be known. However, the ABS argues that currently available data may provide a reasonable estimate of the incidence and prevalence of sexual assault.

In Australia, two sources of data provide information on the prevalence and incidence of sexual assault: police reports and “victimisation” surveys. Victimisation surveys enquire about people’s experience of crime(s), and the information gained from these surveys supplements police statistics because they do not rely on a victim’s disclosure to authorities.

1.2.2.1. Recorded Crime

According to the “Crime Report 2002” by the Australian Institute of Criminology, the police recorded 16,744 victims (as opposed to incidents) of sexual assault in 2001, an
increase of 7% from 2000 and a rate of approximately 86 victims per 100,000 population. Eighty-one per cent of sexual assault victims were female, an increase of 9% from 2000, while male victims decreased slightly (2%). Sixty-three per cent of sexual assaults were perpetrated by an individual known to the victim, with one in four assaults committed by a family member. Since 1995, reported sexual assaults have increased on average by 0.1% each month (statistically significant at p<.01).

1.2.2.2. Crime & Safety Surveys

The most recent Crime and Safety survey was conducted by the ABS (2002) and provides information on both reported and unreported sexual assaults against individuals aged 18 years and over. According to the survey, 33,000 individuals were victims of at least one sexual assault in the 12 months prior to the survey, with 62,700 incidents of sexual assault against women (an incidence rate of 1%). The majority of the victims of sexual assault were female (28,300 or 86%) and 93% of offenders were male. Sixty-six per cent of women experienced a single incident of sexual assault, with the remaining 34% of women experiencing multiple incidents of sexual assault. In 58% of the sexual assaults perpetrated against women, the victim knew the offender.

1.2.2.3. Women’s Safety Survey

In 1996, the ABS conducted the “Women’s Safety Survey”, through face-to-face interviews with 6,300 Australian women aged 18 years and over. The survey estimated that 133,100 women (1.9%) had experienced sexual violence in the 12 months prior to the survey. It was further estimated that 1.2 million Australian women (18%) had experienced an incident of sexual violence since age 15, with 45% of women experiencing multiple incidents of sexual violence.

1.2.2.4. Australian National Survey of Mental Health and Wellbeing

In a study conducted in conjunction with the Australian National Survey of Mental Health and Wellbeing (ABS, 1998), Creamer, Burgess and McFarlane (2001) reported data on the prevalence of lifetime exposure to trauma. Creamer et al. reported that 0.6% of men (N = 4705) and 5.4% of women (N = 5936) had experienced rape at least once, and 3.5% of men and 10.2% of women had experienced sexual molestation.
1.2.2.5. Summary of Sexual Assault

In summary, the current study uses a broad conceptual definition of sexual assault, which includes a continuum of behaviours from sexual harassment to rape. Although statistics of reported sexual offences are presumed to underestimate the true incidence of sexual assault, the ABS argues that available data does provide a reasonable estimate. In 2002, the Australian Institute of Criminology reported that police recorded 16,744 victims of sexual assault, an increase of 7% from 2001. A Crime and Safety Survey conducted by the ABS (2002) reported that 33,000 individuals were victims of at least one sexual assault in 2001. In 1996, the Women’s Safety Survey estimated that 133,100 women had experienced sexual violence in the 12 months prior to the survey. In conjunction with the Australian National Survey of Mental Health and Well-being (1998), Creamer et al. (2001) reported that 0.6% of men and 5.4% of women had experienced rape at least once in their lifetime, and 3.5% of men and 10.2% of women had experienced sexual molestation. It is interesting to note the differences in the frequency of sexual assault victims and incidents reported by the different studies. These differences are presumably due to differences in data collection methods, for example, police reports and victimisation surveys. It is fair to suggest that victimisation surveys will more often report more incidents of sexual assault than police reports, because these surveys do not rely on a victim’s disclosure of the assault(s) to authorities.

1.3. Sexual Assault and Traumatic Stress

1.3.1. Rape Trauma Syndromes

In 1974, Burgess and Holstrom published an influential report on “rape trauma syndrome”. Burgess and Holstrom interviewed 146 female rape victims and concluded that these individuals experienced acute and long-term physical and psychological distress. The acute phase was characterised by physical pain, tension headaches, insomnia, nightmares, genitourinary problems, anxiety, anger and guilt. The long-term effects of rape trauma included rape-related nightmares and thoughts, avoidance behaviours, subjective fears and sexual dysfunction.

In 1979, Kilpatrick, Veronen and Resick reported a longitudinal analysis of post-rape trauma symptomatology. The initial reaction to the rape trauma was characterised by a generalised intense emotional distress. At three and six months post-trauma, the initial acute distress had diminished, however intense fear and rape related anxiety remained. Kilpatrick
et al. concluded that rape victims were significantly more fearful of rape related stimuli and that fear and anxiety represented long-term problems for the victims.

Subsequent researchers have reported a variety of symptoms experienced by survivors of sexual assault, including intense fear and anxiety (Kilpatrick, Veronen & Resick, 1981), depressive symptoms (Atkeson, Calhoun, Resick & Ellis, 1982), and impaired social functioning (Ellis, Atkeson & Calhoun, 1981; Nadelson, Notman, Zackson & Gornick, 1982). Other reported symptoms include sexual dysfunction (Ellis, Calhoun & Atkeson, 1980; Nadelson et al., 1982; Norris & Feldman-Summers, 1981), suicidal ideation (Kilpatrick, Best & Veronen, 1984), hostility (Kilpatrick et al., 1981; Nadelson et al., 1982), intrusive thoughts and concentration difficulties (Nadelson et al., 1982).

1.3.2. Posttraumatic Stress Disorder (PTSD)

According to Foa and Rothbaum (1998), there is a consensus that rape trauma syndromes are best characterised as Posttraumatic Stress Disorder (PTSD). PTSD is the diagnostic label given to an extreme psychological and physiological stress response, resulting from a specific external aetiology. PTSD is characterised by the development of a triad of symptom clusters, following exposure to an extreme stressor that is beyond the range of normal human experience (APA, 1994). The three symptom clusters that define the diagnostic criteria for PTSD include:

(a) the persistent re-experiencing of trauma through recurrent intrusive recollections, distressing dreams and dissociative mental states
(b) persistent avoidance of stimuli associated with the trauma and a general constriction or numbing of responsiveness and affect
(c) persistent symptoms of increased arousal, including hypervigilance, sleep disturbances, irritability, outbursts of anger, exaggerated startle responses and concentration difficulties

(APA, 1994)

For a diagnosis of PTSD, the duration of symptoms must exceed one month and should include one or more re-experiencing symptoms, three or more avoidance / numbing symptoms, and two or more symptoms of increased arousal. The manifestations of these
symptoms must be severe enough to cause significant clinical distress, and/or impairment in important areas of everyday functioning (APA, 1994).

1.3.2.1. Prevalence of PTSD

The DSM IV (APA, 1994) cites lifetime prevalence rates for PTSD ranging from 1% to 14%, while studies of “at risk” individuals (i.e., individuals exposed to trauma) have estimated prevalence rates ranging from 3% to 58% (APA, 1994).

The “National Comorbidity Survey” (NCS) (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995) reported a lifetime PTSD prevalence of 7.8% in the United States, with women more than twice as likely as men to develop PTSD. The NCS estimated a 12-month PTSD prevalence of 3.9% (Kessler, Zhao, Katz, Kouzis, Frank, Edlund & Leaf, 1999). For males (N = 2812), Kessler et al. reported a lifetime prevalence of rape trauma of 0.7% and a lifetime prevalence of sexual molestation of 2.8%. For women (N = 3065) the reported lifetime prevalence for rape was 9.2% and for sexual molestation was 12.3%. Further, it was reported that 65% of men and 45.9% of women who nominated rape as the most upsetting trauma they had ever experienced went on to develop PTSD, compared to 12.2% of men and 26.5% of women who reported sexual molestation as the most upsetting trauma they had experienced (Kessler et al., 1995).

Creamer, Burgess and MacFarlane (2001) reported comparable data for the Australian population, with the Australian “National Survey of Mental Health and Well-being”. Creamer et al. estimated a 12-month prevalence of PTSD of 1.33%, with prevalence rates of 1.2% for men and 1.4% for women. For males (N = 4705), Creamer et al. reported a lifetime prevalence of rape trauma of 0.6% and a lifetime prevalence of sexual molestation of 3.5%. For women (N = 5936) the reported lifetime prevalence for rape was 5.4% and for sexual molestation was 10.2%. Further, it was reported that 8.4% of men and 9.2% of women who nominated rape as the most upsetting trauma they had ever experienced went on to develop PTSD, compared to 11.8% of men and 5.5% of women who reported sexual molestation as the most upsetting trauma they had experienced (Creamer et al., 2001).

The NCS (Kessler et al., 1999) estimates a 12-month PTSD prevalence rate in the USA of three times the rate of PTSD in the Australian sample (Creamer et al., 2001). The difference is not explicable in terms of trauma exposure rates – for the Australian population, 64.6% of men and 49.5% of women had experienced at least one traumatic
event, compared to 60.7% of men and 41.2% of women in the United States. Despite higher trauma exposure rates in Australia, the data presented by Creamer et al. implies that the risk of developing PTSD in Australia is considerably lower than the risk in the United States. Creamer et al. speculate that the difference in prevalence rate may be due to higher reported rates of other DSM disorders in the American sample, such that pre-existing psychiatric conditions increase the risk of developing PTSD. Creamer et al. further suggest that the difference in cross-cultural prevalence rates may lie in the diagnostic tools used in different studies, with some studies being more conservative than others.

In conclusion, it is noteworthy that in both studies, rape was the trauma most likely to be associated with PTSD. For example, Kessler et al. (1995) reported that rape trauma was the event most likely to be associated with PTSD for men, while for women rape and sexual molestation were the events most likely to be associated with PTSD. Similarly, Creamer et al. (2001) reported that for both men and women, rape and sexual molestation were the traumatic events most likely to be associated with PTSD. Despite differences in PTSD prevalence between the American and Australian studies, it is noteworthy that rape was the trauma most likely to lead to PTSD.

1.4. Cognitive Models of Anxiety: Memory Bias and Attentional Bias

A common reaction following a traumatic event, such as sexual assault, is a persistent preoccupation with and re-experiencing of the traumatic event. The “memory bias” perspective essentially regards recapitulation of the traumatic event as a disorder of forgetting. In contrast, the “attentional bias” literature proposes that the apparent inability to forget the trauma is a consequence of “hypervigilance”, whereby survivors become overly sensitive to cues in the environment (internal and external) which constantly reinforce their preoccupation with the traumatic event. In the literature, the memory bias perspective and the attentional bias perspective appear to have been treated as completely separate constructs, essentially in an “either/or” fashion. However, it could be argued that there is considerable overlap between the two perspectives. For example, it could be argued that an intrusive encoding style and attentional biases are analogous, and may be mediated by similar processing mechanisms. Buckley et al. (2000) argued that given the multidimensional nature of PTSD, different processes may contribute to the expression of different symptoms. The authors suggest that automatic processing biases may underlie the hypervigilance symptoms of PTSD, while numbing symptoms may be mediated by strategic
processing biases which result in general memory retrieval for positive information, and specific memory retrieval for negative information.

1.4.1. Memory Bias Models

An influential group of information processing models of anxiety propose that anxious individuals may be characterised by a memory bias for threat related information. For example, anxious individuals may be more likely to recall threat related information compared to non-threat related information, in comparison to the recall performance of non-anxious individuals (Coles & Heimberg, 2002).

Two theories that influenced early research on information processing in the anxiety disorders are Bower’s (1981) network model of mood and cognition (see section 1.5.1.) and a model by Beck and colleagues (e.g. Beck & Clark, 1988; Beck & Emery, 1985), based on schema theory (see section 1.5.2.). Although both Bower and Beck distinguished between the memory processes of encoding and retrieval, they did not discriminate between “explicit” and “implicit” memory (Coles & Heimberg, 2002).

Explicit memory refers to the conscious, effortful retrieval of previously learned information from memory, and may be tested using free recall or recognition paradigms. In contrast, implicit memory denotes the retrieval of information that is not available to consciousness. Implicit memory may be tested using tasks that do not specifically ask participants to search their memories, such as word stem completion and primed lexical decision task paradigms (Coles & Heimberg, 2002).

In a review of cognitive biases in anxiety versus depression, Williams et al. (1988) noted that explicit memory biases appeared to be more common in depression compared to anxiety, whereas support for implicit memory biases was more evident in anxious individuals. Williams et al. proposed a model to account for the observed processing differences between anxious individuals (see section 1.5.3.) and depressed individuals. In essence, the model proposed by Williams et al. is derived from a hypothesis that different emotions may have different specific effects on cognitive processing. The authors theorised that anxious individuals, but not depressed individuals, orient attentional resources towards threat stimuli. In contrast, it was theorised that depressed individuals, but not anxious individuals, may selectively remember negative information. Williams et al. cautioned against attributing apparent dissociations between attentional and memory biases to simple
differences between anxiety and depression. However, the authors argued that exploiting such a simple distinction between anxiety and depression may be useful in identifying dissociations between different emotions and between different elements of cognitive processing (see Williams et al., 1988 for review).

1.4.1.1. Explicit Memory Bias and PTSD

One experimental paradigm suited to testing explicit memory biases is the directed forgetting paradigm. In this paradigm, participants view a series of words, which they are directed to either forget or remember following each word presentation. Participants are then asked to recall all words at the end of the series. A “directed forgetting effect” occurs when recall of to-be-forgotten words is worse than recall of to-be-remembered words.

Two studies have used this paradigm to investigate explicit memory and PTSD resulting from sexual assault (Cloitre, 1996; McNally, Metzger, Lasko, Clancy & Pitman, 1998). A third study by Zoellner et al. (2003) used an item cued directed forgetting task, together with mood induction conditions, to investigate explicit memory biases and sexual and physical assault related PTSD.

Cloitre (1996) compared directed forgetting responses from PTSD sexual assault victims, non-PTSD sexual assault victims, and controls. Cloitre reported that both PTSD and non-PTSD sexual assault victims, but not controls, showed diminished directed forgetting effects for rape words compared to positive, neutral and general trauma words. In contrast, controls showed comparable directed forgetting effects across all word categories.

McNally et al. (1998) studied responses for trauma relevant words, neutral and positive words, in a comparison between PTSD and non-PTSD adult survivors of sexual abuse and controls. Contrary to expectations, McNally et al. observed that the PTSD survivors did not show any recall deficits for trauma relevant words. Instead, the PTSD group showed recall deficits for to-be-remembered non-trauma words. The authors reported no evidence of enhanced processing of trauma relevant words in the PTSD group, relative to the non-PTSD and control groups.

Zoellner et al. (2003) proposed that PTSD individuals have a latent vulnerability to dissociate, and that chronic PTSD is characterised by an avoidant encoding model. Participants completed an item cued directed forgetting task, following either a dissociative
(i.e. emotional detachment) or serenity (i.e. relaxation) mood induction. The authors hypothesised that if individuals with PTSD use an avoidant encoding style, then dissociative mood induction would eradicate the directed forgetting effect for threat stimuli, whereas a directed forgetting effect would be observed for positive and neutral stimuli. Non-traumatised controls were expected to show directed forgetting effects across the range of emotional valencies and mood induction conditions.

Contrary to their hypothesis, Zoellner et al. observed directed forgetting effects on a recall task following serenity induction for both PTSD and control participants, but not for the dissociative induction. On a recognition task, directed forgetting was again observed following serenity induction, yet following the dissociative induction, PTSD and control participants did not differ on recognition for to-be-forgotten and to-be-remembered words.

1.4.1.2. Implicit Memory Bias and PTSD

Studies of implicit memory biases and sexual assault related PTSD are lacking, however there is evidence to suggest implicit memory biases in relation to other types of trauma, such as combat exposure (e.g. Zeitlin & McNally, 1991), and exposure to crime (e.g. Paunovic, Lundh & Ost, 2002).

Using a word stem completion task, Zeitlin and McNally (1991) studied implicit memory for combat, social threat, positive and neutral words, in a comparison of Vietnam combat veterans with and without PTSD. The authors predicted that if traumatic memories are readily activated in PTSD individuals, then PTSD veterans ought to complete more word stems consistent with previously presented combat words, compared to non-PTSD veterans. Moreover, it was hypothesised that chronic activation of trauma memories ought to facilitate this effect in both primed and unprimed conditions.

Consistent with their hypothesis, in the primed condition Zeitlin and McNally observed more word stem completions for combat related words, compared to social threat, positive and neutral words in the PTSD veteran group. Non-PTSD veterans responded consistently across word categories, that is, no differences were observed between word categories. Similarly, in the unprimed condition, PTSD veterans completed more combat related word stems compared to social threat, positive and neutral words. Non-PTSD veterans did not differ in the number of word stems completed for each word category. To test whether combat related word completions in the PTSD group were due to a memory
bias or a response bias, the authors submitted difference scores (calculated by subtracting each subject’s unprimed completions from primed completions) to additional analyses. The authors concluded that the effects of priming were enhanced for combat words compared to the other word categories, but only in the PTSD veteran group. Moreover, it was concluded that enhanced combat word stem completion in the PTSD veteran group was attributable to an implicit memory bias for disorder specific information, and not a response bias.

Paunovic et al. (2002) employed a tachistoscopic word identification task to investigate implicit memory biases for trauma relevant, positive and neutral words, in a comparison between a group of crime victims with PTSD and non-traumatised controls. In the tachistoscopic word identification task, implicit memory is indexed by the increased accuracy with which previously seen words can be identified at brief exposure durations, relative to previously unseen words. The authors hypothesised that if trauma memories are easily primed in PTSD, the PTSD group ought to show selective priming effects on the tachistoscopic identification task, in comparison to non-traumatised controls.

Overall, participants identified significantly more trauma related words and positive words compared to neutral words, however the effect of group did not reach statistical significance. Paunovic et al. observed no evidence of an implicit memory bias in the PTSD group. The authors identified a number of methodological limitations that may have confounded their findings, and they concluded therefore that the existence of implicit memory biases PTSD cannot be discounted, and that future research is required.

1.4.1.3. Summary of Explicit and Implicit Memory Biases and PTSD

In summary, few studies have examined explicit and implicit memory biases in sexual assault related PTSD, and studies of PTSD in general have yielded inconsistent findings. In studies of explicit memory biases for trauma relevant words, Cloitre (1998) observed diminished directed forgetting effects for rape words compared to positive and neutral words, for PTSD and non-PTSD sexual assault victims, whereas McNally et al. (1998) observed no evidence of enhanced processing of trauma relevant words in a PTSD group. Further, Zoellner et al. (2003) observed directed forgetting effects on recall and recognition tasks for PTSD and control groups, following serenity but not dissociative mood induction.
In a study of implicit memory biases, Zeitlin and McNally (1991) reported that enhanced word stem completions for trauma relevant words in a PTSD group was attributable to an implicit memory bias for disorder specific stimuli (cf. Foa et al., 1991; Williams et al., 1996). In contrast, Paunovic et al. (2002) reported no evidence of an implicit memory bias in a group of PTSD crime victims. Further research is required for both explicit and implicit threat related memory biases across a range of trauma experiences, before general conclusions can be formed about PTSD and memory biases. For a detailed discussion of PTSD and memory, see Buckley, Blanchard & Neill, (2000) and Brewin & Holmes (2003).

1.4.2. Attentional Bias Model

In comparison to the memory bias model literature, the “attentional bias” model is relatively under-researched. Accordingly, the “attentional bias” model is of primary interest for the present thesis.

1.4.2.1. “Threat” and “Emotionality” Hypotheses

Anxiety related attentional biases have predominantly been investigated within the framework of two hypotheses, one focusing on specific threat salience, the other on more general emotional salience. The “threat” hypothesis postulates that anxious individuals selectively process threat stimuli that are congruent with the focus of their anxiety (Foa et al., 1991; Martin et al., 1991). For example, evidence suggests that rape victims with PTSD allocate more processing resources to rape-related stimuli (e.g. Cassiday et al., 1992; Foa et al., 1991), while PTSD Vietnam War combat veterans respond similarly to stimuli associated with the Vietnam War (Kaspi, McNally & Amir, 1995; McNally, Kaspi, Riemann & Zeitlin, 1990). Similar findings have been reported for non-clinical participants, where high trait anxiety was associated with an attentional bias for threat stimuli, compared to positive and neutral stimuli (e.g. Mogg, Kentish & Bradley, 1993; Richards & French, 1990; Richards, French, Johnson, Naparstek & Williams, 1992).

In contrast to the specificity of the “threat” hypothesis, the “emotionality” hypothesis proposes a more general attentional bias. The “emotionality” hypothesis postulates that anxious individuals may show attentional biases for emotive stimuli regardless of valence, or threat salience (Martin et al., 1991). For example, Martin et al. (1991) observed no difference in responses to threat and positive stimuli in a sample of generalised anxiety disorder patients. Similarly, Mogg and Marden (1990) reported that
high trait anxious normals showed selective processing effects for emotional information in general. For a review of evidence supporting the emotionality hypothesis, see Ruiz-Caballero & Bermudez (1997). The emotionality hypothesis proposed by Martin et al. (1991) states that anxious individuals’ response latencies for threat stimuli and emotionally salient stimuli should differ significantly from neutral stimuli. It should be noted that testing the prediction made by Martin et al. relies on the experimental stimuli having equal or controlled emotionality, that is, the positive and negative stimuli should ideally be as salient for emotionality as the threat stimuli. It should further be noted that few prior studies reporting support for the threat hypothesis have incorporated such controls.

In brief, if anxious individuals exhibit an attentional bias for threat stimuli relative to neutral stimuli, but not for emotionally salient (non-threat) stimuli, then the bias may be attributed to the specific threat content of the stimuli, and not simply to emotionality. In contrast, if the observed attentional bias was due to the emotionality of the stimuli and not the threat content, then anxious individuals’ response latencies for emotionally salient stimuli (regardless of valence) ought to be significantly different in comparison to neutral stimuli.

1.5. Cognitive Theories of Anxiety and Attentional Biases

Several cognitive models of anxiety and attentional biases have been formulated, and all share common themes: a putative role for pre-attentive processing in threat appraisal and valence evaluation, and a role for selective attention in the allocation of processing resources to emotionally salient stimuli. The following section reviews influential theoretical models of attentional biases in anxiety, from early models of associative memory networks and schemata, to contemporary models of pre-attentive and attentive processing.

1.5.1. Bower’s Network Model of Mood and Cognition

According to Bower’s (1981) “network model of mood and cognition”, attentional biases play a critical role in the development and maintenance of anxiety disorders. Bower postulated a semantic network, in which emotions are uniquely represented as “nodes” in an associative memory network. Each node is connected to other nodes in the network comprising cognitive representations such as memories of emotional experiences. Specifically, Bower proposed that affective states have “a specific node or unit in memory” and that “each emotion unit is also linked with propositions describing events from one’s life during which that emotion was aroused” (p. 135). Furthermore, “activation of an
emotion node also spreads activation throughout the memory structures to which it is connected” (p. 135).

Activation of an emotion node increases the accessibility of associated representations, resulting in an information processing bias that favours mood congruent stimuli. Therefore, in the context of anxiety, Bower’s model predicts that an increase in anxious mood should facilitate an increase in the activation of threat relevant information in memory. Several important properties emerge from the model, specifically mood state dependent retrieval, mood congruent retrieval and selective attention (Forgas, 1999).

1.5.1.1. Mood State Dependent Retrieval

Mood state dependent retrieval is a central property of network theories (Bower, 1981), namely enhanced performance when retrieval memory matches the original encoding mood (Forgas, 1999). Mood state dependent retrieval has been observed in studies of memory for word lists (e.g. Bower, Monteiro & Gilligan, 1978), and autobiographical memories (e.g. Bower, 1981; Snyder & White, 1982).

1.5.1.2. Mood Congruent Retrieval

Mood congruent retrieval predicts that an affective state facilitates the recall of affectively congruent information from memory (Forgas, 1999). Mood congruent retrieval differs from mood state dependent retrieval, because participants are not required to experience any specific affective state during encoding. It is the affective state experienced during retrieval that determines memory for congruent information (Forgas, 1999). Mood congruency effects have been observed in studies using word stem completion and sentence completion tasks (e.g. Ruiz-Caballero & Gonzalez, 1994; Tobias, Kihlstrom & Schacter, 1992). Further, Niedenthal and Setterlund (1994) observed facilitated lexical decision response latencies for words specifically related to participants’ emotional states.

1.5.1.3. Selective Attention

Niedenthal and Setterlund (1994) argued that “emotions should increase the efficiency of perception of emotion-congruent stimuli in the visual field” (p. 402). Selective activation of associated memory nodes follows (Bower, 1981), and emotionally salient information is likely to attract a greater allocation of attentional resources, and is thus preferentially processed over incongruent or neutral information (Forgas, 1999). This perspective is consistent with the observation of attentional biases in studies employing
word processing paradigms (see section 1.8.), more specifically, the emotional Stroop task (see section 1.8.1.) and the emotional lexical decision task (see section 1.8.2.).

**1.5.2. Beck’s Schema Theory**

The central concept used by Beck and colleagues (e.g. Beck & Clark, 1988; Beck & Emery, 1985) in their cognitive theory of clinical anxiety is the “schema”. Schemas are cognitive structures that are responsible for the encoding, organisation and storage of information. Stimuli consistent with one’s pre-existing schemas are elaborated and encoded, whereas inconsistent information tends to be ignored. Schemas influence cognitive functioning according to a congruency principle, such that attentional resources are directed towards stimuli that are consistent with existing schemas. Even if stimuli are ambiguous in meaning, anxious individuals are thought to allocate more processing resources to threat salience, resulting in increased accessibility of threat relevant information from memory.

A common prediction of both Bower’s (1981) network model, and Beck’s (Beck & Clark, 1988; Beck & Emery, 1985) schema model is that emotion-congruent attentional biases should operate at all stages of information processing, including selective attention, reasoning and memory processes. However, failures to observe biases in memory recognition and recall in anxiety (see Mogg, Mathews & Weinman, 1987) pose problems for the network and schema models. For example, Mogg et al. (1987) found no evidence to suggest that anxious individuals preferentially recognised or recalled emotionally salient material. To explain their findings, Mogg et al. proposed an inhibitory mechanism in anxiety that interferes with the access of threatening information from memory. The authors suggested that attentional biases in anxiety may operate in opposite directions at different stages of information processing. In essence, they argued that anxiety may facilitate attentional vigilance but inhibit recall of threat-related stimuli (Mogg et al., 1987). The apparent failure of these models to account for explicit memory processes such as recognition and recall suggests that attentional biases for emotionally salient stimuli may be restricted to pre-attentive processing or selective attention (Williams et al., 1996).

**1.5.3. Williams, Watts, MacLeod & Mathews’ Cognitive Theory of Anxiety**

Williams, Watts, MacLeod and Mathews (1988) formulated a model of anxiety in which attentional biases for threat salient stimuli operate at pre-attentive stages of information processing and in selective attention. The authors suggested that increased vigilance for threat stimuli is associated with a cognitive vulnerability to develop clinical
anxiety. Williams et al. proposed that two mechanisms are responsible for pre-attentive and attentional biases to threat: an “affective decision mechanism” (ADM) and a “resource allocation mechanism” (RAM). The ADM evaluates the threat value of stimuli in the environment. ADM output (threat appraisal) is believed to activate the RAM, which regulates the allocation of attentional resources. While the ADM is thought to depend on state anxiety, the RAM is influenced by trait anxiety, such that high trait anxious individuals become more vigilant and low trait anxious individuals become more avoidant. Further, differences in attentional biases between high and low trait anxious individuals become apparent with increases in ADM output (threat appraisal): in situations of high stress, high trait anxious individuals become more vigilant, whereas low trait anxious individuals become more avoidant of threat.

It should be noted that Williams et al. (1997) revised their 1988 model of anxiety, drawing on the “Parallel Distributed Processing” (PDP) model of Cohen, Dunbar and McClelland (1990). Despite the revision of the anxiety model using PDP terminology, the central assumptions of the model remained unchanged. That is, in the face of a perceived threat, high trait anxious individuals tend to become more vigilant, whereas low trait anxious individuals tend to become more avoidant.

1.5.4. Mathews’ Processing Priorities Theory

Mathews (1990) proposed that in any given emotional state, cognitive processing is structured in such a way that information is prioritised with respect to the specific situation. In the presence of a threat, for example, Mathews argued that priority is given to attentional processes involved in the detection and interpretation of threat stimuli. With an increase in resource allocation necessarily comes a reduction in cognitive resources available for other tasks. Mathews therefore proposed that the cognitive processes that are more likely to be given priority are those involved with elaboration, subsequently facilitating the retrieval of congruent information from memory.

According to Mathews (1990), the experience of anxiety reflects attentional vigilance, such that priority is given to those cognitive processes responsible for the detection and interpretation of potential threat. To account for the observation that low trait anxious individuals shift attention away from threat cues in some circumstances, whereas high trait anxious individuals become more vigilant (e.g. MacLeod & Mathews, 1988), Mathews proposed a threat stimulus threshold. Mathews argued, that to a certain extent,
potentially threatening information is constantly monitored by cognitive systems, however a vigilant mode is not activated until a certain threat threshold is exceeded. Below this threshold, attentional resources are more readily allocated to non-threat related cognitive tasks. Once the threshold is exceeded, threat stimuli are thought to enter awareness and the cognitive system switches to its vigilant mode, which results in increased anxiety and may lead to attentional biases.

For low trait anxious individuals, Mathews argued that threat ambience is below threshold, such that the cognitive system remains in “defensive mode”. To avoid maladaptive consequences (e.g. failing to avoid a real threat), the switch to a vigilant mode occurs once a sufficient level of threat is detected. In contrast, for high trait anxious individuals, the threat ambience is above threshold, which leads to excessive attentional vigilance. Mathews argued that this excessive vigilance may lead to selective attention for threat cues, the interpretation of ambiguous events in a threatening manner, and the experience of repeated intrusive thoughts about potential threats. Prolonged experience of a vigilant mode may result in an increase in the intensity of the anxiety experienced, and in extreme cases may be characterised by an anxiety disorder.

1.5.5. Eysenck’s Hypervigilance Model

The concept of pre-attentive and attentional biases underlying a predisposition to anxiety formed the basis of the “hypervigilance” model proposed by Eysenck (1992). Hypervigilance theory has its foundations in the proposition that a fundamental function of anxiety is to facilitate threat detection. Eysenck argued that this suggests that high and low anxious individuals are more likely to differ in pre-attentive and attentional function, compared to other cognitive processes (e.g. explicit memory processes). For the attentional system to function optimally to detect potential threat, attentional processing needs to be selective, favouring threat over neutral stimuli. Moreover, there needs to be at least some processing of all environmental stimuli in order to assess potential threat, as well as constant attentional scanning of the environment. Eysenck suggested that processing of potential threat may be more accurate and efficient if the attentional focus was broad initially, and narrowed following threat detection.

Eysenck argued that there would be obvious disadvantages in having an attentional system that was constantly scanning the environment for potential threat, and only processing limited non-threat stimuli. Accordingly, manifestations of hypervigilant
attentional processing are believed to be more likely to occur when high trait anxiety individuals are experiencing high state anxiety, compared to when state anxiety is minimal. In addition, Eysenck speculated that chronic hypervigilant processing may give rise to a cognitive vulnerability for clinical anxiety.

1.5.6. Beck & Clark’s Information Processing Model of Anxiety

Beck and Clark (1997) argued that the difference between normal and clinical anxiety is a question of “degree” rather than “kind”. The authors suggested that pathological anxiety is accompanied by a biased perception of threat that is inconsistent with internal and external environmental cues. In contrast, in normal anxiety states the perception of potential threat corresponds more accurately to environmental cues.

The cognitive model of anxiety of Beck and Clark (1997) encompasses a complex pattern of cognitive, affective, physiological and behavioural changes, resulting from a three-stage information processing sequence. Stage 1 of their cognitive model of anxiety is “initial registration” (or “orienting mode”), whereby threat detection and interpretation involves rapid, automatic stimulus recognition. The second stage, “immediate preparation” is characterised by the activation of a “primal mode”, involving a combination of automatic and strategic or elaborative processing. The primal mode alerts the individual to impending threat and initiates further elaborative processing and behavioural action. Manifestations of primal responses include autonomic arousal, behavioural mobilisation and inhibition, fear and hypervigilance.

The final stage of Beck and Clark’s (1997) model is “secondary elaboration”. Information processing at this stage is relatively slow, effortful, and is characteristically schema driven, although biased threat related cognitive operations remain automatic (involuntary) due to activation of the primal mode. At this stage, schemas representing personal concerns are activated and contextualised processing proceeds, that is, processing involving one’s self in relation to the surrounding environment. Further, a “secondary appraisal process” also occurs, involving the evaluation of the availability and effectiveness of coping skills to deal with the perceived threat.

1.5.7. Mogg and Bradley’s Cognitive Motivational Model of Anxiety

The cognitive motivational model proposed by Mogg and Bradley (1998) attempts to account for both anxious and depressive psychopathology, however only the anxiety
perspective is reviewed here. The model of anxiety incorporates two conceptually distinct systems, namely “valence evaluation” and “goal engagement”, which are postulated to interact to mediate anxiety. Pre-attentive biases and initial attentional focus toward emotionally salient stimuli are thought to depend upon the integrative functioning of both systems.

The “valence evaluation” system functions to determine the threat value of stimuli. Stimulus appraisal by the valence evaluation system involves not only rapid automatic analysis of stimulus features, but also integration of detailed contextual and memorial information. The system is therefore conceptualised as having many facets, incorporating stimulus appraisal with previously learned memory representations. Outputs from the valence evaluation system are believed to activate the “goal engagement” system, which regulates the allocation of attentional resources to cognitive processing. Therefore, if a stimulus is appraised by the valence evaluation as threatening, the goal engagement system automatically allocates more processing resources to the perceived threat. However, if the stimulus is not interpreted as threatening then the goal engagement system will inhibit further processing of it and will instead focus processing resources on current goals (Mogg & Bradley, 1998). The authors argued therefore that attentional processing of emotional stimuli may be predominantly determined by subjective appraisal of threat salience (i.e. output from the valence evaluation system), which may be influenced by specific stimulus context and characteristics, for example, one’s anxiety state, as well as one’s vulnerability to anxiety.

Although the cognitive-motivational approach does not implicate attentional biases in the aetiology of anxiety disorders, the model does not exclude the possibility that such biases may play a role in the maintenance of anxiety states (Mogg & Bradley, 1998). A “vigilance-avoidance” pattern of cognitive biases (e.g. Mogg et al., 1987; Williams et al., 1988) may facilitate the detection of even the most minor of threat cues in the environment, leading to the maintenance of anxiety. Mogg and Bradley (1998) proposed that the maintenance of attentional focus to threat may depend on conflicting cognitive response tendencies, specifically automatic vigilance and avoidance strategies. The attentional focus of anxious individuals may therefore be unstable, such that attention may repeatedly shift between vigilance and avoidance cognitive operations. The authors suggested that such instability in pre-attentive and attentional threat related cognitive patterns may contribute to
the maintenance of anxiety in the long term, although the rationale for this suggestion is not clear.

Mogg and Bradley suggested that there are conceptual advantages in having two systems that mediate pre-attentive and attentional biases. Firstly, it delineates a conceptual distinction between threat appraisal and attentional resource allocation. The authors noted the possibility that these characteristics may represent the input and output of a single mechanism, however they argued that given the complexities of each, it is useful to consider them independently. Secondly, the model may be useful in determining whether individual differences in vulnerability to anxiety may be due to disproportionate reactivity of pre-attentive or attentional processing. The authors suggested that the sensitivity of the valence evaluation system to threat stimuli may potentially underlie trait anxiety, and that individual differences in stimulus appraisal may be the principal mechanism that mediates vulnerability to anxiety.

1.5.8. The Appraisal Theory Approach to Anxiety

A fundamental assumption of appraisal theory is that emotions arise and are differentiated on the basis of one’s subjective evaluation or appraisal of the personal significance of their circumstances, according to specific criteria (Ellsworth & Scherer, 2003; Scherer, 1999). Arnold (1960) first used the term “appraisal” to account for the differentiation of emotions. Arnold argued that events are appraised according to three dimensions: benefit versus harm, presence versus absence of significant stimuli, and the ease versus difficulty of approaching or avoiding such stimuli.

Lazarus (1966) proposed an influential early appraisal theory, in which it was argued that both stress and emotion are mediated by a two-stage process, “primary appraisal” and “secondary appraisal”. Primary appraisal refers to the identification of the positive or negative significance of an event, and how the event affects one’s well-being. Secondary appraisal refers to one’s ability to cope with the consequences of an event.

In an attempt to understand the cognitive processes involved in the manifestation of anxiety syndromes, Beck, Emery and Greenberg (1985) adopted the constructs of primary and secondary appraisal proposed by Lazarus. After Lazarus, Beck et al. labelled the initial impression of a situation “primary appraisal”. The authors argued that if a situation is appraised as threatening by an individual, the individual will make successive reappraisals
of the situation in an attempt to determine the nature and degree of the perceived threat. The process by which an individual evaluates their available resources for dealing with the threat was termed “secondary appraisal” by the authors. This process attempts to determine the availability and effectiveness of an individual’s internal resources (e.g. coping skills) and external resources (e.g. allies) for dealing with potentially negative consequences arising from the threat.

Beck at al. argued that primary and secondary appraisal are not separate processes, but rather are integrated to produce an overall threat evaluation. Further it was argued that the processes are not deliberate conscious cognitive operations, but generally rapid automatic processes. The degree of behaviour mobilisation and the experience of anxiety is believed to be proportional to one’s subjective estimate of danger. In the final appraisal of the perceived threat, the degree of estimated danger and subsequent fear reaction is proportional to one’s estimate of the potential negative consequences (e.g. risk of injury) from the perceived threat.

1.5.9. Summary of Cognitive Theories of Anxiety and Attentional Biases

In summary, cognitive theories of anxiety have advanced since Bower’s (1981) network model of mood and cognition, and Beck’s schema theory (Beck & Clark, 1988; Beck & Emery, 1985). Bower proposed that mood congruent attentional biases operate at all stages of information processing, including selective attention, reasoning and memory. Beck proposed that stimuli consistent with an individuals pre-existing schemas are elaborated and encoded (Beck & Clark, 1988; Beck & Emery, 1985; Eysenck, 1992). However, the predictions of Bower and Beck, that mood congruent attentional biases operate at all stages of information processing, have since been falsified in the context of cognitive biases in anxiety. Consequently, Mogg et al. (1987) proposed the existence of an inhibitory mechanism, which functions to inhibit the recall of emotionally salient information from memory. Mogg et al. further proposed that anxiety related attentional biases operate at pre-attentive, rather than attentional stages of information processing.

Most models of anxiety related attentional biases share two themes: a putative role for pre-attentive processing in the appraisal and evaluation of threat, and a role for selective attention in resource allocation to emotionally salient stimuli. Williams et al. (1988) proposed that the mechanism responsible for pre-attentive and attentive threat related biases is associated with automatic activation of vigilance for salient stimuli. Similarly, Mathews
(1990) suggested that the experience of anxiety may contribute to the initiation of attentional vigilance, whereby attention processing priorities function to maintain vigilance until the threat has subsided. Eysenck (1992) characterised hypervigilance as a pre-attentive expansion of the attentional focus, which narrows as salient stimuli enter awareness. The information processing model of anxiety proposed by Beck and Clark (1997) encompassed a three stage sequence of processing, namely: “initial registration” (threat detection) analogous to “hypervigilance”; “immediate preparation”, similar to Eysenck’s narrowing of the attentional focus following threat detection; and finally, “secondary elaboration”, where full activation of elaborative semantic processing occurs. The cognitive-motivational model of anxiety centres on a conceptual distinction between pre-attentive and attentive processing. Valence evaluation is believed to occur at the pre-attentive stage of information processing, while attentional resource allocation is postulated to subsume attentive stages of processing. The appraisal theory proposed by Beck et al. (1985) adopted the constructs of primary and secondary appraisal (cf. Lazarus, 1966) to describe an integrated process of threat evaluation. Although the roles of pre-attentive and attentional processing have predominated cognitive theories of anxiety, the precise mechanisms that mediate anxiety require further elucidation.

1.6. Cognitive Theories of PTSD and Attentional Biases

In addition to cognitive models of attentional biases, several cognitive models of PTSD have been formulated, which may provide a useful framework for understanding the cognitions of specific groups of trauma survivors. The dominant models of traumatic stress have generally focused on emotional processing, rather than attentional biases per se, and many of these models appear to be descriptive rather than explanatory. Often these models appear to focus on rationalising possible therapeutic interventions. Because the primary focus of this thesis is attentional biases in the framework of the threat and emotionality hypotheses, it is beyond its scope to present a comprehensive discussion of PTSD theories. For a reviews of theories of PTSD, for example, see Joseph, Williams and Yule (1997), and Yule (2000). However, for the sake of completeness, the following sections briefly outline three pre-eminent models of emotional processing and traumatic stress, specifically, Rachman’s emotional processing model, Horowitz’s stress response model, and Janoff-Bulman’s theory of shattered assumptions. Following this, a more detailed discussion will present Foa’s fear network and emotional processing theory, and Brewin’s dual representation theory, as both models are of direct relevance to the current thesis. It is
noteworthy that although these models implicitly assume the existence of fear specific cognitive biases, little experimental evidence justifying this assumption has been offered.

1.6.1. Rachman’s Emotional Processing Model

Early influential cognitive models of posttraumatic stress reactions share a common theme, a putative role for the assimilation of trauma relevant information with pre-existing beliefs and assumptions. For example, according to Rachman (1980), emotional processing may be regarded as adaptive if it facilitates the “absorption” of emotional reactions, such that exposure to salient stimuli no longer elicits a strong emotional reaction. Emotional processing is likely to be successful or adaptive if the stimulus is predictable and controllable, the person is high in self efficacy, in a relaxed, non-anxious state, and engages in activities to increase their sense of control over the stimulus. In contrast, maladaptive emotional processing can be characterised by inappropriate expressions of emotion that are out of proportion with the context of a given situation. Emotional processing is likely to be maladaptive if a stimulus is sudden, intense, dangerous, unpredictable and uncontrollable. Maladaptive emotional processing is likely to occur in association with the avoidance of a threatening situation, refusal or inability to talk about the experience, repeated exposure to disturbing stimuli in uncontrolled conditions, agitated rehearsals (e.g. not coping) and an absence of perceived control (Rachman, 1980).

1.6.2. Horowitz’s Stress Response Syndromes

Horowitz’s (1976, 1986) formulation of stress response syndromes is based on the concept of the “schema”, such that individuals have mental models or “schemata” of themselves and their environment which they use to interpret incoming information. Horowitz proposed a “completion principle” which mediates the integration of trauma relevant information with existing schemas. Failure to process trauma relevant information successfully means that partially processed traumatic information remains in active memory, without ever being properly integrated. Horowitz’s model is compatible with Rachman’s emotional processing theory. Both approaches emphasise the role of incomplete processing in posttraumatic stress reactions. However, whereas Horowitz focuses on the importance of assimilation and integration of traumatic memories, Rachman focuses on adaptive and maladaptive emotional processing.
1.6.3. Janoff-Bulman’s Cognitive Appraisal Theory:

Janoff-Bulman’s (1985, 1992) cognitive appraisal theory of anxiety is based on the premise that traumatic stress reactions following victimisation can be attributed to the destruction of pre-existing assumptions about the self and the environment. Victimisation results in extreme stress and anxiety, and it is assumed that the trauma cannot be readily assimilated with pre-existing assumptions. A victim’s perception of themselves and the world no longer match their pre-trauma beliefs and assumptions, which are instead marked by threat, danger, insecurity and self-questioning. According to Janoff-Bulman, for an individual to cope effectively with victimisation, they must re-build their shattered assumptions and re-establish a conceptual system that is congruent with adaptive and effective functioning. Re-building requires the integration of post-trauma memory representations with pre-existing schemas and beliefs.

1.6.4. Foa’s Fear Network and Emotional Processing Theory

The “emotional processing” theory proposed by Foa and colleagues (e.g. Foa & Kozak, 1986; Foa & Riggs, 1993; Foa, Steketee & Rothbaum, 1989; Foa Zinbarg & Rothbaum, 1992; Foa & Rothbaum, 1998) was developed in an attempt to account for why some individuals recover from a traumatic experience, while others develop chronic psychopathology. The theory is based on the observation that emotional experiences can be relived long after a traumatic event, and this pattern of reliving involves re-experiencing the original emotional response and memories and thoughts associated with the traumatic event.

Recall that Rachman’s (1980) “emotional processing” perspective emphasised the significance of factors mediating maladaptive emotional processing, in particular, emotional re-experiencing. The symptoms that Rachman characterised as being indicative of maladaptive emotional processing overlap with the diagnostic criteria for PTSD, and according to Foa and Rothbaum (1998) the presence of PTSD can be viewed as a reflection of maladaptive emotional processing of a traumatic experience. Foa and Rothbaum propose that the identification of factors that differentiate PTSD trauma survivors from non-PTSD trauma survivors may help elucidate the mechanisms underlying adaptive and maladaptive emotional processing.

It has been suggested that traumatic events are represented differently in the memories of trauma survivors with chronic psychopathology, compared to trauma survivors who recover (e.g. Foa & Rothbaum, 1998; Williams et al., 1988). In an attempt to account
for this pathological anxiety, Foa and Kozak (1986) applied Lang’s (1979) “bioinformation theory of emotion”, in which fear is conceptualised as a cognitive operation that facilitates escape from danger. In accordance with Lang’s theory, fear is represented as a memory network that encompasses: (1) stimulus information about the traumatic event; (2) information about cognitive, behavioural and physiological reactions to the event; and (3) interpretive information that links stimulus and response elements (Foa & Rothbaum, 1998). This information structure is thought to represent a cognitive program for escape or avoidance behaviour. Accordingly, it is proposed that the fear structure must contain information pertaining to the danger of the stimulus, and / or responses, and information about physiological activity preparatory for escape. Therefore, a fear structure is distinguished from other cognitive structures not only by response elements, but also by specific information and the meaning it contains (Foa & Kozak, 1986). Foa and Kozak (1986) propose that PTSD reflects a fear memory that encompasses many associations, interpretations and evaluations that are inaccurate with reality, whereas a normal fear memory contains cognitive representations that accurately match reality.

Presentation of information that is congruent with information represented in a “fear structure” is believed to activate the structure and to evoke a fear response (cf. Lang, 1977; Foa et al., 1991). Furthermore, Williams et al. (1988) proposed that the presence of a cognitive fear structure enhances sensitivity and attention to stimuli represented in the fear structure. Accordingly, anxiety disordered individuals are predicted to more readily perceive information that is congruent with their fears, and to allocate more attentional processing resources to such relevant information (Foa et al., 1991). Such enhanced sensitivity and attentional resource allocation is believed to lead to attentional biases for fear (threat) relevant information (see section 1.8.).

Foa and Kozak (1986) suggested that two conditions are required for the successful reduction of fear. Firstly, the fear network must be activated to allow information in the network to enter conscious awareness (e.g. intrusion / re-experiencing PTSD symptoms). Attempts to suppress activation of a fear network are believed to result in the characteristic avoidance symptoms of PTSD. Secondly, when the fear network is activated, the accessible information must contain elements that are congruent with those that exist in the fear structure, so that a new memory can be formed. Successful resolution of the trauma can only occur by integrating new information with the existing evoked information structure.
The assimilation of new information with existing pathological structures allows the latter to be corrected (Foa & Rothbaum, 1998).

1.6.5. Brewin’s Dual Representation Theory

Brewin, Dalgleish and Joseph (1996) expanded Brewin’s (1989) “dual representation theory” of PTSD. The authors propose that dual representations of traumatic experiences in memory are the basic cognitive framework within which conscious and non-conscious information can be understood. One representation (or set of representations), termed “verbally accessible memories” (VAMs), comprises the individual’s conscious experience of the trauma. These memories contain information about the sensory features of the experience, the emotional and physiological reactions experienced, and the perceived meaning of the experience. Non-conscious processing forms the second type of representation (or set of representations), termed “situationally accessible memories” (SAMs). These representations cannot be automatically accessed, but are easily accessed when the individual is in a context similar to the traumatic experience. The context may be internal, for example, consciously thinking about the trauma, or external, such as reading about a similar trauma in a newspaper.

Brewin et al. (1996) proposed that “emotional processing” of trauma consists of at least two elements. One element involves consciously integrating VAMs with pre-existing beliefs and expectations about the self and the environment. The result of this process is to reduce negative affect by restoring a sense of safety and control, by adjusting one’s expectations about the self and the world. The second element involves the activation of highly specific SAMs to aid cognitive readjustment, through exposure to highly detailed trauma cues associated with the traumatic experience. Traumatic SAMs representations can then be adjusted through the integration of new non-threatening information. According to Brewin et al. both elements are facilitated by the information processing system assigning higher priority to trauma relevant cues, in the form of attentional biases and memory biases.

Brewin et al. (1996) identified three possible outcomes of emotional processing: completion / integration, chronic emotional processing, and premature inhibition of emotional processing. Completion / integration represents the optimal stage of emotional processing, where memories of the trauma have been fully processed and integrated with one’s existing memories and sense of self in the world. Successful integration in this context is characterised by the absence of attentional and memory biases for trauma relevant
stimuli (Brewin et al., 1996). The authors argued that chronic processing is likely to occur where there are large discrepancies between pre- and post-trauma assumptions, inadequate cognitive development, poor social support, and an inability to prevent SAMs intrusions. The result of chronic processing is a persistent preoccupation with the trauma and its consequences.

Inhibition of emotional processing is hypothesised to result from sustained efforts to avoid trauma relevant VAMs and SAMs. Brewin et al. (1996) proposed that the inhibition of emotional processing can be distinguished from the completion/integration stage in the following ways: attentional biases will be present, the individual may experience impaired memory for the trauma and trauma related stimuli, the individual should demonstrate phobic avoidance of trauma related situations, and there may be evidence of somatization. If emotional processing is inhibited rather than completed/integrated, then although the individual appears to have recovered from the trauma, the unprocessed memories may be reactivated later in life.

Given the three possible outcomes of emotional processing, Brewin et al. (1996) cautioned against designing studies where individuals with current PTSD are compared to individuals exposed to the same trauma but without current PTSD. The latter may contain both individuals who have completed emotional processing and others who have prematurely inhibited emotional processing. Brewin et al. suggested screening individuals without current PTSD for indicators of incomplete processing, to avoid possible misleading conclusions, however the authors did not elucidate how this might be achieved.

1.6.6. Summary of Cognitive Theories of PTSD

In summary, cognitive models of traumatic stress have generally focused on emotional processing rather than attentional biases per se. Early influential models advocate the assimilation of trauma relevant information with existing beliefs and assumptions. For example, Rachman (1980) argued that emotional processing may be considered successful if traumatic information is absorbed into existing memory representations, such that it no longer triggers an acute emotional response. Similarly, Horowitz (1976, 1986) proposed that the failure to process trauma relevant information successfully, means that partially processed traumatic information remains in active memory without ever being properly integrated. Janoff-Bulman (1985, 1992) argued that for an individual to cope with
victimisation, they must re-build their shattered assumptions and re-establish a conceptual
system that is capable of adaptive and effective processing.

More recently, Foa and colleagues proposed that the presence of PTSD can be
considered a reflection of maladaptive processing of a traumatic experience. Foa et al
argued that in order to reduce fear successfully, new adaptive information must be
assimilated into pathological trauma representations. Brewin et al. (1998) proposed that two
elements are required in order to achieve successful emotional processing. First, highly
specific sensory and physiological trauma memory representations must be activated in
order to facilitate cognitive readjustment. Second, a conscious attempt must be made to
restore one’s sense of safety and control by readjusting one’s existing assumptions.
Integration represents the optimal stage of emotional processing, where trauma memories
have been successfully processed and integrated with existing memories.

1.7. Attentional Bias Effects and Experimental Paradigms

The relationship between attentional biases and emotional disturbances has been
investigated using a variety of experimental paradigms. For attentional biases associated
with anxiety, three information processing paradigms have dominated the literature, namely
the modified Stroop paradigm, the dichotic listening paradigm and the attentional
deployment paradigm (Thrasher & Dalgleish, 1999). It is beyond the scope of the present
discussion to comprehensively review all anxiety related studies that have employed these
paradigms. Instead, the following discussion will be restricted to PTSD studies.

1.7.1. The Stroop Paradigm

In the original “classical” Stroop (1935) task, a participant is asked to identify the
colour ink in which a stimulus is presented, while ignoring the meaning of the stimulus
itself. Stimuli may consist of meaningless items, for example a series of “Xs” (e.g. XXXX),
or colour name words (e.g. “red”). Evidence suggests (see MacLeod, 1991 and Williams et
al., 1996 for reviews) that it takes participants longer to identify the colour ink when the
word is incongruent (e.g. the word “red” presented in green ink) compared to responses to
meaningless stimuli. Such incongruent words have been consistently associated with
increased colour-naming latencies, and this effect has been termed “Stroop interference”.
According to Stroop (1935), “the difference in the time for naming the colours in which
words are printed is the measure of the interference of conflicting word stimuli upon
naming colours” (p. 22). MacLeod (1991) reviewed four theoretical accounts of the Stroop
effect, specifically speed of processing, automaticity, perceptual encoding and parallel
distributed processing. MacLeod presented a comprehensive review of these models,
including the evidence available in the literature to support and refute each as a valid explanation of Stroop interference. It is beyond the scope of the current thesis to discuss Stroop effect theories comprehensively. However, the following section will provide a brief overview of the central features of the four models discussed by MacLeod. For a comprehensive review of theoretical accounts of the Stroop effect and related empirical evidence, see MacLeod (1991).

1.7.1.1. Relative Speed of Processing

The relative speed of processing theory has its origins in the premise that words are read faster than colours are identified (e.g. Cattal, 1886). The interaction between these two competing processes (e.g. word reading versus colour naming) results in a time penalty, which is termed “interference”. According to MacLeod (1991), the relative speed of processing model is predicated on three key assumptions. Firstly, there is parallel processing of the competing stimulus response elements. Secondly, there is a limited capacity response mechanism that can only process one response at a time, with priority determined by speed. Thirdly, there is the capacity for priming of responses.

1.7.1.2. Automaticity

The basic premise of the automaticity view is that the processing of one response element of a stimulus (e.g. colour naming) requires more attention than the processing of another competing response element (e.g. word reading). Thus in the Stroop paradigm, colour naming draws more heavily on attentional resources than does word reading (MacLeod, 1991).

1.7.1.3. Perceptual Encoding

The theory of perceptual encoding is an example of an “early selection” account, where response competition occurs at an early stage of processing (cf. “late selection”, e.g. relative speed of processing and automaticity). The perceptual encoding model predicts that the encoding of ink colour information is delayed by incongruent information from a colour word, compared to a neutral control word (MacLeod, 1991).
1.7.1.4. Parallel Distributed Processing

Central to the parallel distributed processing model is the proposition that processing occurs through activation of pathways of differing strengths. Processing occurs within a system of interconnected modules, by spread of activation along connections within and between modules (cf. Bower’s network model, section 1.5.1.). For the Stroop task, MacLeod (1991) illustrates a simple model comprised of two pathways, one for ink colour information and one for word information, that share a response mechanism. Processing begins with “input units” and progresses to “response units”, one of which will be activated sufficiently, to exceed a threshold and produce a response.

1.7.2. The Emotional Stroop Paradigm

With increased interest in cognition and emotion in the 1970s and 1980s, researchers began using a variation of the Stroop task to examine cognitive processes associated with emotional disturbances (Williams et al., 1996). The Stroop paradigm variation, termed the “emotional Stroop” task, was used to investigate the emotional salience of word stimuli with negative and / or positive valence, with neutral words used as control stimuli. In the emotional Stroop task, participants are asked to identify the colour ink in which emotional word stimuli are presented, while ignoring word meaning. Researchers have compared colour-naming performance for emotional stimuli in clinical groups and non-disturbed control groups, using words specific to the psychopathology under investigation, together with emotional words unrelated to specific psychopathology (Williams et al., 1996). For a review of attentional bias studies associated with sexual assault and PTSD, using the emotional Stroop paradigm, see section 1.8.1.

1.7.3. The Dichotic Listening Paradigm

In the dichotic listening task, participants are asked to repeat (or “shadow”) a message presented to one ear (the “attended message”), while ignoring a message presented simultaneously to the other ear (the “unattended message”) (Thrasher & Dalgleish, 1999). Trandel and McNally (1987) defined three types of “shadowing errors”: (1) “intrusions” where the unattended message is repeated rather than the attended message, (2) “omissions” where the attended message is not repeated, and (3) “mispronunciations” where the attended message is repeated incorrectly. The dichotic listening task is used to measure attentional biases, based on the assumption that the processing of items in the attended message provides an index of the attentional resources allocated to these items (Thrasher & Dalgleish, 1999).
Trandel and McNally (1987) used a dichotic listening task to investigate semantic processing of threat cues in Vietnam combat veterans with PTSD. The authors predicted that Vietnam related words ought to produce more shadowing errors in PTSD veterans, compared to words phonetically similar to the threat words, phobia related and neutral words. Although threat words reportedly elicited more errors than neutral words, this effect was observed in both the PTSD and control groups. Threat words did not produce more shadowing errors than phonetically similar or phobia related words. Trandel and McNally concluded that their findings were inconsistent with the hypothesis that PTSD combat veterans semantically process threat cues with bias and without awareness.

1.7.4. The Attentional Deployment Paradigm

In the attentional deployment, or dot-probe paradigm, each trial comprises presentation of a word pair on the computer screen, one word above and one word below the centre of the screen. In critical trials, one word is threat related and one word is neutral, whereas in control trials two neutral words are presented. When the two words are removed from the screen, a dot-probe appears in one of the positions previously occupied by the words. Participants are asked to press a button when they see the dot-probe. The reaction time to respond to the dot-probe is believed to provide an index of visual attention to the word that the dot-probe replaced, because participants are believed to respond faster to the dot-probe if they are already attending to that spatial location (Dalgleish, Moradi, Taghavi, Neshat-Doost & Yule, 2001).

In a study of attentional deployment and PTSD, Dalgleish et al. (2001) observed that children and adolescents with PTSD showed a visual attentional bias for social threat related information, in comparison to controls. No effects were observed for physical threat related information. An attentional avoidance effect was evident for depression related information for the PTSD group, although the magnitude of this effect decreased with age.

Elsesser, Sartory and Tackenberg (2004) compared dot-probe responses for trauma related, generally aversive, pleasant and neutral pictures, in a comparison between victims of recent trauma, PTSD patients and control participants. Elsesser et al. reported that the trauma groups did not show an attentional bias for trauma related information, that is, the participants did not show decreased reaction times for dot-probes that replaced trauma related pictures.
1.7.5. The Emotional Lexical Decision Task Paradigm

An alternative information processing experimental paradigm for assessing attentional biases for salient stimuli is the emotional lexical decision task. In this paradigm, participants are simply asked to indicate whether a presented letter string is a word or a non-word. Emotionally salient words have widely been reported to elicit decreased response times, and shorter response latencies are interpreted as reflecting emotional salience (Niedenthal & Setterlund, 1994). In the depression and general anxiety literature, covert emotional effects arising from the word versus non-word cognitive set of the emotional lexical decision task appear to have been implicitly compared to the colour-naming cognitive set of the Stroop paradigm. Findings from both paradigms have been interpreted as reflecting emotional salience (e.g. MacLeod & Matthews, 1991; Mogg, Matthews, Eysenck & May, 1991; Niedenthal & Setterlund, 1994). For a detailed discussion of lexical decision task studies that have focused on attentional biases and anxiety, see section 1.8.2.

Whereas theoretical models of the Stroop effect are well established in the literature (see section 1.7.1. and for review see MacLeod, 1991), a literature search yielded nothing on theoretical models of the emotional lexical decision task. However, inspection of the word identification literature identified some influential accounts of lexical access and semantic information. It is beyond the scope of the present review to comprehensively discuss these models. However, the following sections will provide a brief overview of the theory behind models of word production and pre-eminent models of lexical access. For a technical discussion of word identification, see Eysenck and Keane (1995).

Meyer and Schvaneveldt (1971) proposed that both words and non-words have specific locations reserved in long term memory. James (1975) argued that the location of a lexical entry in memory can be likened to looking up a word in a dictionary – locating a lexical entry in memory may be sufficient to confirm that the stimulus is a word, however a semantic search is required to locate the word’s meaning. Furthermore, James suggested that the position of Meyer and Schvaneveldt introduced the possibility that simply identifying the location of a lexical entry may not be sufficient to distinguish a word from a non-word, in the absence of semantic information.

In an early study of lexical decisions and semantic information, James (1975) investigated how much information must be retrieved before a lexical decision can be made. After a series of experiments, James concluded that under certain circumstances, lexical
decisions required the retrieval of semantic information, and not simply access to a lexical entry. Further, James argued that increased word frequency (see section 1.9.2.) may lead to rapid retrieval of both concrete and abstract (see section 1.9.5.) semantic information.

Chumbley and Balota (1984) proposed a theoretical framework for lexical decisions, that assumed that the visual features of a word provide one with the characteristics necessary for further processing. For example, one may employ visual characteristics, phonological characteristics and semantic characteristics to retrieve an appropriate word. The authors argued that the recognition of a word involves the interaction of these characteristics. Within the proposed framework, Chumbley and Balota suggested that lexical decision response latencies should be a function of the word’s meaning and not simply a function of the word’s non-semantic characteristics.

Yelland (1994) reviewed three “families” of models of lexical access, specifically, activation models, computational models and hybrid models. It is beyond the scope of the present review to comprehensively discuss the technicalities and complexities of these models. However, for the sake of completeness, the following sections will provide a brief overview of the models reviewed by Yelland. For a more detailed review of models of lexical access, see Yelland (1994).

1.7.5.1. Activation Models of Lexical Access

A core characteristic of activation models of lexical access is “content addressable memory”, a perceptual system whereby information extracted from spoken or written words is directed to stored lexical representations. Here the information is directed across all lexical representations that share like feature(s) with the incoming information. Lexical access therefore is proposed to be a function of the activation of a match between the incoming word and existing lexical representations. There are two pre-eminent accounts of activation models, the logogen model (e.g. Morton, 1969, 1979) and network models (e.g. McClelland & Rumelhart, 1981, 1986). For review of these models, see Yelland (1994).

1.7.5.2. Computational Models of Lexical Access

Computational models of lexical access “assume that recognition is carried out by a representational system that operates by explicitly manipulating and comparing symbols” (Forster, 1989, p. 76). A pre-eminent computational model is Forster’s (e.g. 1976, 1979) “serial search” model of lexical access. In brief, Forster proposed a 2-stage model in which
a search is performed until a match is made between a representation of the incoming word, and an entry in the lexicon.

1.7.5.3. Hybrid Models of Lexical Access

Hybrid models of lexical access share features from both the “activation” and “computational” families. These models generally have some form of detector (or activation) system, which is responsible for generating potential lexical matches. Potential matches are then searched to find the entry that best matches the incoming information. Pre-eminent hybrid models include the “verification” model (e.g. Becker, 1980), the “activation – verification” model (e.g. Paap, Newsome, McDonald & Schvanenveldt, 1982), and the “checking” model (e.g. Norris, 1981). It is beyond the scope of this review to discuss these models. For review, see Yelland (1994).

1.8. Attentional Bias Effects in Word Processing Paradigms

The following sections review studies that have used the emotional Stroop and emotional lexical decision task paradigms as measures of attentional biases. Both paradigms are believed to provide standardised, non-introspective (McNally et al., 1990), or covert methods of investigating attentional biases. These paradigms have the advantage of being non-invasive, and participants are not asked to overtly recount their traumatic experiences. For the emotional Stroop paradigm, the discussion focuses on attentional biases related to sexual assault and PTSD. For the emotional lexical decision task paradigm, however, to the best of the present author’s knowledge there have been no attempts to investigate attentional biases in the context of sexual assault and PTSD. Therefore, the discussion of attentional biases and lexical decision task performance will necessarily focus on more general attentional biases.

1.8.1. Attentional Bias Effects and the Emotional Stroop Paradigm

Recall from section 1.7.1, the original Stroop colour-naming task requires participants to name the ink colour of a series of colour name words. In the “emotional Stroop” task, individuals identify the colour ink in which word stimuli with positive, negative or neutral valence are presented, while ignoring the meaning of the words (Foa et al., 1991; Williams et al., 1996).

The emotional Stroop task is generally used to quantify the extent to which emotional stimuli engage attentional resources. Mogg et al. (1989) suggested that emotional
stimuli attract disproportionately more processing resources than non-emotional stimuli, due to the activation of specific cognitive structures that represent personal threats. Experimental evidence suggests that colour-naming performance is particularly disrupted when emotional words are specific to the psychopathology under investigation (Williams et al., 1996). For example, Foa et al. (1991) and Cassiday et al. (1992) reported disrupted colour naming for rape related words by PTSD rape victims.

Williams et al. (1996) argued that specificity in clinical populations implies that the interference effect may be sensitive to specific psychopathology. Furthermore, the authors noted that the interference effect in PTSD was much larger than for any other disorder (see Williams et al., 1996, Table 1, p. 8–13). Differences in effect sizes between different types of psychopathology have led researchers to theorise that different or additional cognitive mechanisms may be involved in the interference effects observed in different disorders. For example, Williams et al. suggested that the larger interference effects observed in PTSD are likely due to the diagnostic features of the disorder, namely frequent and severe intrusions, nightmares and flashbacks. Table 1 summarises studies that have used the emotional Stroop task to investigate psychopathology related attentional biases. The table also highlights differences in interference effects between PTSD and other types of psychopathology, noted by Williams et al. The summary table is adapted and extended from Williams et al. (1996), and in order to be consistent with the current thesis, only studies that employed computerised emotional Stroop tasks are included. It should be noted that interference effect scores are estimates only, because many studies reported figures rather than tables of mean scores.
Table 1
Summary of studies that have used the emotional Stroop task to investigate attentional biases in psychopathology

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Authors</th>
<th>Word Categories</th>
<th>Participants (n)</th>
<th>Groups showing attentional bias</th>
<th>Size of interference effect (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cassiday et al. (1992)</td>
<td>High Threat Moderate Threat Positive Neutral</td>
<td>PTSD rape victims (12) Non-PTSD rape victims (12) Controls (12)</td>
<td>PTSD rape victims (specific threat) Non-PTSD rape victims (specific threat)</td>
<td>180 70</td>
</tr>
<tr>
<td></td>
<td>Kaspi et al. (1995)</td>
<td>PTSD Negative Positive Neutral</td>
<td>PTSD Vietnam veteran (30) Non-PTSD Vietnam veteran (30)</td>
<td>PTSD Vietnam veteran (PTSD words)</td>
<td>115</td>
</tr>
<tr>
<td>Disorder</td>
<td>Authors</td>
<td>Word Categories</td>
<td>Participants (n)</td>
<td>Groups showing attentional bias</td>
<td>Size of interference effect (ms)</td>
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<tr>
<td>Panic Disorder</td>
<td>McNally et al. (1992)</td>
<td>Fear Body sensation Catastrophe</td>
<td>Panic Disorder (24) OCD (24) Control (24)</td>
<td>Panic Disorder (catastrophe)</td>
<td>24</td>
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<tr>
<td></td>
<td></td>
<td>Positive XXXXs</td>
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<td></td>
<td></td>
<td>Positive Neutral</td>
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<td></td>
<td></td>
<td>General Threat</td>
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<tr>
<td>Obsessive Compulsive Disorder (OCD)</td>
<td>Foa et al. (1993)</td>
<td>General Threat Contamination</td>
<td>OCD Washers (23) OCD Checkers (10) Controls (14) Spider Phobia (36) Control (30)</td>
<td>OCD Washers (contamination) OCD Checkers (general threat) Pre-treatment interference reduced at post treatment (spider words)</td>
<td>26</td>
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<td></td>
<td></td>
<td>Categorised Neutral</td>
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<td>Non-words</td>
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<td></td>
<td></td>
<td>Spider Negative</td>
<td></td>
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<tr>
<td>Specific Phobia</td>
<td>Lavy et al. (1993)</td>
<td>Neutral</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Non-words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>Segal et al. (1995)</td>
<td>Negative Phrases</td>
<td>Depressed (58) Control (44)</td>
<td>High self-relevance more interference than low self relevance (both positive &amp; negative)</td>
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<td></td>
<td></td>
<td>Positive self-relevant Positive</td>
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<td></td>
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<td>Positive irrelevant</td>
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<td></td>
<td></td>
<td>Negative self-relevant Negative</td>
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<td></td>
<td></td>
<td>Negative irrelevant</td>
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<td></td>
<td>Riemann &amp; McNally (1995)</td>
<td>Neutral</td>
<td>Students allocated to anxiety or neutral mood induction conditions (45)</td>
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<td></td>
<td></td>
<td>Neutral</td>
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<td></td>
<td></td>
<td>Positive Neutral</td>
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<td>Categorised Neutral</td>
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<td></td>
<td></td>
<td>Neutral</td>
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<tr>
<td></td>
<td>Dalgleish (1995) (Experiment one)</td>
<td>Threat</td>
<td>Anxious (14) Low anxious (14)</td>
<td>Anxious (threat)</td>
<td>69</td>
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<tr>
<td></td>
<td></td>
<td>Positive</td>
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<td></td>
<td></td>
<td>Categorised Neutral</td>
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<td></td>
<td></td>
<td>Neutral</td>
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</tbody>
</table>

Table adapted and extended from Williams et al. (1996), pages 8 – 13.

Note: interference scores are rounded to the nearest ms.
In a review of the Stroop literature, MacLeod (1991) noted that in excess of 700 papers had been based on the Stroop effect to that time, and that at least 300 of these had focused on Stroop interference as a measure of attentional biases. These numbers have grown considerably since, and it is beyond the scope of the present discussion to provide a complete update of the history of the Stroop paradigm and emotional Stroop variant. Consequently, the scope of the present discussion is restricted to an overview of the Stroop paradigm as a measure of attentional biases in the context of PTSD and sexual assault, with particular emphasis on the complexities and unresolved issues arising in relation to the emotional Stroop paradigm.

Foa, Feske, Murdock, Kozak and McCarthy (1991) investigated the processing of threat related information in rape victims. The authors hypothesised that if a diagnosis of PTSD indicates the presence of a trauma related cognitive fear structure (see section 1.6.4.), resulting from a failure to process the trauma successfully, an emotional Stroop paradigm should be able to differentiate between traumatised individuals with and without PTSD. Foa et al. controlled for exposure to a traumatic experience by including a group of rape victims who did not exhibit current PTSD. The PTSD rape victims and non-PTSD rape victims did not differ on four of the five assault characteristics measured, namely “injury”, “use of weapon”, “perceived threat for one’s life” and “time since assault”, however the PTSD rape victims reported more “use of force” than the non-PTSD rape victims. Foa et al. reported that PTSD rape victims displayed greater colour naming latencies for rape related words compared to general anxiety words, neutral, and non-words. No interference effect was observed for the non-PTSD rape victims or non-victimised controls.

Foa et al. (1991) argued that the observed Stroop interference effect for rape related words was associated with PTSD rather than trauma exposure. The two rape victim groups did not differ on degree of injury, use of weapon and perceived life threat. Although the PTSD rape victims reported more use of force, Foa et al. reported that controlling for use of force, through an analysis of covariance, did not reduce the observed Stroop interference effect. Therefore, although the PTSD and non-PTSD rape victims reported comparable rape experiences, only the PTSD group showed Stroop interference for rape related stimuli.

The authors speculated that traumatic information may be represented differently in the memories of individuals with PTSD. Foa et al. (1991) suggested that when pathological
cognitive structures are activated (e.g. cognitive fear structures), they interfere with the accessibility of other cognitive structures required to integrate new information successfully. The authors further suggested that fear structures, activated by threatening information, are more elaborate than non-fear structures, and therefore require more processing capacity. It was speculated that selective interference in the Stroop task may result from competition for processing capacity, whereby the more elaborate fear structures compete for resources required to complete the colour-naming task successfully. According to Foa et al., this account (i.e. the “elaboration hypothesis”) predicts that any information associated with an elaborate schema (threat or non-threat) will produce a Stroop interference effect (c.f. section 1.6.4.).

It should be noted that Foa et al. (1991) acknowledged that the majority of the non-PTSD rape victim group had in fact suffered from PTSD at some time in the past. At the time of the study, however, these participants did not meet the diagnostic criteria for PTSD. Foa et al. reported that PTSD but not non-PTSD rape victims showed Stroop interference for rape related stimuli. The authors speculated that clinical specificity in threat processing may have resulted because traumatic information is represented differently in the memories of individuals with PTSD. However, Foa et al. offered no account of the cognitive mechanisms of recovery that presumably must have occurred in order to account for the absence of attentional biases in the non-PTSD group. If the authors maintain that traumatic information is stored differently in the memories of PTSD individuals, which results in attentional biases, then it is reasonable to expect that previously diagnosed (but not current) PTSD individuals may also show attentional bias effects. Elsewhere (e.g. Foa & Kozak, 1986) (see section 1.6.4.), it was suggested that successful treatment of anxiety disorders modifies one’s cognitive fear structures, thereby diminishing threat related attentional biases. However, Foa et al. did not report whether the non-PTSD rape victims had been successfully treated and / or how this may have been accomplished.

In an extension of the study by Foa et al. (1991), Cassiday, McNally and Zeitlin (1992) investigated threat specificity effects and emotionality effects in rape victims. Consistent with expectation, Cassiday et al. reported that PTSD rape victims exhibited greater Stroop interference for high threat words compared to moderate threat, positive and neutral words. A non-PTSD rape victim group also exhibited Stroop interference for high threat words, although not to the extent of the PTSD rape victim group. The authors reported that moderate threat words produced more interference than the positive or neutral
words, consistent with their prediction that Stroop interference parallels the degree of threat salience. In addition, Stroop interference for high threat words was significantly related to intrusive PTSD symptoms, but not to avoidance symptoms.

Cassiday et al. (1992) argued that their findings were generally consistent with those of Foa et al. (1991), however the authors acknowledged that unlike Foa et al. their non-PTSD rape victims showed Stroop interference for threat stimuli. Cassiday et al. suggested that this finding may be attributed to residual PTSD symptomatology in their non-PTSD rape victim group.

Consistent with the “emotionality hypothesis” of Martin et al. (1991), Cassiday et al. (1992) reported that PTSD rape victims exhibited greater Stroop interference for positive words than for neutral words. The authors argued that this finding may indicate that anxious individuals may selectively process any emotional information, positive or negative in valence. There is however a problem with this recourse to the emotionality hypothesis. The words employed by Cassiday et al. were not controlled for emotionality, a limitation that was recognised by the authors. The authors may therefore have been premature in attributing their findings to the emotionality hypothesis proposed by Martin et al. (1991).

Dubner and Motta (1999) examined the relationship between PTSD and sexual abuse in a sample of foster care children and adolescents, and compared them to physically abused and non-abused foster care children and adolescents. The authors employed the emotional Stroop paradigm in an attempt to bypass the difficulties that children reportedly often have in verbalising their thoughts and feelings about traumatic experiences. It should be noted that Dubner and Motta employed additional measures to investigate the relationship between PTSD and sexual abuse, however it is only the emotional Stroop measure that is relevant to the current discussion.

Dubner and Motta (1999) reported that the sexually abused group evidenced significantly longer colour naming latencies for sexual abuse related words, compared to the non-abused group. No difference was found between the sexually abused and physically abused groups for the sexual abuse related words. Consistent with expectation, sexually abused children diagnosed with PTSD showed greater Stroop interference for the sexual abuse related words, compared to positive and neutral words.
Dubner and Motta (1999) theorised that the absence of differences between the sexually abused and physically abused groups may have been a direct result of the high level of secrecy and shame surrounding sexual abuse, and the reluctance of sexually abused children to discuss their experiences. The authors suggested that it was possible that some of the physically abused children may have been sexually abused as well, despite having denied such a history and despite cross-referencing with caseworker reports. Furthermore, the authors suggested that the ambiguity of some of the sexual abuse related words (e.g. “touch”, “secret”) may have made the words salient to the physically abused group as well as the sexually abused group. Despite the ambiguities in their experimental stimuli, Dubner and Motta suggested that the emotional Stroop paradigm shows promise as both a research and diagnostic tool, for children who are unable or unwilling to divulge details of abuse.

Dubner and Motta (1999) cautioned that their findings may have been specific to foster care children, and therefore not easily generalised to other populations of child abuse survivors. The sample recruited by these investigators was unique in that the children had experienced multiple instances of abuse, which may account for the high percentage of PTSD diagnoses in the sexual abuse group (64%), physically abused group (42%) and non-abused group (18%). The authors concluded that it would be premature to nominate PTSD as the core manifestation of sexual abuse trauma, because it could not account for the percentage of abused children in the sample who did not develop PTSD. Dubner and Motta proposed that future research should focus on the effects of sexual abuse on children’s functioning, as well as factors that may facilitate resilience to PTSD symptomatology.

Freeman and Beck (2000) sought to replicate the findings of studies of cognitive interference in adult rape related PTSD (e.g. Cassidy et al., 1992; Foa et al., 1991), with a sample of sexually abused girls diagnosed with current PTSD. The authors argued that in order to better understand the characteristics of PTSD in younger populations, research needs to focus on children and adolescents, rather than extrapolating and generalising from adult PTSD populations.

Freeman and Beck (2000) reported an overall slowing of colour naming responses in the PTSD group. Contrary to expectation, however, the non-PTSD sexually abused girls did not differ in response latencies from the PTSD and non-victimised control groups. In addition, all participants demonstrated interference effects for sexual abuse threat related
stimuli, with the PTSD abuse group showing the most interference, followed by the non-PTSD abuse group and finally the control group.

Consistent with adult theories of PTSD, adolescents with PTSD showed more interference overall regardless of content, yet did not show greater Stroop interference for abuse related words. Freeman and Beck hypothesised that the absence of an interaction between group and word category may have resulted from the considerable diagnostic comorbidity in the PTSD group. However, the authors were able to control for depression and anxiety, and these variables did not confound their original findings.

The finding that the two sexual abuse groups did not differ in overall colour naming latencies is not entirely inconsistent with the adult PTSD literature (e.g. Cassiday et al., 1992). Recall that Cassiday et al. reported Stroop interference for PTSD rape victims, and with a smaller effect size, non-PTSD rape victims. Freeman and Beck (2000) noted that many of the non-PTSD sexually abused girls had previously met the diagnostic criteria for PTSD. Indeed, many non-PTSD adult rape victims in comparable studies (e.g. Cassiday et al., 1992; Foa et al., 1991) had also previously met the diagnostic criteria for PTSD, and differences between PTSD and non-PTSD rape victim groups were observed in these studies (although to a lesser extent in Cassiday et al). Freeman and Beck suggested that the adults in these studies may have received more effective treatment interventions, or they may have underreported PTSD symptomatology. Further, it was argued that past PTSD diagnoses would have been more problematic had threat related interference only been observed in the PTSD and non-PTSD abuse groups. Freeman and Beck reported that all three groups (PTSD, non-PTSD and non-victimised controls) evidenced some degree of threat interference, and therefore the effect could not be attributed to a history of abuse or PTSD. Freeman and Beck proposed that the quality of the abuse related words may not have been optimal, and possibly not specific enough for the abuse populations under investigation. Accordingly, the authors recognised that it would have been advantageous to have their participants rate the experimental stimuli for threat salience following the modified Stroop procedure.

It should be noted that Freeman and Beck (2000) did not entertain the possibility that attentional biases could be expected in both clinical and control groups, but to a greater degree in the former. In mitigation, Freeman and Beck speculated that a generalised response to abuse related stimuli in all participants may best account for their unexpected
findings. However, the authors noted that in a pilot study the control participants did not rate the abuse related stimuli as threatening, and thus the observed interference effect did not necessarily reflect a threat related attentional bias.

In concluding, Freeman and Beck (2000) maintained that their investigation represents an important preliminary step towards understanding the cognitive processing of emotional information by individuals diagnosed with PTSD. The authors proposed that the identification of specific maladaptive forms of cognitive processing has important implications for child and adolescent PTSD, as well as psychopathology in a broader context.

Field, Classen, Butler, Koopman, Zarcone and Spiegel (2001) investigated the effect of sexual re-victimisation on information processing of trauma related stimuli, in childhood sexual abuse survivors diagnosed with PTSD. Field et al. argued that adult women with a history of childhood sexual abuse experience greater distress in response to subsequent sexual assaults, compared to women with no history of sexual abuse who are sexually assaulted. Based on an information-processing model, the authors essentially proposed that re-victimisation results in a priming effect. Because recency of exposure is believed to be an important contributor to the accessibility of related information in memory, re-victimisation is argued to act as a prime in activating trauma relevant memories. It was therefore hypothesised that re-victimised survivors of sexual abuse with PTSD would show greater Stroop interference for sexual / victimisation related stimuli, compared to non-re-victimised survivors.

Field et al. (2001) reported that colour naming latencies were slower for emotionally salient words (i.e. sexual / victimisation and general threat words) compared to neutral words. Overall, slower response latencies were observed for sexual / victimisation threat words compared to general threat words. Consistent with expectation, re-victimised survivors showed significantly greater Stroop interference for sexual / victimisation threat words, compared to non-re-victimised survivors. The non-re-victimised survivors also demonstrated significantly longer response latencies for sexual / victimisation words, compared to general threat related stimuli. The authors concluded that re-victimisation is predictive of Stroop interference, even when subjective stress measures are controlled for.
Field et al. (2001) argued that these findings are consistent with a trauma memory network model. According to Field et al., re-victimisation activates trauma memory networks established through prior victimisation in individuals with PTSD. The authors further suggest that the result of re-victimisation is that the impact of a trauma on cognitive processing of sexual trauma related stimuli is amplified. The authors caution however, that it is unlikely that re-victimisation alone would account for the observed Stroop interference effect for sexual / victimisation threat words among re-victimised survivors.

Field et al. (2001) recognised that the absence of a non-PTSD survivor group and a non-victimised control group may have limited their findings. By excluding these populations, the question of whether sexual victimisation would have less impact on individuals with no history of childhood sexual abuse or PTSD cannot be answered. The authors concluded that in order to better understand the relationship between sexual re-victimisation and cognitive interference, longitudinal research is required to examine these and other related factors.


In summary, a number of studies have used the emotional Stroop paradigm to investigate attentional biases in the context of sexual assault and associated post-trauma syndromes. For example, Foa et al. (1991) observed a Stroop interference effect for rape related stimuli for PTSD rape victims, but not for non-PTSD rape victims even though both groups reported similar rape experiences. The authors speculated that traumatic information may be represented differently in the memories of PTSD trauma survivors (cf. cognitive fear structures – section 1.6.4.). Cassiday et al. (1992) observed similar findings to Foa et al., however the authors also observed Stroop interference for threat stimuli in a group of rape victims without PTSD. Cassiday et al. speculated that this finding may be attributed to residual PTSD symptomatology in the asymptomatic rape victim group. Similarly, Dubner and Motta (1999), observed longer colour naming latencies for sexual abuse related words, compared to neutral words in sexually and physically abused groups of children. Moreover, Freeman and Beck (2000) observed that both PTSD and non-PTSD sexual abuse groups were slower to colour name sexual abuse related words compared to neutral words, although the magnitude of the effect was greater for the PTSD group. Similarly, Field et al. (2001) reported that both victimised and re-victimised survivors showed Stroop interference for sexual assault related words.
Despite the number of studies that have used the emotional Stroop paradigm to investigate sexual assault related attentional biases, at least two key issues appear to remain unresolved.

Firstly, it remains unclear whether attentional biases are only elicited in response to threat related stimuli, or whether attentional biases extend to emotional stimuli in general, irrespective of valence. Numerous researchers have reported evidence supporting the threat hypothesis, however few of these studies have controlled for the possibility that attentional biases may extend to emotional stimuli in general, or even that threat and emotionality attentional biases may co-exist. When considering the emotionality hypothesis, the interpretation of Stroop interference in anxiety extends beyond a simple threat – non-threat distinction, potentially leading to a more complex account of interrelationships between positive and negative stimuli. There is experimental support suggesting specificity of effects in PTSD (e.g. Foa et al., 1991, Williams et al., 1996), however the role of positive and negative stimuli and emotionality requires further investigation.

Secondly, it is not clear whether threat interference (and/or attentional biases in general) is sensitive to specific psychopathology. Williams et al. (1996) noted that Stroop interference in clinical populations implies that the interference effect may be specific to psychopathology. For example, Foa et al. (1991) reported that although PTSD and non-PTSD rape victim groups reported similar rape experiences, only the PTSD group showed Stroop interference for rape related stimuli. However, while Cassiday et al. (1992) reported Stroop interference for high threat words in PTSD rape victims, the authors also reported that a non-PTSD rape victim group exhibited Stroop interference for high threat words, although not to the same extent as the PTSD group. Similarly, Dubner and Motta (1999) observed no difference between a PTSD sexual abuse group and a non-PTSD physically abused group for sexual abuse related words. Freeman and Beck (2000) observed a similar pattern of findings. The authors reported that all participants showed interference effects for sexual abuse related words, with a PTSD abuse group showing the most interference, followed by a non-PTSD abuse group and finally a control group. In a study of sexual re-victimisation and attentional biases, Field et al. (2001) reported that re-victimised survivors and non-re-victimised survivors both showed Stroop interference for sexual assault related words. The re-victimised group exhibited greater Stroop interference however, compared to the non-re-victimised group.
Although specific threat interference effects have been observed in sexual assault related PTSD (e.g. Foa et al., 1991), the question remains as to whether the effects are specific to the disorder, whether they result from trauma exposure, or whether the effects extend to non-disordered individuals. Since Foa et al., a pattern has emerged in the sexual assault related Stroop interference literature, reappraising the clinical specificity hypothesis proposed by Williams et al. (1996). The present review of the emotional Stroop literature cannot discount the possibility that attentional biases may be not so much a question of clinical specificity, but rather a question of magnitude or degree. In the latter contingency, it would follow that Stroop interference may be observed in both clinical and control populations, although the magnitude of the effect should be greater in clinical populations.

In conclusion, future research is required to clarify the determinants of attentional biases, and to explain the cognitive mechanisms that mediate anxiety. To this end, it may be useful to determine whether attentional biases are restricted to the emotional Stroop paradigm. The next section therefore, reviews an alternate paradigm for assessing attentional biases, namely the emotional lexical decision task.

1.8.2. Attentional Bias Effects in the Emotional Lexical Decision Task Paradigm

In the lexical decision task, participants identify whether a presented letter string is a word or a non-word, and early studies of lexical access interpreted speeded lexical decisions as a reflection of word meaning (Chumbley & Balota, 1984). Decreases in response latencies have been associated with words having emotional salience. According to Niedenthal and Setterlund (1994), “emotions should increase the efficiency of perception of emotion congruent stimuli in the visual field; individuals should be able to detect, identify or classify emotion congruent words faster or more accurately than other words” (p. 402).

MacLeod and Mathews (1991) used a lexical decision task to investigate selective attention to threat in generalised anxiety disorder patients and control participants. It should be noted that MacLeod and Mathews were primarily concerned with testing a “processing priorities” hypothesis of anxiety related biases using a double-string lexical decision task. This anxiety model is beyond the scope of the present thesis, and therefore only findings resulting from the more traditional single-string lexical decision task will be discussed.
The stimuli comprised threat words, neutral and non-words, and the threat words were rated by independent judges as being significantly more negative (p < .01) and more related to anxiety (p < .01), compared to the neutral stimuli. MacLeod and Mathews observed no significant differences in response latencies for threat and neutral words between generalised anxiety patients and controls. Moreover, neither trait nor state anxiety scores were significantly correlated with lexical decision times for threat words relative to neutral words. In general, reaction times for threat stimuli were faster than for neutral words for both clinical and control groups. However, the authors noted that given that the threat stimuli were rated as significantly more negative and related to anxiety than the neutral stimuli, the reduction in decision latencies for threat stimuli may reflect the characteristics of the word categories employed. Specifically, it is possible that the threat words shared closer associations within this stimulus category than did the neutral words, and it was suggested that this could lead to a greater associative priming effect or general expectancy for such items.

Mogg, Mathews, Eysenck and May (1991) investigated selective speeding of lexical decisions for threat words compared to neutral words in a comparison of generalised anxiety and control participants. In addition the authors investigated whether decreased decision latencies for threat stimuli (cf. MacLeod & Mathews, 1991) resulted from an associative priming effect. The authors suggested that if this was the case, then the findings observed by MacLeod and Mathews may have reflected associative priming by “word categorisation” rather than word valence. It is possible that the speeded lexical decision latencies observed for the threat stimuli resulted from these words (e.g. nervous, stressed, distressed, frightened) sharing closer associations than the uncategorised neutral words (e.g. facilitate, modulation, openings, waltzing), thus leading to greater associative priming for the threat stimuli. Accordingly, in addition to the stimulus words used by MacLeod and Matthews, Mogg et al. included an additional set of “categorised” neutral words based on household terms (e.g. tablecloth, upstairs, cooking, polished). It should be noted that after MacLeod and Mathews, Mogg et al. investigated a “processing priorities” hypothesis using a double-string lexical decision task condition. Only findings from the more traditional single-string condition are relevant to the current discussion.

Mogg et al. (1991) observed no significant difference in response latencies between clinical and control participants. Moreover, there was no significant difference in response latencies for threat and neutral words across all participants. However, the authors did
observe a significant mean effect of word categorisation ($p < .001$), with longer response latencies for uncategorised neutral words compared to categorised neutral words. The authors concluded that, given the strong main effect of “word categorisation” on response latencies, the prior findings of MacLeod and Matthews could not be attributed solely to a word valence effect, but rather may have reflected an associative priming effect.

Mathews and Milroy (1994) investigated lexical decisions for threatening information in anxious participants. According to Mathews and Milroy, if attentional priority is given to threatening stimuli, it follows that anxious individuals must first make a basic valence evaluation of emotional stimuli, so that threats may be processed differently to non-threats. The authors proposed that if the tendency to process threat stimuli differently to non-threat stimuli is a characteristic of anxious individuals, rather than faster lexical access, then it would be expected that anxious individuals have faster access to threat value information.

Mathews and Milroy (1994) observed no evidence to support the hypothesis that anxious individuals are faster at making lexical decisions for threatening information. The authors suggested that the lexical decision task may not require access to emotional information, and proposed therefore that speeded lexical decisions for emotionally salient information occur only when the task requires access to affective meaning.

Despite the absence of evidence of speeded lexical decisions for emotionally salient information, Mathews and Milroy argued that evidence for some selective processing of threat stimuli remains strong. The authors argued that the reason for their negative findings in the face of positive findings in the Stroop interference literature (e.g. Mathews et al., 1990; Mogg et al., 1989) may be that the processing mechanisms may differ for different experimental paradigms (e.g. Stroop vs lexical decision task). Mathews and Milroy argued that threatening stimuli may be selected (or rejected) at a sufficiently early stage of information processing, that it may not require an affective valence judgement. Further, it was proposed that the effects of threat value evaluations may vary according to anxiety levels. Accordingly, it was suggested that anxious individuals may prioritise attentional processing according to threat value, thereby causing interference with non-threat tasks.

Geer and Bellard (1996) used a lexical decision task to investigate the cognitive processing of sexual words. The authors aimed to extend the research literature on the
“SCID” effect. Geer and Melton (1994) used the acronym “SCID” (sexual content induced delay) to describe the observation that lexical decision response latencies for words with sexual content may be delayed, relative to non-sexual words.

Geer and Bellard observed delayed lexical decisions for sexual related words compared to romantic and neutral words in female participants. A similar pattern was observed for male participants, although the findings did not reach statistical significance. Response latencies for sexual related words were significantly slower for women, compared to men.

The authors argued that their findings were an important advance in the knowledge of cognitive processing of sexual stimuli, such that the SCID effect can be evidenced at a very basic level of information processing using an unprimed lexical decision task. The authors further argued that the implication here is that a similar effect ought to be observed using any task that involves semantic processing. Geer and Bellard suggested that a combination of response and appraisal processes may explain the SCID effect. The authors speculated that sexual words may evoke a response bias, which may reflect a tendency to be apprehensive when processing sexual material. The authors argued that the effect was not explicable in terms of a resource allocation effect, because emotionality ratings of word stimuli were not related to the observed response latencies. Emotionality ratings indicated that women rated the sexual stimuli as more unacceptable, less positive and less familiar, in comparison to the ratings completed by men. The authors proposed that because sexual related stimuli can have both positive and negative valency, the extent to which their findings can be extrapolated to other research on emotion and information processing (e.g. anxiety or depression) is unknown and deserves further investigation.

1.8.2.1. Summary of Attentional Bias Effects in the Emotional Lexical Decision Task

In summary, there are many unresolved issues regarding the use of the emotional lexical decision task as a measure of emotional salience and attentional biases. Given the absence of lexical decision task studies to investigate sexual assault related PTSD and attentional biases, and considering the literature reviewed here, it appears that the use of the lexical decision task as a measure of attentional biases is still very much in its infancy. According to Niedenthal and Setterlund (1994), speeded lexical decisions are associated with emotional salience, yet other interpretations have been advocated in the context of anxiety. For example, MacLeod and Mathews (1991) and Mogg et al. (1991) attempted to
account for speeded lexical decisions for threat stimuli in terms of an associative priming effect, rather than an emotional salience effect. Mathews and Milroy (1994) observed no evidence of speeded lexical decisions for emotionally salient stimuli. The authors argued that the lexical decision task may not require access to emotional information, and proposed that attentional biases may only manifest in paradigms that require access to affective meaning. Moreover, the authors argued that attentional biases are independent of affective valence judgements. Geer and Bellard (1996) used a lexical decision task to demonstrate delayed lexical decisions (i.e. “interference” rather than “facilitation”) for sexual related stimuli.

Given the absence of consistent findings in the literature reviewed here, it could be argued that the lexical decision task has not been adequately investigated as a measure of attentional biases. The lexical decision task ought therefore to be validated as a measure of attentional biases in both clinical and control populations. Similar issues arguably apply to both the emotional Stroop (see section 1.8.1. and 1.8.1.1.) and emotional lexical decision task as measures of attentional biases. For example, the lexical decision task ought to be used to investigate whether attentional biases are specific to threat related stimuli, or whether similar biases may be elicited in response to emotionally salient stimuli, regardless of valence. In addition, while speeded lexical decisions have been advocated as an index of emotional salience (e.g. Niedenthal & Setterlund, 1994), the findings of Geer and Bellard (1996) suggest that in some circumstances, delayed lexical decisions may reflect emotional salience. The circumstances in which speeded (i.e. facilitation) and delayed (i.e. interference) lexical decision responses may occur deserves further investigation.

Consistent with the emotional Stroop paradigm, the issue of clinical specificity (cf. Foa et al., 1991; Williams et al., 1996) ought to be studied using a lexical decision task paradigm. To the best of the present author’s knowledge, there has been no attempt to study attentional biases in the context of sexual assault and post-trauma syndromes (e.g. PTSD) using an emotional lexical decision task paradigm. Accordingly, it is not clear whether lexical decision response latencies may be sensitive to specific psychopathology. The question remains as to whether lexical decisions may be sensitive to post-trauma syndromes, trauma exposure or whether speeded (or delayed) response latencies may be observed in non-disordered individuals. In conclusion further research is needed to validate the lexical decision task as a measure of attentional biases, for emotionally salient information, in both clinical and control populations.
1.9. Known Confounds of Word Processing Tasks of Attentional Biases

Studies of the determinants of variation in responses on word processing paradigms have identified a number of semantic constructs that cause effects that should be controlled for in word processing tasks. The following sections briefly discuss known confounds of word processing paradigms, specifically, word length, word frequency, age of acquisition, word familiarity and concreteness.

1.9.1. Word Length

It is common practice to match word stimuli for approximate length (i.e. number of letters) in studies of attentional biases using word processing paradigms. The rationale for controlling word length originates from models of the “word length effect” (Hulme, Surprenant, Bireta, Stuart & Neath, 2001). The item based “feature” model (Neath & Nairne, 1995) views words as consisting of multiple segments, each of which must be correctly connected in order for the word item to be identified. Short and long word items are assumed to differ in the number of segments they contain, and because long words have more segments, the probability of an identification error and / or longer response latency is greater, in comparison to shorter word items (Hulme et al., 2004). Hulme et al. reported two experiments that compared the identification of short and long words. When lists of long words and separate lists of short words were presented, participants recalled fewer long words compared to short words. When the presentation of long and short words was intermixed however, the authors observed no evidence of a word length effect.

In the visual word recognition literature, the effects of word length are well established. For example, Lavidor, Ellis, Shilcock and Bland (2001) noted that when an individual is fixating centrally, information presented to the right of the fixation point (in the right visual field) is projected to the visual cortex of the left cerebral hemisphere. In contrast, information presented to the left of the fixation point (in the left visual field) is projected to the right cerebral hemisphere (for a review of the neuroanatomy of the visual system, see Fitzgerald (1996)). Studies that have manipulated the number of letters presented to the left and right of a central fixation point have observed that lexical decision response latencies are affected by the number of letters presented to the left, but not to the right of the fixation point (e.g. Lavidor et al., 2001).
1.9.2. Word Frequency

The frequency with which a word occurs in a given language is widely believed to affect the efficiency with which a word can be recognised and a response made. Words that occur frequently have been shown to be processed more rapidly and accurately than words that occur less frequently (see Monsell, 1991, for review).

1.9.3. Age of Acquisition

An issue related to word frequency is “age of acquisition”. Morrison and Ellis (1995) have argued that the age at which one first learns a word may be a more powerful predictor of lexical processing than word frequency per se. In a series of experiments, Morrison and Ellis observed significant effects of age of acquisition, in that early-acquired words were named faster than late acquired words. The authors argued that these effects were not attributable to word frequency, because once age of acquisition was controlled, no significant word frequency effects were observed. More recently however, Lewis, Gerhand and Ellis (2001) have argued that it is the total number of times a word has been encountered (its cumulative frequency), not its simple age of acquisition or simple frequency, that best predicts lexical processing.

1.9.4. Word Familiarity

Familiarity is an estimate of how familiar speakers are with a word (McDonald & Shillcock, 2001). Familiarity and frequency are generally highly correlated because familiar words tend to be produced and encountered more often than unfamiliar words (McDonald & Shillcock, 2001).

1.9.5. Concreteness

Concreteness has been extensively studied as one of the semantic properties believed to influence lexical processing (e.g. James, 1975; Paivio, 1971; Schwanenflugel & Shoben, 1983; Schwanenflugel, Harnishfeger & Stowe, 1988). Concrete words are those that represent phenomena that can be perceived with the senses (e.g. spoon), and have been observed to be associated with faster lexical responses in comparison to abstract words (e.g. grief) (James, 1975; Schwanenflugel et al., 1988; McDonald & Shillcock, 2001).

1.9.6. Interactions with Psychopathology

Although these semantic properties are important confounds known to influence responses on word processing tasks in general, they may be less important to studies
involving clinical populations, or alternatively may lead to symptomatic group differences. For example, Cassiday et al. (1992) argued that the frequency with which patients use or think about words that are congruent to their specific clinical condition(s) is almost certainly higher than the frequency with which the general population uses such words. Similarly, this line of reasoning may also apply to the semantic properties of age of acquisition, familiarity and concreteness. It could be argued that words that are congruent with a specific clinical condition are more likely to be abstract than concrete, acquired at any stage of the lifespan and more familiar to patients compared to non-disordered individuals.

One must be careful to avoid a circular argument at this point. By arguing that words related to clinical specificity are more familiar to patients than non-disordered individuals, it could be suggested that any observed attentional bias effects may be attributed to the familiarity of the information, rather than the emotional or threat salience. To the best of the present author’s knowledge, there is no precedent in the literature for assessing the familiarity of experimental stimuli. It should be noted that Foa et al. (1991) asked individuals (independent of the study) to estimate the frequency with which rape related words were used. However, despite the putative correlation between familiarity and frequency (see section 1.9.4.), it could be argued that the procedure used by Foa et al. yielded estimates of word frequency that may not have accurately reflected the experiences of the study participants, and accordingly may not have been indicative of word familiarity for the study population. On the other hand, precedents do exist in the literature for assessing emotional salience and threat salience of word stimuli (see section 2.2.6.), which seemingly makes it easier to attribute observed attentional bias effects to the salience of word stimuli.

1.10. Methodological Issues in Word Processing Tasks of Attentional Biases

1.10.1. Controlling for Threat Specificity and Emotionality

In the context of PTSD, attentional bias studies of the threat hypothesis (see section 1.4.2.1.) have generally argued that anxious individuals selectively process threat stimuli that are congruent with the focus of their anxiety. For example, PTSD rape and sexual abuse victims appear to allocate more attentional resources to sexual assault related stimuli (e.g. Cassiday et al., 1992; Foa et al., 1991). In contrast, the emotionality hypothesis postulates a more general attentional bias that extends to stimuli of both positive and negative valence (Martin et al., 1991). Proponents of the emotionality hypothesis have questioned whether
anxiety is intrinsically associated with selective processing of threat alone, and instead have proposed that anxiety may lead to attentional biases for emotional material in general.

Prior studies of anxiety related attentional biases have often included a positive word category, but have generally omitted a negative non-threat word category, presumably because the specific threat words were also deemed to be negative in valence (see table 1, section 1.8.1. & table 2, section 1.10.4.). In order to test predictions of the threat and emotionality hypotheses adequately, experimental stimuli should not be restricted to specific threat, neutral and positive conditions alone. To test the specificity of threat effects, it is necessary to include a general threat word category together with the specific threat words, and all categories should be matched for emotionality. Specifically, the absence of a negative non-threat condition arguably makes it impossible to differentiate positive emotionality effects from negative emotionality effects. A positive emotionality effect would be evidenced in an attentional bias for positive stimuli relative to neutral stimuli. On the other hand, a negative emotionality effect would be evidenced in an attentional bias for negative stimuli relative to neutral stimuli. While it must be acknowledged that there is potentially a very subtle distinction between what can be considered “threatening” and what may be considered generally “negative” in meaning, the distinction is arguably a critical factor in the interpretation of anxiety related attentional biases, especially in the differentiation of threat specificity and negative emotionality. Put simply, what one individual considers threatening, another individual may consider negative but non-threatening. For a review of studies that examined attentional biases for emotional words, and summaries of the word categories used, see Williams, Mathews and MacLeod (1996) and Ruiz-Caballero and Bermudez (1997) (see section 1.10.4.).

1.10.2. Semantic Relatedness

An important methodological issue in studies of anxiety related attentional bias is “semantic relatedness”. Semantic relatedness refers to the degree to which words within a category are related. For example, the words “cat” and “dog” belong to common semantic groups, such as “animals” and “pets”, and are therefore strongly semantically related. In contrast, the words “hat” and “dog” do not belong to a common group, and therefore are not semantically related (Thrasher, Dalgleish & Yule, 1994).

According to Holle, Neely and Heimberg (1997), previously observed differences between threat and neutral colour naming latencies may have been the result of two separate
effects: the threat value of the words used, as well as the degree to which the words were semantically related. Thrasher et al. (1994) argued that without semantically related neutral control words, it is not possible to exclude effects of semantic relatedness.

1.10.3. Blocked versus Random Stimulus Presentation

Another methodological issue that is potentially related to the issue of semantic relatedness, and thus may require due consideration in attentional bias studies, is blocked versus random word stimulus presentation. Blocked presentation of stimuli involves words of the same category being presented one after another. Blocked presentations have been criticised because it can be difficult to determine whether specific threat effects observed using this format, are attributable to attentional biases, post-stimulus rumination (Foa et al., 1991), or to semantic priming effects (Holle et al., 1997).

In contrast to the blocked presentation format, the random presentation format presents stimulus words from different categories intermixed in random order. Holle et al. (1997) argued that the random format ought to minimise semantic priming and rumination effects that may occur in the blocked format.

In a study of rape victims with and without PTSD, using the emotional Stroop paradigm, Cassiday et al. (1992) directly compared blocked versus random presentation formats. The authors observed significantly less interference in the blocked format for positive and neutral stimuli, while colour-naming latencies for threat stimuli were not affected by format. Cassiday et al. proposed that blocked formats may produce semantic habituation for positive and neutral stimuli, but not for threatening information.

In contrast, Kaspi, McNally and Amir (1995) found no significant difference between blocked and random presentation formats in an emotional Stroop investigation of combat veterans with and without PTSD. However, the authors reported non-significant trends suggesting that blocked presentations of threat stimuli may exacerbate interference effects.

In the face of the apparent disagreement in the literature, regarding blocked versus random presentation formats, the current study favours a random stimulus presentation format. In addition to controlling for post-stimulus rumination and semantic priming, a random presentation format was considered to be less potentially traumatic for survivors.
of sexual assault. The consensus of study advisors and consultants was that a blocked design may potentially trigger acute emotional distress, and therefore was not in the best interests of traumatised participants.

1.10.4. Validation of Experimental Word Stimuli

The selection of appropriate experimental word stimuli is critical to the design of attentional bias studies employing word processing paradigms. The development of standardised norms (e.g. ANEW, Bradley & Lang, 1999) (see section 2.3.8.) for the study of emotion and attention, permits straightforward comparisons and replications of research findings. Although the use of standardised norms has advantages (e.g. ease of comparison and replication), it is here argued that researchers ought to validate the applicability of such norms for the specific populations under investigation, by asking participants to rate the word stimuli.

For studies of attentional bias, the validation of word stimuli should arguably consist of two separate ratings, specifically emotional salience and threat salience. Ideally emotional salience ratings for emotional word categories ought to be comparable regardless of valence. It should be noted however, that comparable emotionality across word categories (rated by participants) may not be a realistic expectation, especially in studies involving clinical populations. Perhaps more importantly, researchers should attempt to initially select emotional word stimuli norms with comparable affective valence ratings, regardless of valence.

To the best of the present author’s knowledge, there does not yet exist a set of standardised threat salience norms. At present, the best that investigators can do is to select specific and general threat words based on subjective judgements of the words applicability to the specific populations under investigation. For clinical studies, such judgements ought to be made by, or in conjunction with, highly experienced clinical staff. Participants’ threat salience ratings should ideally differentiate threat categories from other emotional and neutral word categories. Similarly, threat salience ratings by clinical participants should ideally differentiate specific threat words from general threat words.

Validating the applicability of established affective norms for specific populations does not appear to have been a priority in the attentional bias literature. For attentional bias studies based on the emotional Stroop (see section 1.8.1.) and emotional lexical decision
task (see section 1.8.2.), none of the studies reviewed here asked their participants to validate the experimental stimuli. Word validation by independent judges who do not participate in the experimental tasks appears to be the preferred method of validating experimental stimuli (e.g. Cassidy et al., 1992; Foa et al., 1991; Freeman & Beck, 2000; MacLeod & Mathews, 1991; Mathews & Milroy, 1994). A number of investigators relied on word stimuli that had been used previously, however the applicability of the stimuli for the populations under investigation was not assessed (e.g. Dubner & Motta, 1999; Field et al., 2001; Geer & Bellard, 1996; Mogg et al., 1991).

Retrospective comparison of the word lists used by the authors of the emotional Stroop and emotional lexical decision task studies reviewed here (see section 1.8.) was inconclusive. It was anticipated that category membership could be verified by inspecting the ANEW affective valence norms (see section 2.3.8.) for each word. Table 2 lists the ANEW affective valence norms for words used in emotional Stroop and emotional lexical decision task studies reviewed here. However, many of the words used in these studies were not listed in the ANEW database. The data presented in Table 2 is therefore an estimate of affective valence ratings. With these caveats in mind, there is a remarkable spread among studies in emotional valence norms for each type of word category.
Table 2
ANEW affective valence norms for emotional Stroop and emotional lexical decision task (LDT) studies reviewed here.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Paradigm</th>
<th>Word Category</th>
<th>Mean</th>
<th>SD</th>
<th>N</th>
<th>N (ANEW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foa et al. (1991)</td>
<td>Stroop</td>
<td>Specific Threat</td>
<td>2.27</td>
<td>1.51</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General Threat</td>
<td>2.54</td>
<td>1.58</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Cassiday et al. (1992)</td>
<td>Stroop</td>
<td>High Threat</td>
<td>4.17</td>
<td>2.92</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moderate Threat</td>
<td>2.89</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive</td>
<td>8.23</td>
<td>.50</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>7.18</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Dubner &amp; Motta (1999)</td>
<td>Stroop</td>
<td>Sexual Abuse</td>
<td>8.05</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OCD</td>
<td>2.96</td>
<td>.31</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive</td>
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<td>.32</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>5.20</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Freeman &amp; Beck (2000)</td>
<td>Stroop</td>
<td>Sexual Abuse</td>
<td>6.83</td>
<td>1.25</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
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<td>.46</td>
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<td>.97</td>
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<td>7</td>
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<td>5.32</td>
<td>.39</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Field et al. (2001)</td>
<td>Stroop</td>
<td>Sexual Threat</td>
<td>1.74</td>
<td>.47</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
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<td>2.54</td>
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</tr>
<tr>
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<td></td>
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<td>-</td>
<td>-</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>MacLeod &amp; Mathews (1991) &amp; Mogg et al. (1991)</td>
<td>LDT</td>
<td>Threat</td>
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<td>.76</td>
<td>40</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Mathews &amp; Milroy (1994)</td>
<td>LDT</td>
<td>Physical Threat</td>
<td>2.00</td>
<td>.38</td>
<td>24</td>
<td>12</td>
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<tr>
<td></td>
<td></td>
<td>Social Threat</td>
<td>2.87</td>
<td>1.34</td>
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<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive</td>
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<td>.43</td>
<td>24</td>
<td>11</td>
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<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>7.33</td>
<td>-</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>Geer &amp; Bellard (1996)</td>
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<td>Sexual</td>
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<td>2.22</td>
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<td>Neutral</td>
<td>5.69</td>
<td>1.66</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: the ANEW norms were gathered from word ratings by non-clinical participants, which accounts for why sexual abuse related words (e.g. hold, undress, penis, kissing, taken from Freeman & Beck 2000; sex, privates, naughty, touch, taken from Dubner & Motta, 1999) may be rated on the positive end of the scale. It should be remembered that such words were not rated in the context of sexual abuse for the ANEW norms.
1.10.5. Mood Congruency and Participant Ratings of Affective States

Recall from section 1.5.1.2. that an individual’s affective state is believed to facilitate the recall of mood congruent information from memory (Forgas, 1999). In the emotional Stroop and lexical decision tasks, mood congruency may be evidenced as an association (e.g. a statistically significant ANOVA finding) between response latencies for emotionally salient word stimuli and participant ratings of subjective affective and anxiety states. For example, if response latencies for negative words were significantly different from neutral words, an attentional bias would be evident. In the event that participant’s response latencies for negative words were significantly associated with negative affect scores, then the observed attentional bias may be attributed, at least in part, to a mood congruency effect. On the other hand, if no significant effect was observed between response latencies and negative affect scores, then the attentional bias may be attributed to a more general negative emotionality effect. In order to differentiate mood congruency effects from emotionality effects, it is necessary to administer measures assessing participant anxiety and affective states.

1.10.6. Summary of Methodological Issues in Word Processing Tasks of Attentional Biases

The preceding section described five key methodological issues that should be addressed in studies that use word processing tasks to quantify threat and emotionality attentional biases. First, researchers should attempt to control for threat specificity and emotionality, by employing an appropriate set of word categories. Second, it is important to control for semantic relatedness. Specific threat words (e.g. rape related threat words) share a common theme, and without a category of semantically related neutral words, it is not possible to differentiate effects of semantic relatedness from threat effects. The third issue that requires due consideration is blocked versus random stimulus presentation. Each has advantages and limitations, and as such, researchers should endeavour to provide justification of the format they choose to employ. Fourth, it is important that experimental stimuli are validated for the population(s) under investigation, even when stimuli are derived from standardised norms. Fifth, in order to differentiate participant mood state effects (e.g. congruency) from threat and emotionality effects, it is necessary to include measures to assess participant anxiety and affective states.

The current study attempts to control for these five methodological issues. In order to control for threat specificity and emotionality, the current study employed specific threat, general threat and emotional non-threat (positive and negative) word categories (see section
2.3.7. & 2.3.8.). The issue of semantic relatedness was addressed in the current study by including both an uncategorised neutral word category and a categorised (i.e. household items) neutral word category (see section 2.3.8.). The current study favoured a random stimulus presentation format. A blocked presentation format arguably has greater potential to trigger acute emotional distress in traumatised participants, and therefore was not deemed to be in their best interests (see section 1.10.3.). In order to validate the experimental word stimuli, participants rated the words for both threat salience and emotional salience (see section 2.3.6.). Lastly, in an attempt to differentiate mood congruency effects from threat and emotionality effects, the current participants completed anxiety and affective state questionnaires (see section 2.3.2. & 2.3.3.).

1.11. Aims and Hypotheses

1.11.1. Aims of study

The general aim of this study was to investigate attentional biases in survivors of sexual assault trauma and non-traumatised controls, testing predictions of both the threat and emotionality hypotheses.

One of the most prominent and potentially disabling symptoms of the syndromes that can follow a traumatic event such as sexual assault, is the enduring preoccupation with and inability to forget the trauma (see section 1.3.). According to attentional bias models (see section 1.4.2.), the trauma renders the victim hypervigilant, or overly sensitive to cues in the environment which constantly reinforce the preoccupation with the trauma and preclude forgetting it. Previous researchers have reported evidence consistent with attentional bias models (e.g. Cassiday et al., 1992; Foa et al., 1991) (see section 1.8.), however there remains some disagreement about whether the bias is a specific threat salience effect or one reflecting a more general emotionality effect. (see section 1.4.2.1.)

Specific aims of the present study were to administer both the emotional Stroop and emotional lexical decision task paradigms, and to directly test and compare predictions of the threat and emotionality hypotheses, in clinical and control populations. The study therefore comprises three key comparisons:

1.11.1.1. Threat versus Emotionality Hypotheses

The threat hypothesis proposes that anxious individuals selectively process threat stimuli that are congruent with the focus of their anxiety (Foa et al., 1991; Martin et al.,
1991) (see section 1.4.2.1.). In contrast, the emotionality hypothesis proposes that anxious individuals may show comparable attentional biases for stimuli of comparable emotionality, regardless of valence (Martin et al., 1991) (see section 1.4.2.1.). It remains unclear whether attentional biases are restricted to specific threat salient information, or whether such biases extend to stimuli of both positive and negative valence. Further, it is not clear whether specific threat and emotionality attentional biases may co-exist.

Accordingly, the current study compares predictions of both the threat and emotionality hypotheses. Further, the current study distinguishes between specific threat, general threat, positive emotionality and negative emotionality.

1.11.1.2. Symptomatic versus Asymptomatic

Previous studies of rape related attentional biases and PTSD (e.g. Cassiday et al., 1992; Foa et al., 1991) have generally focused on post-trauma symptoms, by comparing PTSD rape victims, non-PTSD rape victims and non-traumatised controls (see section 1.8.1.). Brewin et al. (1996) cautioned against study designs in which individuals with current PTSD are compared to individuals exposed to the same trauma but without current PTSD. The authors argued that a non-PTSD trauma group may contain individuals who have inhibited emotional processing, thereby masking possible posttraumatic symptomatology.

The current study was comprised of two separate group comparisons:

(a) After Brewin et al. (1996) attentional biases were compared between non-traumatised controls overall and survivors of sexual assault overall.

(b) Consistent with prior studies of rape related attentional biases and PTSD (e.g. Cassiday et al., 1992; Foa et al., 1991), survivors of sexual assault were dichotomised into symptomatic and asymptomatic groups, and word type effects were compared between PTSD positive survivors of sexual assault, PTSD negative survivors of sexual assault, and a matched subset of non-traumatised controls.

1.11.1.3. Stroop versus Lexical Decision Task

Evidence from studies using the emotional Stroop task (e.g. Cassiday et al., 1992; Foa et al., 1991) (see section 1.8.1.) suggests specificity of attentional bias effects in anxiety, however it is not clear whether sexual assault related attentional biases manifest only in the context of the emotional Stroop paradigm. Since lexical decision task studies
have been interpreted in terms of biases in information processing (e.g. MacLeod & Mathews, 1991; Mogg et al., 1991), the lexical decision task may be a viable alternative to the emotional Stroop paradigm for measuring attentional biases (see section 1.8.), and both paradigms will be directly compared here.

1.11.2. Hypotheses

The study design consists of a series of contingent hypotheses, grouped according to predictions of emotionality effects, general threat effects, and specific threat effects for clinical and control groups.

1.11.2.1. Emotionality Effects

If advocates of the emotionality hypothesis (see section 1.4.2.1.) are correct, then it would be expected that anxious individuals will show attentional biases for emotionally salient stimuli in general, regardless of valence (cf. Martin et al., 1991).

Extrapolating from the threat hypothesis literature (see section 1.4.2.1. & 1.8.1.), attentional biases consistent with the emotionality hypothesis are expected to fall along a continuum rather than show a categorical clinical effect (c.f. Foa et al., 1991; Williams et al., 1996).

Accordingly, it would be expected that both controls and survivors of sexual assault will elicit emotionality effects, although the magnitude of these effects is expected to be greater for survivors of sexual assault, compared to controls.

Similarly, for the symptomatic versus asymptomatic group dichotomisation (see section 1.11.1.2.), matched controls, PTSD positive survivors, and PTSD negative survivors are expected to elicit attentional biases for emotionally salient stimuli. For PTSD positive survivors of sexual assault, the magnitude of this effect is expected to be greater compared to PTSD negative survivors and matched controls. The magnitude of emotionality effects for PTSD negative survivors is expected to be greater in comparison to matched controls.

1.11.2.2. General Threat Effects

Although attentional bias studies have generally focused on specific threat effects (see section 1.8.1.), the possibility that threat salience may extend beyond specific threats to more general threats cannot be discounted.
Accordingly, if threat salience encompasses both specific and general threats, then it would be expected that both controls and survivors of sexual assault will elicit general threat effects, although the magnitude of these effects is expected to be greater for survivors of sexual assault.

Similarly, for the symptomatic versus asymptomatic group dichotomisation (see section 1.11.1.2.), matched controls, PTSD positive survivors, and PTSD negative survivors are expected to elicit attentional biases for general threat stimuli. For PTSD positive survivors of sexual assault, the magnitude of this effect is expected to be greater compared to PTSD negative survivors and matched controls. The magnitude of the general threat effect for PTSD negative survivors is expected to be greater in comparison to matched controls.

1.11.2.3. Specific Threat Effects

Since Foa et al., a pattern has emerged in the literature that suggests that attentional biases may be a question of magnitude, or a continuum of effects, rather than being specific only to clinical participants (see section 1.8.1.). Accordingly, the current study predicts that both controls and survivors of sexual assault will elicit specific threat attentional biases, although the magnitude of these effects is expected to be greater for survivors of sexual assault than for controls.

Similarly, for the symptomatic versus asymptomatic group dichotomisation (see section 1.11.1.2.), matched controls, PTSD positive survivors, and PTSD negative survivors are expected to elicit attentional biases for specific threat stimuli. For PTSD positive survivors of sexual assault, the magnitude of this effect is expected to be greater compared to PTSD negative survivors and matched controls. The magnitude of the specific threat effect for PTSD negative survivors is expected to be greater in comparison to matched controls.
2. Method

Chapter Overview

The Method section begins where the previous chapter concluded, with a discussion of the study design and operationalisation of study effects. This is followed by a discussion of the characteristics of the clinical and control participants, and participant inclusion and exclusion criteria. The materials and apparatus section follows and describes the questionnaires used in the current study. The questionnaires cover demographic data, anxiety and affect, sexual assault symptoms, PTSD symptoms, and emotionality and threat salience ratings of the experimental word stimuli. The next two sub-sections detail the development and selection of the six experimental word stimuli categories used in the current study. This is followed by a detailed description of the computerised word processing paradigms, namely the emotional Stroop task and the emotional lexical decision task. The Method section concludes with a discussion of the procedures used in the current study.

2.1. Study Design and Operationalised Effects

The study is comprised of a number of analyses, designed to investigate differences in information processing between non-traumatised controls and survivors of sexual assault (overall, and dichotomised symptomatic and asymptomatic groups – see section 1.11.1.2.). A mixed model design was used, with “word category” (sexual assault related threat, general threat, negative, positive, categorised neutral, uncategorised neutral and non-words) as the within subjects factor. There were two alternative between subjects factors, “group” (sexual assault survivors versus controls), and “symptomatology” (symptomatic versus asymptomatic versus matched subset of controls).

For the symptomatic versus asymptomatic group dichotomisation (see section 1.11.1.2.), survivors of sexual assault were assigned to symptomatic (PTSD Positive) and asymptomatic (PTSD negative) groups based on cut-off score criterion on the MPSS PTSD symptomatology measure (see section 2.3.5.).

Each experimental word and non-word was presented once only for each participant, and the order of stimuli presentation was randomised by the task computer for each participant. For the emotional Stroop paradigm, each word and non-word was assigned
to one of the following colours, red, yellow, green or blue. The order of administration of the Stroop and lexical decision task paradigms was counter-balanced across participants.

The following section details how each of the effects under investigation was operationalised.

2.1.1. Lexical Effects

The analysis of a lexical effect was included to verify semantic processing in all participants. A lexical effect was operationalised as the difference in response latencies between non-word and neutral word categories.

For both the emotional Stroop task and the emotional lexical decision task, a lexical effect is observed if response latencies for non-words are significantly different to neutral words.

2.1.2. Categorisation Effects

The analysis of a categorisation effect was included in an attempt to control for semantic relatedness (see section 1.10.2.). A categorisation effect was operationalised as the difference in response latencies between categorised neutral words and uncategorised neutral words.

For both the emotional Stroop task and the emotional lexical decision task, a categorisation effect is observed if response latencies for categorised neutral words are significantly different to uncategorised neutral words.

2.1.3. Emotionality Effects

An emotionality effect was operationalised as the difference in response latencies between emotional (non-threat) words and uncategorised neutral words.

For both the emotional Stroop task and the emotional lexical decision task, a positive emotionality effect is observed if response latencies for positive words are significantly different to uncategorised neutral words. A negative emotionality effect is observed if response latencies for negative words are significantly different to uncategorised neutral words.
2.1.4. General Threat Effects

A general threat effect was operationalised as the difference in response latencies between general threat words and uncategorised neutral words.

For both the emotional Stroop task and the emotional lexical decision task, a general threat effect is observed if response latencies for general threat words are significantly different to uncategorised neutral words.

2.1.5. Specific Threat Effects

A specific threat effect was operationalised as the difference in response latencies between specific sexual assault related threat words and categorised neutral words (see section 2.3.8.).

For both the emotional Stroop task and the emotional lexical decision task, a specific threat effect is observed if response latencies for specific threat words are significantly different to categorised neutral words.

2.2. Participants

2.2.1. Survivors of Sexual Assault

The clinical sample in the present study comprised 28 survivors of sexual assault, 26 female and 2 male, with a mean age of 38.11 years (SD = 10.48). The number of years since assault(s) ranged from 1 year to 41 years (M = 19.21, SD = 11.11). Seventy-five percent of the survivors recruited for the study knew the identity of their assailant(s), and 82.14% had experienced multiple sexual assaults. In terms of PTSD, 46.3% of survivors had received a formal psychiatric diagnosis, 46.3% of survivors had been diagnosed with a psychiatric disorder other than PTSD, and 50% were taking prescription medication at the time of the study.

Sexual assault participants were recruited from Melbourne counselling and sexual assault agencies, including “Centres Against Sexual Assault” (CASAs) (South Eastern CASA and Northern CASA), University Counselling Services, and private psychiatric clinics. Participants were also recruited through the media via newspaper advertisements. A variety of recruitment avenues were explored to maximise participant numbers and in an attempt to ensure a broadly representative sample. Sexual assault was defined as “a continuum of behaviours, from sexual harassment to life threatening rape. These behaviours
include lewdness, stalking, indecent assault, date rape, drug assisted sexual assault, child
sexual abuse, incest, exposure of a person to pornography, use of a person in pornography,
and threats or attempts to sexually assault” (ABS, p.9, 2003). The definition of sexual
assault was necessarily broad to maximise participation rates, and was adopted after
consultation with highly experienced clinical staff from collaborating institutions.

Male and female survivors of any type of sexual assault, with or without a diagnosis
of PTSD, were invited to participate in the study. Survivor participants were required to be
at least 18 years of age, and the assault(s) must have occurred at least one month prior to
participation. No limit was placed on the number of years elapsed since the assault(s).
Survivors could be diagnosed with a co-morbid disorder, and could be taking any form of
medication, providing their ability to complete the tasks of the study were not
compromised. It should be noted that medications used to treat anxiety disorders have been
known to produce attentional and psychosocial impairments (see review by Curran, 1991),
and that repeated use over time may increase selective attention to threat cues (see Westra
& Stewart, 1998). For the current study however, the exclusion of medicated survivors
would have severely compromised participation rates. The inclusion criteria were pre-
reviewed and critiqued by highly experienced clinical staff of several participating
institutions.

2.2.2. Controls

The control group comprised 28 participants, 26 female and 2 male, with a mean
age of 32.89 years (SD = 12.39). Controls had never experienced any form of sexual assault
or psychiatric illness.

2.2.3. Survivors of Sexual Assault and Controls

Exclusion criteria for all participants included a history of neurological pathology
causing seizures (e.g. epilepsy), colour blindness, dyslexia or non-fluency in English
language reading, and the emotional or physical inability to complete the tasks.

Ninety-eight point two (98.2) per cent (%) of participants indicated that English was
their primary language, and 98.2 % indicated that their understanding of the English
language was “very good” or “excellent”. All participants had normal or corrected to
normal vision, and participants were not excluded on the basis of handedness. Participants
were approximately matched for age, education level, marital status and primary language.
All participants provided informed consent prior to the study, which was approved by institutional ethics committees.

2.3. Materials & Apparatus

2.3.1. Demographic Questionnaire

The demographic questionnaire comprised two parts. Part one included information concerning age, education level, marital status and primary language. All participants completed part one of the demographic questionnaire. The second part of the questionnaire asked survivors of sexual assault to disclose general information about the sexual assault(s) together with their general and mental health. The demographic questionnaire is included as Appendix A.

2.3.2. Anxiety Rating Measure

The State Trait Anxiety Inventory (STAI) (Spielberger, 1968) consists of two separate self-report scales measuring state (how people feel “right now”) and trait (how people feel “generally”) anxiety (see Appendix B). The STAI was included to quantify anxiety and to assist in identifying possible anxiety effects.

The state anxiety scale measures feelings such as apprehension, tension, nervousness and worry. The state anxiety scale has been found to be a sensitive measure of changes in transitory anxiety experienced by clients/patients undergoing counselling, psychotherapy, behaviour modification programs and relaxation training (Speilberger, Gorsuch & Lushene, 1990). The scale is also reportedly useful for assessing everyday stressors such as imminent surgery, dental procedures, job interviews and exams (Spielberger et al., 1990).

The trait anxiety measure has been widely used to assess clinical anxiety in medical, surgical, psychosomatic and psychiatric patients. The trait anxiety scale has also been used to screen for anxiety problems in high school and college students and military recruits, as well as for evaluating short and long term outcomes for psychotherapy, counselling, behaviour modification and drug treatment programs. In clinical and experimental research, the trait anxiety scale is useful for identifying individuals with high levels of neurotic anxiety and identifying differences in motivation or drive level (Spielberger et al., 1990).
The state and trait anxiety measures each consist of 20 statements (e.g. “I feel secure”) that participants are asked to judge according to their present feelings (state anxiety) and how they feel generally (trait anxiety). Both the state and trait measures have been previously reported to have very high reliability, with alpha coefficients of 0.93 and 0.91 (female norms) and 0.91 and 0.91 (male norms) (Spielberger et al., 1990).

2.3.3. Emotionality Rating Measures

2.3.3.1. PANAS

All participants completed the Positive and Negative Affect Schedule (PANAS) (Watson, Clark & Tellegen, 1988). The PANAS (see Appendix C) was included to quantify emotional states and to enable control for potential mood congruency effects. According to Watson et al. (1988), “positive affect” (PA) refers to the extent to which an individual feels enthusiastic, active and alert. Low PA is characterised by lethargy and sadness. “Negative affect” (NA) refers to aversive mood states such as anger, contempt, disgust, guilt fear and nervousness. Low NA is characterised by a feeling of calmness and serenity (Watson et al., 1988). “Present moment” (state) and “general” (trait) temporal prompts were used in the present study, corresponding to the state and trait distinction in the STAI. For each PANAS item, participants were asked to judge the extent to which they experienced each mood state at that present moment, and again in general or on average. The PA scale of the PANAS has previously been reported to have acceptably high reliability, with alpha coefficients of 0.89 (present moment) and 0.88 (general) for the state and trait instructions. The NA scale has also been reported to have high reliability, with alpha coefficients of 0.85 (present moment) and 0.87 (general) (Watson et al., 1988).

2.3.3.2. STES

The State Trait Emotionality Schedule (STES) (Cox & Sergejew, 2004) was developed for the present study as an alternative to the PANAS for quantifying mood valence. The specific purpose of the instrument is to quantify participant affect along a unidimensional continuum of positive and negative affect, in order to to directly test predictions of emotionality effects, and enable direct controls for mood congruency. Unlike the PANAS and other existing measures of positive and negative mood, the STES directly quantifies positivity and negativity along a single equidistant scale, which is important in comparing against word ratings of assumed comparable emotionality for opposite valence, and also for directly testing congruency effects.
The STES was derived by the present author from existing mood measures, by taking all relevant items from the BDI, POMS and PANAS, to ensure a broad sample of mood descriptors. Item Response Theory (IRT) was employed to determine the optimum subset of mood items to quantify emotionality effects, according to a latent statistical construct. After 8 IRT iterations, in which redundant and suboptimal items were deleted, a scale of 15 items emerged. The new measure, entitled the “State Trait Emotionality Schedule” (STES) consists of 10 negative items (alpha = .84) and 5 positive items (alpha = .78). Preliminary analyses indicate very good convergent validity of STES scores compared to constituent mood scales. As can be seen in Table 3, cross-correlations between the STES, BDI, PANAS and POMS are congruent and consistent despite differences in factorial and latent models. The high correlations against established mood measures suggested high convergent validity. The STES is included as Appendix D.

Table 3
Cross-Correlations of STES with BDI, PANAS and POMS

<table>
<thead>
<tr>
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<th>PANAS</th>
<th>BDI</th>
<th>POMS</th>
<th>STES Positive</th>
<th>STES Negative</th>
<th>PANAS Positive</th>
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<tr>
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<tr>
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<td>.84**</td>
<td></td>
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</tr>
<tr>
<td>STES Positive</td>
<td>.85**</td>
<td>.29**</td>
<td>-.61**</td>
<td>-.76**</td>
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<td></td>
</tr>
<tr>
<td>STES Negative</td>
<td>-.94**</td>
<td>.31**</td>
<td>.83**</td>
<td>.91**</td>
<td>-.61**</td>
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<tr>
<td>PANAS Positive</td>
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<td>.63**</td>
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<td>-.55*</td>
<td>.79**</td>
<td>-.42**</td>
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<tr>
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<td>.62**</td>
<td>.75**</td>
<td>-.48**</td>
<td>.82**</td>
<td>-.29**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 – tailed)
* Correlation is significant at the 0.05 level (2 – tailed)
2.3.4. Sexual Assault Symptomatology Measure

The “Rape Aftermath Symptom Test” (RAST) is a 70 item self-report measure of psychological symptoms and potentially fear-producing stimuli (Kilpatrick, 1988) (see Appendix E). The RAST was included to quantify symptomatology resulting from sexual assault trauma and to assist in dichotomisation on this basis. Participants are asked to rate each item on a 5-point Likert type scale, indicating the degree of disturbance currently associated with each item. A rating of zero indicates no disturbance, whereas a rating of four, denotes severe disturbance. The RAST yields a global distress score that can range from 0 – 280.

The RAST was developed to provide a relatively brief, but sensitive measure of fear and other symptoms commonly experienced following a rape or sexual assault experience. The authors proposed that although other tests had proven capable of assessing the effects of rape, the RAST increases assessment efficiency by assessing critical symptomatology with fewer items. The RAST was constructed using items from the SCL-20 and Modified Fear Survey (MFS), two assessment instruments that had previously proved useful in measuring rape related symptomatology.

The RAST has been reported to have good internal consistency (alpha = .95) and good test-retest reliability (over a 2.5 month interval for non-victims) (r = .85). With respect to its validity, the RAST can distinguish the symptoms of rape victims from non-victims at 3 months – indeed the test was constructed on the basis of items that discriminated at that point. In addition, cross sectional comparisons reportedly also yielded significant differences at 6 – 21 days, 3 months, 6 months, 1 year, 2 years and 3 years post rape, with victims having higher scores on all occasions, compared to non-victims.

2.3.5. Posttraumatic Stress Disorder Symptomatology Measure

The “Modified PTSD Symptom Scale - Self Report” (MPSS-SR) (Falsetti et al., 1993) was developed from the PTSD Symptom Scale (PSS) (Foa, Riggs, Dancu, & Rothbaum 1993), in order to fulfil the need for an assessment device to measure both the frequency and severity of PTSD symptomatology. The MPSS-SR was included to quantify posttraumatic symptomatology and to assist dichotomisation on this basis. The MPSS-SR is included as Appendix F.
The MPSS-SR consists of 17 items corresponding to the DSM III-R symptom criteria for PTSD. Frequency is assessed on a 4-point scale, from 0 – not at all to 3 – five or more times per week / very much/ almost always. Severity of symptoms is assessed on a 5-point scale ranging from A – not at all distressing, to E – extremely distressing (for scoring purposes, A = 0, B = 1, C = 2, D = 3, E = 4). The MPSS-SR is designed to assess PTSD symptomatology for a two-week period prior to the time of administration. There are several ways that the MPSS-SR can be scored, however for the present study the scale is scored as a continuous measure. The authors developed and validated cut-off scores that discriminate between PTSD positive and PTSD negative groups, for both treatment and community samples. People who score at the cut-off or higher are deemed to be symptomatic, or PTSD positive. Those scoring lower than the cut-off are deemed to be asymptomatic, or PTSD negative. Scores can range from 0 – 51 on frequency (cut-off = 23), 0 – 68 on severity (cut-off = 47), and 0 – 119 for total scores (cut-off = 71).

The psychometric characteristics of the MPSS-SR have been investigated in both treatment and community samples reporting a wide variety of traumatic events. In both samples, the MPSS-SR demonstrated good overall internal consistency. Alphas of .96 for the treatment sample and .97 for the community sample were obtained for the full scale. In addition, the MPSS-SR has demonstrated good concurrent validity with the SCID PTSD Module.

2.3.6. Word Rating Measures

Following the computerised tasks (see section 2.3.9.), each participant was asked to rate the word stimuli for emotional salience on a 7-point scale ranging from +3 – “very positive” to –3 – “very negative”, in a procedure adapted from McNally et al. (1990) and Foa et al. (1991). The emotional salience word rating measure was included to verify the applicability of the word stimuli for the populations under investigation. Mean emotionality scores were calculated for each stimulus category, and these were compared to the ANEW affective valence norms (see section 2.3.8.). Further, in a procedure also adapted from McNally et al. (1990) and Foa et al. (1991), the experimental word stimuli were rated for threat salience on a 5-point scale ranging from 0 – “not at all threatening” to 4 – “extremely threatening”, and mean threat salience scores were calculated for each word category. The threat salience rating was included to provide an indication of how threatening the experimental stimuli were considered to be for the populations under investigation. The emotionality and threat salience word rating questionnaires are included in Appendix G.
2.3.7. Development and Selection of Experimental Word Stimuli

Few studies of anxiety related emotional Stroop and emotional lexical decision task paradigms have administered a sufficient number and range of sets of word categories that could adequately investigate both the threat and emotionality hypotheses (see section 1.4.2.1. and 1.8.). Consequently, the findings of these studies of information processing can be difficult to interpret. Specifically it is argued that experimental stimuli should not be restricted to threat and neutral conditions alone. In order to test the specificity of threat effects, it is necessary to include a general threat word category, and these words should be matched with the specific threat words for emotionality. Furthermore, positive and negative non-threat word categories are required to adequately investigate predictions of the emotionality hypothesis. Prior investigations of anxiety related processing biases have often omitted the negative non-threat category, presumably because the threat words are also negative in valence. However, the absence of a non-threat negative condition makes it difficult, if not impossible to exclude possible emotionality effects, and thus observed effects may be mistakenly attributed to threat salience specificity.

In an attempt to eliminate confounders resulting from limitations in stimulus groups, a pilot study was conducted to develop a set of word stimulus lists that would be able to test predictions of both the threat and emotionality hypotheses. The pilot study necessarily employed non-traumatised control participants. It was considered unrealistic to validate the words using a clinical population, because it was felt that exposing survivors of sexual assault to the experimental stimuli prior to the information processing tasks would have severely compromised participation rates. Stimuli were to be validated by a clinical sample, but this phase was necessarily deferred until recruitment for the information processing experiments.

2.3.8. Experimental Word Stimuli

For the current study the experimental stimuli comprised words in six categories (sexual assault-related threat words, general threat words, negative non-threat words, positive words, categorised neutral words and uncategorised neutral words), with each category comprising twenty word items, along with a group of 60 graphemically legitimate non-words. The non-words were formed by taking ten words at random from each stimulus category and changing one vowel in each, in a procedure adapted from Foa et al. (1991). The experimental stimuli lists are included in Appendix H.
The majority of the 120 word items employed in the current study were chosen from a database of word stimuli ratings called the “Affective Norms for English Words” (ANEW) corpus (Bradley & Lang, 1999). The ANEW database contains over 1000 words, rated by a control sample of University of Florida psychology students, for affective valence on a 9-point scale, ranging from 1 – “low pleasure” to 9 – “high pleasure”. In order to obtain threat, negative, positive and neutral stimuli for the present study, the 9-point ANEW scale was divided into thirds, where ratings of 1-3 were deemed “low pleasure (negative)” words, 4-6 deemed “neutral” and 7-9 deemed “high pleasure (positive)” words. Words for each category were selected to be representative for each given category, with the aim of having mean valence scores approximating the mid-point of valence scoring range (e.g. for the negative valence range of 1-3, a mean valence score of 2 was preferred) and a standard deviation not greater than 2.

In addition to the ANEW database, specific threat words were also taken from Foa et al. (1991), who employed rape related words that had been judged by rape victims as having high threat value. These words were used as a guide for selecting additional threat words from the ANEW corpus. General threat words were also taken from MacLeod and Mathews (1988), Thrasher, Dalgleish and Yule (1994), and Freeman and Beck (2000).

Since the specific rape related threat words were semantically related, without a semantically related neutral word category it would not be possible to exclude an explanation of Stroop interference for fear relevant stimuli in terms of semantic relatedness (Thrasher, Dalgleish & Yule, 1993). Therefore, it was necessary to employ two neutral word lists: a categorised (semantically related) neutral word list and an uncategorised neutral word list. The categorised neutral words were all household items. The category theme was adapted from Mogg, Matthews, Eysenck and May (1991), Mogg, Kentish and Bradley (1993) and Freeman and Beck (2000).

All word stimuli were balanced for frequency of usage in the English language and word length, that is the means for frequency and length were approximately equal across word categories. The threat, negative and positive words were also matched for approximate mean emotionality, and the threat and negative words were judged by independent raters (N = 48), prior to the current study, for “threat” and “negative” content. Kappa statistics were used to determine category membership for threat and non-threat
negative words. This statistical procedure was employed in an attempt to control for threat salience in the negative non-threat word category.

For the current study, a primary aim was to employ positive and negative word categories with equal or controlled emotionality across opposite valency. If emotional stimuli are not controlled, it is more difficult (i.e. less statistical power) to test predictions of the emotionality hypothesis. Prior to the current study, in order to verify that the emotional words selected from the ANEW corpus were equally emotive, an analysis of variance (ANOVA) was performed on the ANEW affective norms, to investigate the effect of wordtype. The ANOVA revealed a significant main effect of wordtype ($F(5,105) = 280.86$, $p < .001$, $\eta^2 = .930$). Post hoc Scheffe tests indicated no significant difference in mean affective valence ratings between specific threat, general threat, negative and positive word categories. The uncategorised neutral and categorised neutral words were rated as significantly less emotional than the specific threat, general threat, negative and positive word categories. Table 4 presents the mean ANEW affective valence norms and standard deviations for each word category.

2.3.9. Computer Word Processing Tasks

The experimental stimuli for the Stroop and lexical decision tasks were presented on a notebook computer with a calibrated system clock, using a modified version of the RTM program from the PXL package by Irtel (1994). Letter strings were displayed centrally on the notebook LCD screen in lowercase letters rendered 2 cm high. Prior to the presentation of each stimulus, a white fixation cross was displayed centrally on the screen for 200 ms. The interval between response and the next stimulus was 1500 ms, and trials timed out after 4000 ms. The stimulus was removed from the screen when a response was made, or when the trial timed out (figure 1). Reaction times (RTs) were measured from the time of stimulus presentation, and were accurate to less than 1 ms.
Table 4
Mean ANEW affective valence norms and standard deviations for each word category.

<table>
<thead>
<tr>
<th>Wordtype</th>
<th>ANEW Ratings&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual assault related threat</td>
<td>1.78 (.40)&lt;sup&gt;b,e&lt;/sup&gt;</td>
</tr>
<tr>
<td>General threat</td>
<td>2.13 (.84)&lt;sup&gt;c,e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Negative non-threat</td>
<td>1.84 (.32)&lt;sup&gt;d,e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Positive</td>
<td>8.44 (.22)</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>5.07 (.34)</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>5.14 (.21)</td>
</tr>
</tbody>
</table>

<sup>a</sup> 9-point scale: 1 = “low pleasure” to 9 = “high pleasure”
<sup>b</sup> excluding 5 words from Foa et al., (1991) which are not listed in the ANEW
<sup>c</sup> excluding 3 words from MacLeod and Mathews (1988), Thrasher, Dalgleish and Yule (1994) and Freeman and Beck (2000) which are not listed in the ANEW
<sup>d</sup> excluding one word from MacLeod and Mathews (1988) which is not listed in the ANEW
<sup>e</sup> for the ANOVA analysis, the negative signs were removed from ratings for negatively valenced word categories

N = 111
Figure 1
Schematic representation of the progression of screens presented in the word processing computer tasks
2.3.9.1. Emotional Stroop Task:

Prior to the administration of the Stroop tasks, participants were asked to identify the coloured circles presented in a Stroop demonstration screen (see figure 2). This was done in order to familiarise participants with the Stroop procedure, and to informally confirm that participants were not colour blind.

The emotional Stroop task was preceded by a computerised version of the classical Stroop colour-naming task, with four colour name words (red, yellow, green and blue) presented in a random colour from the repertoire of colours in the colour names. The classical colour-name version of the Stroop task was included in order to compare Stroop interference effects for colour name and emotional words, and this also constituted the practise phase for the emotional Stroop task (see figure 3).

Participants held a four-button, horizontally aligned response box in both hands, and were asked to identify the colour in which a word was presented by pressing the appropriate button with the thumb or index finger of either hand. Each letter string was presented centrally on the screen together with four coloured circles 2cm beneath this, corresponding to the four buttons on the response box. Each circle / button combination corresponded to one of the following colours: red, yellow, green and blue. The correspondence between a particular colour and a particular button was varied randomly with each presentation, that is, the order of the coloured circles varied randomly for each trial.

2.3.9.2. Emotional Lexical Decision Task:

The emotional lexical decision task was also preceded by a demonstration screen (see figure 4) and a practise task to familiarise participants with the procedure. The practice task comprised 6 neutral words plus 4 derivative non-words that were unrelated to those used in the experimental task. Participants were asked to decide whether each letter string was a word or a non-word. Using a horizontally aligned, labelled, two-button response box, participants pressed the right-hand button if they judged the letter string to be a word, and the left-hand button if they judged the letter string to be a non-word. Participants held the response box in both hands, and made their responses with either the thumb or index finger of either hand.
Figure 2
Schematic Representation of Emotional Stroop Task Demonstration Screen
Figure 3
Schematic Representation of Classical Stroop Task Demonstration Screens

Fixation cross

+  

Congruent Trial
Correct answer = red

red

Incongruent Trial
Correct answer = red

blue
Figure 4
Schematic Representation of Emotional Lexical Decision Task Demonstration Screens

Fixation Cross

Word Trial

Non-word Trial
2.4. Procedure:

Directors of sexual assault centres, counselling services, and private psychiatric clinics were approached for their support and assistance in recruiting survivors of sexual assault. Health care professionals were provided with a detailed summary of the background of the study, aims, procedures and expected outcomes. In addition they were given a “participant recruitment notice” (see Appendix I) to disseminate to prospective participants. The participant recruitment notice explained the purpose of the study, the experimental tasks, participant inclusion / exclusion criteria, individual health care agency affiliations, and contact details for the investigator. Individual health care centres decided on their own preferred method of information dissemination, which ranged from recruitment notices / posters displayed in waiting rooms, to health care professionals approaching suitable clients. Despite the differences in the manner of information dissemination, participation was completely voluntary and the decision to participate or not had no effect on clients’ ongoing treatment.

Media listings (see Appendix J) were advertised in various newspapers / publications, inviting survivors of sexual assault to participate in the research study.

Control participants were recruited via announcements posted on university notice boards (see Appendix K) and by word-of-mouth.

During the initial contact with the investigator (either by phone or email), participants were briefly screened to confirm their appropriateness for participation. The screening process involved going over the inclusion / exclusion criteria with prospective participants. Suitable participants were given the option of completing the experimental tasks either at their preferred health care agency (with or without their health care professional present) or at the investigator’s institution (with the full support of the institutional counselling service).

Upon arrival, participants were seated in a comfortable chair, approximately 1 metre from the computer monitor. Participants were then provided with the “participant information document” (see Appendix L) and were asked to carefully read the information document describing to the purpose of the study, experimental procedures, inclusion / exclusion criteria, possible risks, privacy, confidentiality and disclosure of information,
project results and outcomes, ethical guidelines and complaint procedures. After providing informed consent (Appendix L), participants were informed that a debriefing about the study expectations and predicted outcomes would be provided at the end of the session.

Together with the use of task demonstration screens (see figures 3 & 4), participants were informed that both the Stroop task and the lexical decision tasks involved the presentation of letter strings centrally on the computer screen.

For both experimental tasks, participants were asked to fixate on the centrally presented white cross which preceded each stimulus presentation. Participants were asked to make their responses as quickly and accurately as possible. For both practice tasks, participants were given feedback after each response with the word “correct” or “incorrect” displayed after each trial, along with the RT. Feedback remained on the screen for 1000 ms. The use of feedback in the practice tasks was intended to reinforce both accuracy and speed. Consistent with prior studies, feedback was not provided in the experimental tasks. Between the experimental tasks, participants were given a five-minute break. In addition to the computerised tasks, all participants completed the appropriate section(s) of a demographic questionnaire and state and trait sections of the STAI, PANAS and STES. Survivors of sexual assault also completed the RAST and MPSS-SR. Following the computerised tasks all participants rated the experimental stimuli (threat, negative, positive and neutral categories) for emotionality, and for threat salience. It is arguably better to present covert word processing tasks, followed by overt emotional / threat appraisal tasks, in order to avoid inadvertently cueing participants.

The duration of the experimental session was 1.5 to 2 hours. A debrief of the study was provided at the conclusion of the experimental session. Participants were given a brief explanation of prior literature and the predicted outcomes of the study. Finally, participants were asked to register their interest in future research activities, and in receiving a report of the study’s findings (see Appendix L).
3. Results

Chapter Overview

The results section begins with a brief recapitulation of the clinical and control, and asymptomatic and symptomatic group dichotomisations and comparisons. The demographic data and group anxiety and affect analyses are then presented, followed by the results of the analyses performed on the participant emotionality and threat salience ratings of the experimental word stimuli. The results chapter then moves on to report the primary analyses of the word processing paradigms, beginning with the classical Stroop effect data. This is followed by the emotional Stroop task analyses and the emotional lexical decision task analyses. For the sake of clarity, each word processing paradigm is presented separately. Within each word processing paradigm section, results are presented first for controls overall versus survivors of sexual assault overall, and second for a matched subset of controls, versus PTSD positive survivors of sexual assault versus PTSD negative survivors of sexual assault.

3.1. Group Dichotomisations

The current study consisted of the following group comparisons (see section 1.11.1.2.):

1. Controls ($N = 28$) versus Survivors of sexual assault ($N = 28$)

2. Matched subset of controls ($N = 14$) versus PTSD positive survivors of sexual assault ($N = 15$) versus PTSD negative survivors of sexual assault ($N = 13$)

For the PTSD positive and negative group comparison, the control group comprised a random selection of 14 of the original 28 matched control participants.

3.1.1. Symptomatic and Asymptomatic Group Dichotomisation

In order to investigate the effects of posttraumatic symptomatology on threat related and emotionality related attentional biases, survivors of sexual assault were dichotomised into symptomatic (PTSD positive, $N=15$) and asymptomatic (PTSD negative, $N=13$) groups. After Falsetti et al. (1993), PTSD group dichotomisation was based on an MPSS
cut-off score criterion (see section 2.3.5). Total MPSS scores can range from 0 to 119, with an empirically determined cut-off point of 71. According to Falsetti et al., individuals who score at the cut-off point or higher can be deemed to be symptomatic (or PTSD positive), whereas those individuals who score lower than the cut-off point are deemed asymptomatic (or PTSD negative). PTSD dichotomisation data is presented in table 5. As expected, the PTSD positive survivor group reported significantly more PTSD symptomatology than the PTSD negative survivor group ($t(26) = 9.60, p < .001$).

3.1.2. Sexual Assault Symptomatology

Table 6 presents the mean and standard deviation sexual assault symptom data, for survivor groups dichotomised based on PTSD symptomatology. It should be noted that for survivors of sexual assault, scores on the PTSD symptom measure and the sexual assault symptom measure (see section 2.3.4. & 2.3.5.) were highly correlated ($r = .823, p < .01$). Due to the strong correlational relationship between these scores, it was not deemed necessary to dichotomise survivor groups separately on the basis of sexual assault symptom scores (see confusion matrix, table 7, and figure 5).

There was no significant difference ($F(1,26) = .087, p > .05, \eta^2 = .003$) in the number of years elapsed since the assault(s) for PTSD positive survivors of sexual assault ($M = 19.80, SD = 11.44$), and PTSD negative survivors of sexual assault ($M = 18.54, SD = 11.13$).
Table 5
Mean and standard deviation data for survivor groups dichotomised based on PTSD symptomatology.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Positive</td>
<td>85.67</td>
<td>12.02</td>
<td>40</td>
<td>74</td>
<td>114</td>
<td>15</td>
</tr>
<tr>
<td>PTSD Negative</td>
<td>33.38</td>
<td>16.72</td>
<td>58</td>
<td>5</td>
<td>63</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61.39</td>
<td>30.07</td>
<td>109</td>
<td>5</td>
<td>114</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 6
Mean and standard deviation data for sexual assault symptoms, for survivor groups dichotomised based on PTSD symptomatology.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD Positive</td>
<td>172.40</td>
<td>39.73</td>
<td>138.00</td>
<td>93.00</td>
<td>231.00</td>
<td>15</td>
</tr>
<tr>
<td>PTSD Negative</td>
<td>104.46</td>
<td>34.45</td>
<td>125.00</td>
<td>30.00</td>
<td>155.00</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>140.86</td>
<td>50.36</td>
<td>201.00</td>
<td>30.00</td>
<td>231.00</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 7
Confusion matrix of the numbers of survivors of sexual assault scoring high and low on both the sexual assault symptom measure and the PTSD symptom measure

<table>
<thead>
<tr>
<th></th>
<th>High sexual assault symptom score</th>
<th>Low sexual assault symptom score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High PTSD symptom score</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Low PTSD symptom score</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: PTSD symptom groups were dichotomised based on established cut-off score criterion (see section 2.3.5.), whereas sexual assault symptom scores (see section 2.3.4.) were dichotomised by a median split, into high and low groups.
Figure 5
Scattergram showing relationship between sexual assault symptom scores and PTSD symptom scores for survivors of sexual assault.
3.2. Demographic Data

3.2.1. Controls versus Survivors of Sexual Assault

Descriptive statistics for survivors of sexual assault and controls are presented for each demographic variable (see table 8). Pearson’s Chi Square statistics indicate that survivors of sexual assault and controls did not differ significantly on age, marital status or education level.

3.2.2. Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

Descriptive statistics for matched controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault are presented for each demographic variable (see table 9). Pearson’s Chi Square statistics indicate that matched controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault did not differ significantly on age, marital status or education level.

3.3. Group Anxiety and Affective State Measures

3.3.1. Controls versus Survivors of Sexual Assault

A series of independent t-tests were conducted to compare the mood measure scores of the survivors of sexual assault to the controls. These analyses indicated that survivors of sexual assault scored significantly higher on measures of state anxiety, trait anxiety, state negative affect and trait negative affect compared to controls. Further, survivors of sexual assault scored significantly lower on measures of trait positive affect, state STES and trait STES. There was no difference in mean scores for state positive affect between survivors of sexual assault and controls. Table 10 presents the means and t-test data for group anxiety and affect scores. In order to investigate possible effects of anxiety and mood congruency, anxiety and affect scores were further broken down into high and low subgroups. This was done separately for controls and survivors of sexual assault. This data is presented in table 11 for controls and table 12 for survivors.
Table 8
Chi Square statistics for age, marital status and education level for survivors of sexual assault and controls.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Controls</th>
<th></th>
<th></th>
<th>Survivors</th>
<th></th>
<th>X^2</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
<td>%</td>
<td>X^2</td>
<td>df</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 30</td>
<td>15 (10)</td>
<td>26.8</td>
<td>5 (10)</td>
<td>8.9</td>
<td>7.43</td>
<td>3</td>
<td>.059</td>
<td></td>
</tr>
<tr>
<td>31 - 40</td>
<td>6 (9)</td>
<td>10.7</td>
<td>12 (9)</td>
<td></td>
<td>21.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 - 50</td>
<td>3 (5)</td>
<td>5.4</td>
<td>7 (5)</td>
<td>12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 +</td>
<td>4 (4)</td>
<td>7.1</td>
<td>4 (4)</td>
<td>7.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>14 (13)</td>
<td>25.0</td>
<td>12 (13)</td>
<td>21.4</td>
<td>7.75^a</td>
<td>3</td>
<td>.051</td>
<td></td>
</tr>
<tr>
<td>Cohabitating</td>
<td>7 (5)</td>
<td>12.5</td>
<td>3 (5)</td>
<td>5.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>7 (7)</td>
<td>12.5</td>
<td>7 (7)</td>
<td>12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced / Separated</td>
<td>0 (3)</td>
<td>0</td>
<td>6 (3)</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>0 (1)</td>
<td>0</td>
<td>2 (1)</td>
<td>3.6</td>
<td>7.90^b</td>
<td>4</td>
<td>.095</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>3 (5.5)</td>
<td>5.4</td>
<td>8 (5.5)</td>
<td>14.3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Completed Secondary</td>
<td>0 (.5)</td>
<td>0</td>
<td>1 (.5)</td>
<td>1.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary – Undergraduate</td>
<td>13 (9.5)</td>
<td>23.2</td>
<td>6 (9.5)</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary – Postgraduate</td>
<td>12 (11.5)</td>
<td>21.4</td>
<td>11 (11.5)</td>
<td>19.6</td>
<td></td>
<td></td>
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<tr>
<td>N = 56</td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

^a The Chi Square assumption of “expected cell frequency” is violated where 25% of cells have expected frequencies <5.

^b The Chi Square assumption of “expected cell frequency” is violated where 40% of cells have expected frequencies <5.

Note: Expected cell frequencies are shown in parentheses.
Table 9
Chi Square statistics for age, marital status and education level for matched controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Variable</th>
<th>Matched Controls</th>
<th>PTSD Positive Survivors</th>
<th>PTSD Negative Survivors</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 30</td>
<td>7 (4)</td>
<td>3 (5.4)</td>
<td>2 (4.6)</td>
<td>10.29</td>
<td>6</td>
<td>.113</td>
</tr>
<tr>
<td>31 - 40</td>
<td>3 (5)</td>
<td>7 (4.8)</td>
<td>5 (4.2)</td>
<td>11.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 - 50</td>
<td>0 (2.3)</td>
<td>4 (2.7)</td>
<td>3 (2.3)</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 +</td>
<td>4 (2.7)</td>
<td>1 (2.1)</td>
<td>3 (1.9)</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7 (6.3)</td>
<td>7 (6.8)</td>
<td>5 (5.9)</td>
<td>5.68</td>
<td>6</td>
<td>.460</td>
</tr>
<tr>
<td>Cohabitating</td>
<td>3 (2)</td>
<td>2 (2.1)</td>
<td>1(1.9)</td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>4 (3.7)</td>
<td>4 (3.9)</td>
<td>3 (3.4)</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced/ Separated</td>
<td>0 (2)</td>
<td>2 (2.1)</td>
<td>4 (1.9)</td>
<td>9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>0 (0.7)</td>
<td>0 ( .7)</td>
<td>2 ( .6)</td>
<td>13.23</td>
<td>8</td>
<td>.104</td>
</tr>
<tr>
<td>Secondary</td>
<td>3 (3.7)</td>
<td>6 (3.9)</td>
<td>2(3.4)</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>0 ( .3)</td>
<td>1 ( .4)</td>
<td>0 ( .3)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>4 (3.3)</td>
<td>5 (3.6)</td>
<td>1 (3.1)</td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>7 (6)</td>
<td>3 (6.4)</td>
<td>8 (5.6)</td>
<td>19.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 42

\( a \) The Chi Square assumption of “expected cell frequency” is violated where 83.3% of cells have expected frequencies <5.

\( b \) The Chi Square assumption of “expected cell frequency” is violated where 75% of cells have expected frequencies <5.

\( c \) The Chi Square assumption of “expected cell frequency” is violated where 80% of cells have expected frequencies <5.

Note: Expected cell frequencies are shown in parentheses.
Table 10
Sample means and t-test data for group anxiety and affect scores

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>31.46 (8.69)</td>
<td>47.54 (10.70)</td>
<td>6.17</td>
<td>54</td>
<td>.000</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>36.93 (8.11)</td>
<td>54.50 (10.86)</td>
<td>6.86</td>
<td>54</td>
<td>.000</td>
</tr>
<tr>
<td>State PA</td>
<td>29.46 (6.74)</td>
<td>27.21 (7.89)</td>
<td>-1.15</td>
<td>54</td>
<td>.256</td>
</tr>
<tr>
<td>State NA</td>
<td>11.21 (1.62)</td>
<td>20.39 (7.60)</td>
<td>6.25a</td>
<td>29.54</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>35.89 (6.59)</td>
<td>28.64 (9.23)</td>
<td>-3.38a</td>
<td>48.86</td>
<td>.001</td>
</tr>
<tr>
<td>Trait NA</td>
<td>14.71 (5.08)</td>
<td>26.14 (8.71)</td>
<td>5.99a</td>
<td>43.48</td>
<td>.000</td>
</tr>
<tr>
<td>State STES</td>
<td>7.07 (4.17)</td>
<td>-3.93 (11.22)</td>
<td>-4.86a</td>
<td>34.32</td>
<td>.000</td>
</tr>
<tr>
<td>Trait STES</td>
<td>8.36 (5.86)</td>
<td>-6.36 (11.53)</td>
<td>-6.02a</td>
<td>40.06</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 56
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
a Equal variance not assumed

Table 11
Sample means and t-test data for controls’ high and low anxiety and affect dichotomised subgroups

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>38.07 (7.19)</td>
<td>24.86 (3.35)</td>
<td>-6.23a</td>
<td>18.38</td>
<td>.000</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>43.64 (5.79)</td>
<td>30.21 (2.42)</td>
<td>-8.01a</td>
<td>17.42</td>
<td>.000</td>
</tr>
<tr>
<td>State PA</td>
<td>34.78 (5.07)</td>
<td>24.14 (2.74)</td>
<td>-6.91a</td>
<td>20.00</td>
<td>.000</td>
</tr>
<tr>
<td>State NA</td>
<td>12.43 (1.50)</td>
<td>10.00 (0.00)</td>
<td>-6.04a</td>
<td>13.00</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>39.35 (6.39)</td>
<td>32.43 (4.85)</td>
<td>-3.23</td>
<td>1.26</td>
<td>.003</td>
</tr>
<tr>
<td>Trait NA</td>
<td>18.43 (4.83)</td>
<td>11.00 (0.78)</td>
<td>-5.68a</td>
<td>13.68</td>
<td>.000</td>
</tr>
<tr>
<td>State STES</td>
<td>10.00 (1.88)</td>
<td>4.14 (3.76)</td>
<td>-5.21</td>
<td>1.26</td>
<td>.000</td>
</tr>
<tr>
<td>Trait STES</td>
<td>12.35 (2.20)</td>
<td>4.36 (5.65)</td>
<td>-4.93a</td>
<td>16.87</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 28
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
a Equal variances not assumed
3.3.2. Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

A series of one-way ANOVAs with post hoc Scheffe tests were conducted to compare the anxiety and affect scores of the matched subset of controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault. Table 13 presents the means and ANOVA data for group anxiety and affect scores.

Post hoc Scheffe tests indicated that PTSD positive and PTSD negative survivors of sexual assault scored significantly higher on measures of state anxiety, trait anxiety, state negative affect and trait negative affect compared to matched controls. Further, PTSD positive survivors scored significantly higher on these measures than PTSD negative survivors. For state positive affect, PTSD positive survivors scored significantly lower than PTSD negative survivors. There was no significant difference between PTSD negative survivors’ scores and matched controls’ scores, or between PTSD positive survivors’ scores and matched controls’ scores on state positive affect. For trait positive affect and state STES (i.e. emotionality), PTSD positive survivors scored significantly lower than PTSD negative survivors and matched controls. There was no significant difference between PTSD negative survivors’ and matched controls’ scores for trait positive affect and state STES. For trait STES, post hoc Scheffe tests indicated that PTSD positive and PTSD negative survivors scored significantly lower than matched controls. Further, PTSD positive survivors scored significantly lower on this measure compared to PTSD negative survivors.

In order to investigate possible effects of anxiety and mood congruency on attentional biases, anxiety and affect scores were further broken down into high and low subgroups. This was done separately for matched controls, PTSD positive survivors and PTSD negative survivors. This data is presented in table 14 for matched controls, table 15 for PTSD positive survivors and table 16 for PTSD negative survivors.
Table 12
Sample means and t-test data for survivors high and low anxiety and affect dichotomised subgroups

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>55.64 (7.76)</td>
<td>39.43 (39.43)</td>
<td>6.19</td>
<td>26</td>
<td>.000</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>63.07 (4.99)</td>
<td>45.93 (7.86)</td>
<td>-6.86&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.04</td>
<td>.000</td>
</tr>
<tr>
<td>State PA</td>
<td>33.36 (5.09)</td>
<td>21.07 (4.69)</td>
<td>-6.63</td>
<td>26</td>
<td>.000</td>
</tr>
<tr>
<td>State NA</td>
<td>26.43 (5.93)</td>
<td>14.36 (2.49)</td>
<td>-7.02&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17.47</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>36.43 (4.09)</td>
<td>20.86 (5.43)</td>
<td>-8.57</td>
<td>26</td>
<td>.000</td>
</tr>
<tr>
<td>Trait NA</td>
<td>33.50 (5.58)</td>
<td>17.78 (3.14)</td>
<td>-8.59</td>
<td>26</td>
<td>.000</td>
</tr>
<tr>
<td>State STES</td>
<td>5.14 (6.19)</td>
<td>-13.00 (6.77)</td>
<td>-7.39</td>
<td>26</td>
<td>.000</td>
</tr>
<tr>
<td>Trait STES</td>
<td>3.28 (5.89)</td>
<td>-16.00 (6.43)</td>
<td>-8.27</td>
<td>26</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 28
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
<sup>a</sup> Equal variances not assumed
Table 13
Sample means and ANOVA data for dichotomised groups’ anxiety and affect scores

<table>
<thead>
<tr>
<th></th>
<th>Matched Controls</th>
<th>PTSD Positive Survivors</th>
<th>PTSD Negative Survivors</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>27.85 (9.22)</td>
<td>53.60 (8.67)</td>
<td>40.54 (8.41)</td>
<td>31.15</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>32.71 (6.64)</td>
<td>61.80 (6.33)</td>
<td>46.08 (8.67)</td>
<td>58.91</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>State PA</td>
<td>30.21 (7.18)</td>
<td>23.87 (7.95)</td>
<td>31.08 (6.01)</td>
<td>4.37</td>
<td>2, 39</td>
<td>.019</td>
</tr>
<tr>
<td>State NA</td>
<td>10.29 (0.61)</td>
<td>24.00 (7.83)</td>
<td>16.23 (4.83)</td>
<td>23.43</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>37.64 (6.16)</td>
<td>23.33 (7.85)</td>
<td>34.77 (6.61)</td>
<td>17.28</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>Trait NA</td>
<td>11.64 (2.17)</td>
<td>31.80 (7.48)</td>
<td>19.62 (4.41)</td>
<td>54.27</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>State STES</td>
<td>8.21 (2.81)</td>
<td>-10.60 (9.46)</td>
<td>3.77 (7.68)</td>
<td>26.58</td>
<td>2, 39</td>
<td>.000</td>
</tr>
<tr>
<td>Trait STES</td>
<td>11.36 (3.10)</td>
<td>-14.20 (8.78)</td>
<td>2.69 (6.63)</td>
<td>55.40</td>
<td>2, 39</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 56
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
a Equal variance not assumed
Table 14
Sample means and t-test data for matched controls’ high and low anxiety and affect
dichotomised subgroups

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>33.43 (10.34)</td>
<td>22.28 (2.21)</td>
<td>-2.78</td>
<td>12</td>
<td>.016</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>37.00 (7.14)</td>
<td>28.43 (1.27)</td>
<td>-3.13&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.38</td>
<td>.019</td>
</tr>
<tr>
<td>State PA</td>
<td>36.14 (4.09)</td>
<td>24.28 (3.59)</td>
<td>-5.75</td>
<td>12</td>
<td>.000</td>
</tr>
<tr>
<td>State NA</td>
<td>10.57 (0.79)</td>
<td>10.00 (0.00)</td>
<td>-1.92&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.00</td>
<td>.103</td>
</tr>
<tr>
<td>Trait PA</td>
<td>42.71 (3.25)</td>
<td>32.57 (3.41)</td>
<td>-5.69</td>
<td>12</td>
<td>.003</td>
</tr>
<tr>
<td>Trait NA</td>
<td>12.86 (2.54)</td>
<td>10.43 (0.53)</td>
<td>-2.47&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.53</td>
<td>.045</td>
</tr>
<tr>
<td>State STES</td>
<td>10.28 (1.89)</td>
<td>6.14 (1.86)</td>
<td>-4.13</td>
<td>12</td>
<td>.001</td>
</tr>
<tr>
<td>Trait STES</td>
<td>13.43 (1.99)</td>
<td>9.28 (2.63)</td>
<td>-3.33</td>
<td>12</td>
<td>.006</td>
</tr>
</tbody>
</table>

N = 28
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
<sup>a</sup> Equal variances not assumed
Table 15
Sample means and t-test data for PTSD positive survivors’ high and low anxiety and affect dichotomised subgroups

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>61.00 (7.02)</td>
<td>47.12 (2.29)</td>
<td>-4.99&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.12</td>
<td>.001</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>67.14 (3.53)</td>
<td>57.12 (3.98)</td>
<td>-5.12</td>
<td>13</td>
<td>.000</td>
</tr>
<tr>
<td>State PA</td>
<td>30.43 (5.85)</td>
<td>18.12 (4.05)</td>
<td>-4.78</td>
<td>13</td>
<td>.000</td>
</tr>
<tr>
<td>State NA</td>
<td>32.17 (4.02)</td>
<td>18.56 (3.71)</td>
<td>-6.73</td>
<td>13</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>30.00 (5.54)</td>
<td>17.50 (3.70)</td>
<td>-5.20</td>
<td>13</td>
<td>.000</td>
</tr>
<tr>
<td>Trait NA</td>
<td>37.71 (3.30)</td>
<td>26.63 (6.07)</td>
<td>-4.47&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.06</td>
<td>.001</td>
</tr>
<tr>
<td>State STES</td>
<td>-4.28 (8.84)</td>
<td>-16.13 (6.10)</td>
<td>-3.05</td>
<td>13</td>
<td>.009</td>
</tr>
<tr>
<td>Trait STES</td>
<td>-6.71 (6.60)</td>
<td>-20.75 (3.41)</td>
<td>-5.28</td>
<td>13</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 28
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
<sup>a</sup> Equal variances not assumed
Table 16
Sample means and t-test data for PTSD negative survivors’ high and low anxiety and affect dichotomised subgroups

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>47.60 (9.15)</td>
<td>36.12 (3.94)</td>
<td>-2.59</td>
<td>11</td>
<td>.025</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>52.28 (5.85)</td>
<td>38.83 (4.75)</td>
<td>-4.95</td>
<td>11</td>
<td>.001</td>
</tr>
<tr>
<td>State PA</td>
<td>36.33 (4.08)</td>
<td>26.57 (2.64)</td>
<td>-5.20</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>State NA</td>
<td>20.50 (3.45)</td>
<td>12.57 (1.71)</td>
<td>-5.38</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>Trait PA</td>
<td>39.14 (3.85)</td>
<td>29.67 (5.39)</td>
<td>-3.69</td>
<td>11</td>
<td>.004</td>
</tr>
<tr>
<td>Trait NA</td>
<td>23.00 (2.89)</td>
<td>15.67 (1.37)</td>
<td>-5.67</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>State STES</td>
<td>11.00 (3.35)</td>
<td>-2.43 (3.41)</td>
<td>-7.14</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>Trait STES</td>
<td>7.71 (3.64)</td>
<td>-3.17 (3.60)</td>
<td>-5.40</td>
<td>11</td>
<td>.000</td>
</tr>
</tbody>
</table>

N = 28
Note: SDs in parentheses
PA = Positive Affect
NA = Negative Affect
STES = State Trait Emotionality Schedule
* Equal variances not assumed
3.4. Word stimuli ratings

As discussed in section 1.10.4., extensive analyses were conducted on the participants’ ratings of the experimental word categories, in order to verify the applicability of the ANEW norms (see section 2.3.8.) for the current populations under investigation.

3.4.1. Emotionality Ratings for Controls versus Survivors of Sexual Assault

As discussed in section 2.3.8., an analysis of ANEW affective valence rating norms indicated that the emotional word categories did not differ in a priori normative degree of “emotiveness”. However, in order to determine whether these ANEW norms were applicable to emotionality ratings by the current participants, separate analyses were conducted for controls and survivors of sexual assault. Note that in order to focus on emotionality and not valence, the negative signs for negative rating scores were removed for the ANOVA analyses.

3.4.1.1. Emotionality Ratings by Controls

For emotionality word ratings completed by controls, a univariate ANOVA indicated significant differences in mean emotionality ratings between the six word categories \( (F(5, 114) = 125.64, p < .001, \eta^2 = .846) \). Post hoc Scheffe tests indicated that the mean emotionality ratings for the two neutral word categories were significantly different to those for the specific threat, general threat, positive and negative words. Positive words were rated as significantly more emotional than the negative words. Positive words, specific threat and general threat words did not differ in emotionality. Moreover, negative and specific threat words did not differ in emotionality, nor did the two threat word categories or the two neutral word categories. Controls did not rate the emotional stimuli as comparably emotive. Table 17 presents the mean emotionality rating data for controls.

In order to compare controls ratings directly with ANEW norms (see table 18), the latter were numerically rescaled to the range -3 to +3. Note the difference in mean ratings for most word types between table 17 and table 18. Some words used and rated were not listed in the ANEW norms database (see notes below table 18), and missing data was not included in the paired t-test analyses.
### Table 17
Mean and standard deviation emotionality rating scores for controls

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.84</td>
<td>.56</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.46</td>
<td>.32</td>
</tr>
<tr>
<td>Positive</td>
<td>2.01</td>
<td>.46</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.01</td>
<td>.48</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-0.05</td>
<td>.07</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>0.02</td>
<td>.02</td>
</tr>
</tbody>
</table>

N = 28

Note: 20 words per category

### Table 18
Mean emotionality ratings for the ANEW, rescaled ANEW norms, and controls’ ratings.

<table>
<thead>
<tr>
<th>Word type</th>
<th>Controls&lt;sup&gt;a&lt;/sup&gt;</th>
<th>ANEW&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Rescaled&lt;sup&gt;c&lt;/sup&gt; ANEW</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-1.93 (.51)</td>
<td>1.78 (.40)</td>
<td>-2.61 (.31)</td>
<td>-6.09</td>
<td>14</td>
<td>.000</td>
</tr>
<tr>
<td>Negative&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-1.48 (.31)</td>
<td>1.84 (.33)</td>
<td>-2.57 (.25)</td>
<td>-15.66</td>
<td>18</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>2.01 (.46)</td>
<td>8.44 (.23)</td>
<td>2.56 (.17)</td>
<td>6.03</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat&lt;sup&gt;f&lt;/sup&gt;</td>
<td>-2.07 (.49)</td>
<td>2.13 (.84)</td>
<td>-2.35 (.65)</td>
<td>-2.08</td>
<td>16</td>
<td>.054</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.03 (.08)</td>
<td>5.14 (.21)</td>
<td>-.02 (.16)</td>
<td>.80</td>
<td>19</td>
<td>.435</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>-.01 (.02)</td>
<td>5.07 (.34)</td>
<td>-.05 (.28)</td>
<td>1.03</td>
<td>19</td>
<td>.316</td>
</tr>
</tbody>
</table>

N = 28

<sup>a</sup> 7 point scale from -3 – “very negative” to +3 – “very positive”

<sup>b</sup> 9 point scale from 1 – “low pleasure” to 9 – “high pleasure”

<sup>c</sup> numerically rescaled ANEW to 7 point scale (see <sup>a</sup>)

Note: 20 words per category, except:

<sup>d</sup> excluding 5 words from Foa et al. (1991) which are not listed in the ANEW

<sup>e</sup> excluding 1 word from MacLeod & Mathews (1988) which is not listed in the ANEW

<sup>f</sup> excluding 3 words from MacLeod & Mathews (1988), Thrasher, Dalgleish & Yule (1994) and Freeman & Beck (2000) which are not listed in the ANEW
Paired t-tests indicated that the rescaled ANEW norms were significantly different from controls’ ratings for the specific threat, negative and positive word categories. In general, the controls’ ratings for the specific threat, negative and positive word categories were slightly lower in emotionality (i.e. closer to neutral) compared to the rescaled ANEW ratings. In contrast, the ANEW norms and participant ratings for general threat and neutral word categories did not differ significantly.

3.4.1.2. Emotionality Ratings by Survivors of Sexual Assault

For emotionality word ratings completed by survivors of sexual assault, a univariate ANOVA indicated significant differences in mean emotionality ratings between the six word categories ($F(5, 114) = 263.97, p < .001, \eta^2 = .920$). Post hoc Scheffe tests indicated that the mean emotionality ratings for the two neutral word categories were significantly different to those for the specific threat, general threat, positive and negative words. Moreover, emotionality ratings for the positive and negative words were significantly less emotional than the specific threat and general threat words. Negative words were rated as significantly more emotional compared to positive words. The two threat categories did not differ in emotionality, nor did the two neutral categories. Survivors of sexual assault did not rate the emotional word categories as comparably emotive. Table 19 presents the mean scores for emotionality ratings completed by survivors of sexual assault.

In order to compare survivors’ ratings directly with ANEW ratings (see table 20), the latter were numerically rescaled to the range -3 to +3. Note the difference in mean ratings for most word types between table 19 and table 20. Some words used and rated were not listed in the ANEW norms database (see notes below table 20), and missing data was not included in the paired t-test analyses.
Table 19
Means and standard deviations of emotionality ratings for survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-2.45</td>
<td>.39</td>
</tr>
<tr>
<td>Negative</td>
<td>-2.03</td>
<td>.33</td>
</tr>
<tr>
<td>Positive</td>
<td>1.48</td>
<td>.30</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.37</td>
<td>.38</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.15</td>
<td>.14</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.09</td>
<td>.08</td>
</tr>
</tbody>
</table>

N = 28
Note: 20 words per category

Table 20
Mean emotionality ratings for the ANEW norms, rescaled ANEW norms, and survivors’ ratings

<table>
<thead>
<tr>
<th>Word type</th>
<th>Survivors a</th>
<th>ANEW b</th>
<th>Rescaled c</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat d</td>
<td>-2.43 (.43)</td>
<td>1.78 (.40)</td>
<td>-2.61 (.31)</td>
<td>-1.43</td>
<td>14</td>
<td>.176</td>
</tr>
<tr>
<td>Negative e</td>
<td>-2.05 (.32)</td>
<td>1.84 (.33)</td>
<td>-2.57 (.25)</td>
<td>-5.50</td>
<td>18</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>1.68 (.30)</td>
<td>8.44 (.23)</td>
<td>2.56 (.17)</td>
<td>13.85</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat f</td>
<td>-2.47 (.31)</td>
<td>2.13 (.84)</td>
<td>-2.35 (.65)</td>
<td>.815</td>
<td>16</td>
<td>.427</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.06 (.21)</td>
<td>5.14 (.21)</td>
<td>-.02 (.16)</td>
<td>1.26</td>
<td>19</td>
<td>.223</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.01 (.12)</td>
<td>5.07 (.34)</td>
<td>-.05 (.28)</td>
<td>-.970</td>
<td>19</td>
<td>.334</td>
</tr>
</tbody>
</table>

N = 28

a 7 point scale from -3 – “very negative” to +3 – “very positive”
b 9 point scale from 1 – “low pleasure” to 9 – “high pleasure”
c numerically rescaled ANEW to 7 point scale (see a )

Note: 20 words per category, except:
d excluding 5 words from Foa et al. (1991) which are not listed in the ANEW
e excluding 1 word from MacLeod & Mathews (1988) which is not listed in the ANEW
f excluding 3 words from MacLeod & Mathews (1988), Thrasher, Dalgleish & Yule (1994) and Freeman & Beck (2000) which are not listed in the ANEW
Paired t-tests indicated that the rescaled ANEW norms were significantly different from survivors’ ratings for the negative and positive word categories. In general, survivors’ ratings for the negative and positive word categories were slightly lower in emotionality (i.e. closer to neutral) compared to the rescaled ANEW ratings. In contrast there was no significant difference between the ANEW norms and participants’ ratings of threat or neutral word categories.

3.4.1.3. Comparison of Emotionality Ratings by Controls and Survivors

Paired t-tests indicated that the survivors’ ratings of emotionality were significantly different to the controls’ ratings for specific threat, negative, positive and general threat word categories (table 21). In general, survivors’ ratings for threat, negative, positive and general threat words were significantly lower in emotionality (i.e. in the negative direction) compared to the controls’ ratings. In contrast, there was no significant difference in emotionality ratings for neutral word categories between survivors and controls.

3.4.2. Threat Salience Ratings for Controls versus Survivors of Sexual Assault

Recall from section 1.10.4., that there are no threat salience norms available and therefore threat salience norms cannot be compared with participants’ threat salience ratings.

3.4.2.1. Threat Salience Ratings by Controls

For threat salience ratings completed by controls (table 22), a univariate ANOVA indicated significant differences in mean threat ratings between the six word categories ($F(5, 114) = 157.10, p < .001, \eta^2 = .873$). Post hoc Scheffe tests indicated that the specific threat words, general threat words and negative words were rated as significantly more threatening than the positive and neutral word categories. Moreover, the specific threat and the general threat word categories were rated as significantly more threatening than the negative word category. The controls rated the general threat words as significantly more threatening than the specific threat words. There was no difference in the threat salience ratings for the two neutral word categories.

3.4.2.2. Threat Salience Ratings by Survivors of Sexual Assault

For threat salience word ratings completed by survivors of sexual assault (table 22), a univariate ANOVA indicated significant differences in mean threat salience ratings between the six word categories ($F(5, 114) = 441.52, p < .001, \eta^2 = .951$). Post hoc Scheffe
tests indicated that specific threat word, general threat word and negative word categories were rated as significantly more threatening than the positive and neutral word categories. Moreover, the specific threat and general threat words were rated as significantly more threatening than the negative words. There was no difference in the threat salience ratings for the specific threat and general threat words, or for the two neutral word categories.

3.4.2.3. Comparison of Controls’ and Survivors’ Threat Salience Ratings

Paired t-tests indicated that survivors’ threat salience ratings were significantly different to controls’ threat salience ratings for specific threat, negative, positive, general threat, uncategorised neutral and categorised neutral word categories (see table 22). In general, survivors of sexual assault rated all six word categories as significantly more threatening compared to the non-victimised controls’ ratings.

3.4.3. Emotionality Ratings for Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

3.4.3.1. Emotionality Ratings by Matched Controls

For emotionality word ratings completed by the matched subset of controls, a univariate ANOVA indicated significant differences in mean emotionality ratings between the six word categories ($F(5, 114) = 125.59, p< .001, η^2 = .846$). Post hoc Scheffe tests indicated that the mean emotionality ratings for the two neutral word categories were significantly different to those for the specific threat, general threat, positive and negative words. Positive words were rated as significantly more emotional than the negative words. Positive words, specific threat and general threat words did not differ significantly in emotionality. Moreover, negative words and specific threat words did not differ significantly in emotionality, nor did the two threat word categories or the two neutral word categories. Matched controls did not rate the emotional stimuli as comparably emotive. Table 23 presents the mean emotionality rating data for matched controls.

In order to compare matched controls ratings directly with ANEW norms (see table 24), the latter were numerically rescaled to the range -3 to +3. Note the difference in mean ratings for most word types between table 23 and table 24. Some words used and rated were not listed in the ANEW norms database (see notes below table 24), and missing data was not included in the paired t-test analyses.
Table 21
Mean emotionality ratings for controls and survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Controls</th>
<th>Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.84 (.56)</td>
<td>-2.45 (.39)</td>
<td>-6.09</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.46 (.32)</td>
<td>-2.03 (.33)</td>
<td>-7.54</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>2.01 (.46)</td>
<td>1.68 (.30)</td>
<td>-2.92</td>
<td>19</td>
<td>.009</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.01 (.48)</td>
<td>-2.37 (.38)</td>
<td>-5.44</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.03 (.08)</td>
<td>-.06 (.21)</td>
<td>-.83</td>
<td>19</td>
<td>.418</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.01 (.02)</td>
<td>.01 (.12)</td>
<td>.02</td>
<td>19</td>
<td>.985</td>
</tr>
</tbody>
</table>

N = 56
Note: 20 words per category

Table 22
Mean threat salience ratings for controls and survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Controls</th>
<th>Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>1.82 (.64)</td>
<td>2.92 (.37)</td>
<td>10.50</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>.09 (.33)</td>
<td>2.30 (.25)</td>
<td>17.12</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>.01 (.02)</td>
<td>.04 (.34)</td>
<td>4.62</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat</td>
<td>2.25 (.48)</td>
<td>2.67 (.32)</td>
<td>5.08</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>.02 (.05)</td>
<td>.03 (.23)</td>
<td>3.85</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.03 (.05)</td>
<td>.12 (.09)</td>
<td>3.47</td>
<td>19</td>
<td>.003</td>
</tr>
</tbody>
</table>

N = 56
Note: 20 words per category
Table 23
Mean and standard deviation emotionality rating scores for matched controls

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.79</td>
<td>.64</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.38</td>
<td>.36</td>
</tr>
<tr>
<td>Positive</td>
<td>2.04</td>
<td>.49</td>
</tr>
<tr>
<td>General threat</td>
<td>-1.96</td>
<td>.47</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.02</td>
<td>.05</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.01</td>
<td>.02</td>
</tr>
</tbody>
</table>

N = 14
Note: 20 words per category

Table 24
Mean emotionality ratings for the ANEW, rescaled ANEW norms, and matched controls’ ratings.

<table>
<thead>
<tr>
<th>Word type</th>
<th>Matched Controlsa</th>
<th>ANEWb Ratings</th>
<th>Rescaledc ANEW Ratings</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.88 (.56)</td>
<td>1.78 (.40)</td>
<td>-2.61 (.31)</td>
<td>6.16</td>
<td>14</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.40 (.36)</td>
<td>1.84 (.33)</td>
<td>-2.57 (.25)</td>
<td>14.54</td>
<td>18</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>2.04 (.49)</td>
<td>8.44 (.23)</td>
<td>2.56 (.17)</td>
<td>5.34</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.03 (.48)</td>
<td>2.13 (.84)</td>
<td>-2.35 (.65)</td>
<td>-2.42</td>
<td>16</td>
<td>.028</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.02 (.05)</td>
<td>5.14 (.21)</td>
<td>-.02 (.16)</td>
<td>.49</td>
<td>19</td>
<td>.629</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.00 (.02)</td>
<td>5.07 (.34)</td>
<td>-.05 (.28)</td>
<td>-.92</td>
<td>19</td>
<td>.370</td>
</tr>
</tbody>
</table>

N = 14

a 7 point scale from -3 – “very negative” to +3 – “very positive”
b 9 point scale from 1 – “low pleasure” to 9 – “high pleasure”
c numerically rescaled ANEW to 7 point scale (see a)

Note: 20 words per category, except:
d excluding 5 words from Foa et al. (1991) which are not listed in the ANEW
e excluding 1 word from MacLeod & Mathews (1988) which is not listed in the ANEW
f excluding 3 words from MacLeod & Mathews (1988), Thrasher, Dalgleish & Yule (1994) and Freeman & Beck (2000) which are not listed in the ANEW
Paired t-tests indicated that the rescaled ANEW norms were significantly different from matched controls’ ratings for the specific threat, general threat, negative and positive word categories. In general, the controls’ ratings for the specific threat, general threat, negative and positive word categories were slightly lower in emotionality (i.e. closer to neutral) compared to the rescaled ANEW ratings. In contrast the ANEW norms and participant ratings for the neutral word categories did not differ significantly.

3.4.3.2. Emotionality Ratings by PTSD Positive Survivors of Sexual Assault

For emotionality word ratings completed by the PTSD positive survivors of sexual assault, a univariate ANOVA indicated significant differences in mean emotionality ratings between the six word categories ($F(5, 114) = 245.12, p < .001, \eta^2 = .915$). Post hoc Scheffe tests indicated that the mean emotionality ratings for the two neutral word categories were significantly different to those for the specific threat, general threat, positive and negative words. Moreover, emotionality ratings for positive words and negative words were significantly less emotional than those for the specific threat and general threat word categories. Negative words were rated as significantly more emotional than the positive words. The two threat word categories did not differ significantly in emotionality, nor did the two neutral word categories. PTSD positive survivors did not rate the emotional stimuli as comparably emotive. Table 25 presents the mean emotionality rating data for PTSD positive survivors of sexual assault.

In order to compare PTSD positive survivors’ ratings directly with ANEW norms (see table 26), the latter were numerically rescaled to the range -3 to +3. Note the difference in mean ratings for most word types between table 25 and table 26. Some words used and rated were not listed in the ANEW norms database (see notes below table 26), and missing data was not included in the paired t-test analyses.

Paired t-tests indicated that the rescaled ANEW norms were significantly different from PTSD positive survivors’ ratings for the positive and negative word categories. In general, the PTSD positive survivors’ ratings for the positive and negative word categories were slightly lower in emotionality (i.e. closer to neutral) compared to the rescaled ANEW ratings. In contrast, the ANEW norms and participant ratings for the two threat word categories or the two neutral word categories did not differ significantly.
Table 25
Mean and standard deviation emotionality rating scores for PTSD positive survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-2.50</td>
<td>.38</td>
</tr>
<tr>
<td>Negative</td>
<td>-2.17</td>
<td>.40</td>
</tr>
<tr>
<td>Positive</td>
<td>1.55</td>
<td>.31</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.29</td>
<td>.33</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .07</td>
<td>.28</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>- .04</td>
<td>.12</td>
</tr>
</tbody>
</table>

N = 15
Note: 20 words per word category

Table 26
Mean emotionality ratings for the ANEW, rescaled ANEW norms, and PTSD positive survivors’ ratings.

<table>
<thead>
<tr>
<th>Word type</th>
<th>PTSD Positive Survivors(^a)</th>
<th>ANEW(^b)</th>
<th>Rescaled(^c) ANEW</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-2.46 (.42)</td>
<td>1.78 (.40)</td>
<td>-2.61 (.31)</td>
<td>-1.18</td>
<td>14</td>
<td>.257</td>
</tr>
<tr>
<td>Negative</td>
<td>-2.19 (.39)</td>
<td>1.84 (.33)</td>
<td>-2.57 (.25)</td>
<td>-3.48</td>
<td>18</td>
<td>.003</td>
</tr>
<tr>
<td>Positive</td>
<td>1.55 (.31)</td>
<td>8.44 (.23)</td>
<td>2.56 (.17)</td>
<td>14.91</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.35 (.31)</td>
<td>2.13 (.84)</td>
<td>-2.35 (.65)</td>
<td>.05</td>
<td>16</td>
<td>.962</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .07 (.28)</td>
<td>5.14 (.21)</td>
<td>- .02 (.16)</td>
<td>1.00</td>
<td>19</td>
<td>.328</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.04 (.12)</td>
<td>5.07 (.34)</td>
<td>- .05 (.28)</td>
<td>-.20</td>
<td>19</td>
<td>.846</td>
</tr>
</tbody>
</table>

\(N = 15\)

\(^a\) 7 point scale from -3 – “very negative” to +3 – “very positive”

\(^b\) 9 point scale from 1 – “low pleasure” to 9 – “high pleasure”

\(^c\) numerically rescaled ANEW to 7 point scale (see \(^a\))

Note: 20 words per category, except:

\(^d\) excluding 5 words from Foa et al. (1991) which are not listed in the ANEW

\(^e\) excluding 1 word from MacLeod & Mathews (1988) which is not listed in the ANEW

\(^f\) excluding 3 words from MacLeod & Mathews (1988), Thrasher, Dalgleish & Yule (1994) and Freeman & Beck (2000) which are not listed in the ANEW
3.4.3.3. Emotionality Ratings by PTSD Negative Survivors of Sexual Assault

For emotionality word ratings completed by the PTSD negative survivors of sexual assault, a univariate ANOVA indicated significant differences in mean emotionality ratings between the six word categories ($F(5, 114) = 178.65, p< .001, \eta^2 = .887$). Post hoc Scheffe tests indicated that the mean emotionality ratings for the two neutral word categories were significantly different to those for the specific threat, general threat, positive and negative words. Moreover, emotionality ratings for positive words and negative words were significantly less emotional than those for the specific threat and general threat word categories. Negative words were rated as significantly more emotional than the positive words. The two threat word categories did not differ significantly in emotionality, nor did the two neutral word categories. PTSD negative survivors did not rate the emotional stimuli as comparably emotive. Table 27 presents the mean emotionality rating data for PTSD negative survivors of sexual assault.

In order to compare PTSD negative survivors’ ratings directly with ANEW norms (see table 28), the latter were numerically rescaled to the range -3 to +3. Note the difference in mean ratings for most word types between table 27 and table 28. Some words used and rated were not listed in the ANEW norms database (see notes below table 28), and missing data was not included in the paired t-test analyses.

Paired t-tests indicated that the rescaled ANEW norms were significantly different from PTSD negative survivors’ ratings for the positive and negative word categories. In general, the PTSD negative survivors’ ratings for the positive and negative word categories were slightly lower in emotionality (i.e. closer to neutral) compared to the rescaled ANEW ratings. In contrast, the ANEW norms and participant ratings for the two threat word categories or the two neutral word categories did not differ significantly.
Table 27
Mean and standard deviation emotionality rating scores for PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-2.40</td>
<td>.44</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.89</td>
<td>.33</td>
</tr>
<tr>
<td>Positive</td>
<td>1.83</td>
<td>.43</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.45</td>
<td>.48</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .06</td>
<td>.22</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.07</td>
<td>.15</td>
</tr>
</tbody>
</table>

N = 13
Note: 20 words per category

Table 28
Mean emotionality ratings for the ANEW, rescaled ANEW norms, and PTSD negative survivors’ ratings.

<table>
<thead>
<tr>
<th>Word type</th>
<th>PTSD Negative Survivors</th>
<th>ANEW&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Rescaled&lt;sup&gt;c&lt;/sup&gt; ANEW</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-2.39 (.46)</td>
<td>1.78 (.40)</td>
<td>-2.61 (.31)</td>
<td>-1.64</td>
<td>14</td>
<td>.122</td>
</tr>
<tr>
<td>Negative&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-1.91 (.32)</td>
<td>1.84 (.33)</td>
<td>-2.57 (.25)</td>
<td>-7.04</td>
<td>18</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>1.83 (.43)</td>
<td>8.44 (.23)</td>
<td>2.56 (.17)</td>
<td>7.92</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat&lt;sup&gt;f&lt;/sup&gt;</td>
<td>-2.58 (.36)</td>
<td>2.13 (.84)</td>
<td>-2.35 (.65)</td>
<td>1.46</td>
<td>16</td>
<td>.164</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .06 (.22)</td>
<td>5.14 (.21)</td>
<td>- .02 (.16)</td>
<td>1.25</td>
<td>19</td>
<td>.225</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.66 (.15)</td>
<td>5.07 (.34)</td>
<td>-.05 (.28)</td>
<td>-1.74</td>
<td>19</td>
<td>.097</td>
</tr>
</tbody>
</table>

N = 13
<sup>a</sup> 7 point scale from -3 – “very negative” to +3 – “very positive”
<sup>b</sup> 9 point scale from 1 – “low pleasure” to 9 – “high pleasure”
<sup>c</sup> numerically rescaled ANEW to 7 point scale (see <sup>a</sup>)

Note: 20 words per category, except:
<sup>d</sup> excluding 5 words from Foa et al. (1991) which are not listed in the ANEW
<sup>e</sup> excluding 1 word from MacLeod & Mathews (1988) which is not listed in the ANEW
<sup>f</sup> excluding 3 words from MacLeod & Mathews (1988), Thrasher, Dalgleish & Yule (1994) and Freeman & Beck (2000) which are not listed in the ANEW
3.4.3.4. Comparison of Emotionality Ratings by Matched Controls, PTSD Positive Survivors of Sexual Assault and PTSD Negative Survivors of Sexual Assault

3.4.3.4.1. Matched Controls versus PTSD Positive Survivors of Sexual Assault

Paired t-tests indicated that matched controls’ emotionality ratings were significantly different to PTSD positive survivors’ ratings for specific threat, general threat, positive and negative words (table 29). In general, PTSD positive survivors’ ratings of threat and negative words were significantly lower (i.e. more negative) in valence compared to matched controls’ ratings. Further PTSD positive survivors rated the positive words as significantly less emotional compared to the matched controls’ ratings for these words. There was no significant difference in emotionality ratings between the two groups for the neutral word categories.

3.4.3.4.2. Matched Controls versus PTSD Negative Survivors of Sexual Assault

Paired t-tests indicated that matched controls’ emotionality ratings were significantly different to PTSD negative survivors’ ratings for specific threat, general threat, and negative words (table 30). In general, PTSD positive survivors’ ratings of threat and negative words were significantly lower (i.e. more negative) in valence compared to matched controls’ ratings. There was no significant difference in emotionality ratings between the two groups for the positive words or the two neutral word categories.

3.4.3.4.3. PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

Paired t-tests indicated that PTSD positive survivors’ emotionality ratings were significantly different to PTSD negative survivors’ ratings for specific threat, positive, negative and categorised neutral words (table 31). In general, PTSD positive survivors’ ratings of specific threat, positive, negative and categorised neutral words were significantly lower (i.e. more negative) in valence compared to PTSD negative survivors’ ratings. There was no significant difference in emotionality ratings between the two groups for the uncategorised neutral word category.
Table 29
Mean emotionality ratings and t-test data for matched controls and PTSD positive survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Matched Controls</th>
<th>PTSD Positive Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.84 (.56)</td>
<td>-2.50 (.38)</td>
<td>-5.74</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.45 (.32)</td>
<td>-2.16 (.39)</td>
<td>-8.61</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>2.01 (.46)</td>
<td>1.55 (.31)</td>
<td>-3.37</td>
<td>19</td>
<td>.003</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.01 (.48)</td>
<td>-2.29 (.33)</td>
<td>-3.87</td>
<td>19</td>
<td>.001</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .03 (.08)</td>
<td>-.06 (.28)</td>
<td>-.68</td>
<td>19</td>
<td>.503</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.01 (.02)</td>
<td>-.04 (.12)</td>
<td>-1.85</td>
<td>19</td>
<td>.079</td>
</tr>
</tbody>
</table>

N = 29
Note: 20 words per category

Table 30
Mean emotionality ratings and t-test data for matched controls and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Matched Controls</th>
<th>PTSD Negative Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-1.84 (.56)</td>
<td>-2.39 (.44)</td>
<td>-6.29</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-1.45 (.32)</td>
<td>-1.89 (.33)</td>
<td>-5.14</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>2.01 (.46)</td>
<td>1.83 (.43)</td>
<td>-1.71</td>
<td>19</td>
<td>.104</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.01 (.48)</td>
<td>-2.45 (.48)</td>
<td>-5.03</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- .03 (.08)</td>
<td>-.06 (.22)</td>
<td>-.802</td>
<td>19</td>
<td>.433</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.01 (.02)</td>
<td>.06 (.15)</td>
<td>1.65</td>
<td>19</td>
<td>.115</td>
</tr>
</tbody>
</table>

N = 27
Note: 20 words per category
Table 31
Mean emotionality ratings and t-test data for PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>PTSD Positive Survivors</th>
<th>PTSD Negative Survivors</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-2.50 (.38)</td>
<td>-2.39 (.44)</td>
<td>2.11</td>
<td>19</td>
<td>.048</td>
</tr>
<tr>
<td>Negative</td>
<td>-2.16 (.39)</td>
<td>-1.89 (.33)</td>
<td>4.08</td>
<td>19</td>
<td>.001</td>
</tr>
<tr>
<td>Positive</td>
<td>1.55 (.31)</td>
<td>1.83 (.43)</td>
<td>2.83</td>
<td>19</td>
<td>.011</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.29 (.33)</td>
<td>-2.45 (.48)</td>
<td>-1.91</td>
<td>19</td>
<td>.071</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-.06 (.28)</td>
<td>-.06 (.22)</td>
<td>.014</td>
<td>19</td>
<td>.989</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>-.04 (.12)</td>
<td>.06 (.15)</td>
<td>3.49</td>
<td>19</td>
<td>.002</td>
</tr>
</tbody>
</table>

N = 28
Note: 20 words per category
3.4.4. Threat Salience Ratings for Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

Recall from section 1.10.4., that there are no threat salience norms available and therefore threat salience norms cannot be compared with participants’ threat salience ratings.

3.4.4.1. Threat Salience Ratings by Matched Controls

For threat salience ratings completed by matched controls (table 32), a univariate ANOVA indicated significant differences in mean threat ratings between the six word categories ($F(5, 114) = 117.23, p< .001, \eta^2 = .837$). Post hoc Scheffe tests indicated that the specific threat words, general threat words and negative words were rated as significantly more threatening than the positive and neutral word categories. Moreover, the specific threat and the general threat word categories were rated as significantly more threatening than the negative word category. There was no significant difference in the threat salience ratings for the two threat word categories or for the two neutral word categories.

3.4.4.2. Threat Salience Ratings by PTSD Positive Survivors of Sexual Assault

For threat salience word ratings completed by PTSD positive survivors of sexual assault (table 33), a univariate ANOVA indicated significant differences in mean threat salience ratings between the six word categories ($F(5, 114) = 311.91, p< .001, \eta^2 = .932$). Post hoc Scheffe tests indicated that specific threat word, general threat word and negative word categories were rated as significantly more threatening than the positive and neutral word categories. Moreover, the specific threat words were rated as significantly more threatening than the negative words. There was no difference in the threat salience ratings for the general threat and negative words, or for the positive and two neutral word categories.

3.4.4.3. Threat Salience Ratings by PTSD Negative Survivors of Sexual Assault

For threat salience word ratings completed by PTSD negative survivors of sexual assault (table 34), a univariate ANOVA indicated significant differences in mean threat salience ratings between the six word categories ($F(5, 114) = 331.52, p< .001, \eta^2 = .936$). Post hoc Scheffe tests indicated that specific threat word, general threat word and negative word categories were rated as significantly more threatening than the positive and neutral word categories. Moreover, the specific threat and general threat word categories were rated
as significantly more threatening than the negative words. There was no difference in the threat salience ratings for the two threat word categories, or for the positive and neutral word categories.

3.4.5. Comparison of Threat Salience Ratings for Matched Controls, PTSD Positive Survivors of Sexual Assault and PTSD Negative Survivors of Sexual Assault

3.4.5.1. Matched Controls versus PTSD Positive Survivors of Sexual Assault

Paired t-tests indicated that matched controls’ threat salience ratings were significantly different to PTSD positive survivors’ threat salience ratings for specific threat, negative, positive, general threat, uncategorised neutral and categorised neutral word categories (see table 35). In general, PTSD positive survivors of sexual assault rated all six word categories as significantly more threatening compared to the matched controls’ ratings. For means see table 32 (matched controls) and table 33 (PTSD positive survivors).

3.4.5.2. Matched Controls versus PTSD Negative Survivors of Sexual Assault

Paired t-tests indicated that matched controls’ threat salience ratings were significantly different to PTSD negative survivors’ threat salience ratings for specific threat, negative, positive, general threat, and uncategorised neutral word categories (see table 36). In general, PTSD negative survivors of sexual assault rated these word categories as significantly more threatening compared to the matched controls’ ratings. There was no significant difference between these groups for threat salience ratings of categorised neutral words. For means see table 32 (matched controls) and table 34 (PTSD negative survivors).

3.4.5.3. PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

Paired t-tests indicated that PTSD positive survivors’ threat salience ratings were significantly different to PTSD negative survivors’ threat salience ratings for specific threat, negative, positive, general threat, uncategorised neutral and categorised neutral word categories (see table 37). In general, PTSD positive survivors of sexual assault rated most word categories as significantly more threatening compared to the PTSD negative survivors’ ratings. For means see table 33 (PTSD positive survivors) and table 34 (PTSD negative survivors).
Table 32
Mean and standard deviation threat salience rating scores for matched controls

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>1.69</td>
<td>.66</td>
</tr>
<tr>
<td>Negative</td>
<td>.89</td>
<td>.38</td>
</tr>
<tr>
<td>Positive</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>General threat</td>
<td>1.96</td>
<td>.47</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>.02</td>
<td>.05</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.77</td>
<td>.89</td>
</tr>
</tbody>
</table>

N = 14
Note: 20 words per category

Table 33
Mean and standard deviation threat salience rating scores for PTSD positive survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>3.11</td>
<td>.34</td>
</tr>
<tr>
<td>Negative</td>
<td>2.52</td>
<td>.29</td>
</tr>
<tr>
<td>Positive</td>
<td>.54</td>
<td>.47</td>
</tr>
<tr>
<td>General threat</td>
<td>2.54</td>
<td>.39</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>.27</td>
<td>.29</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>1.52</td>
<td>.15</td>
</tr>
</tbody>
</table>

N = 15
Note: 20 words per category
Table 34
Mean and standard deviation threat salience rating scores for PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>2.71</td>
<td>.51</td>
</tr>
<tr>
<td>Negative</td>
<td>2.05</td>
<td>.28</td>
</tr>
<tr>
<td>Positive</td>
<td>.20</td>
<td>.28</td>
</tr>
<tr>
<td>General threat</td>
<td>2.82</td>
<td>.42</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>.17</td>
<td>.19</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>.07</td>
<td>.09</td>
</tr>
</tbody>
</table>

N = 13
Note: 20 words per category

Table 35
Comparison of threat salience ratings for matched controls and PTSD positive survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-10.64</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-21.38</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>- 5.06</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>General threat</td>
<td>- 6.09</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>- 3.76</td>
<td>19</td>
<td>.001</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>- 2.57</td>
<td>19</td>
<td>.019</td>
</tr>
</tbody>
</table>

N = 29
Note: 20 words per category
Table 36
Comparison of threat salience ratings for matched controls and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>-9.24</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>-11.39</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>-3.28</td>
<td>19</td>
<td>.004</td>
</tr>
<tr>
<td>General threat</td>
<td>-9.27</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>-3.33</td>
<td>19</td>
<td>.003</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>-1.09</td>
<td>19</td>
<td>.286</td>
</tr>
</tbody>
</table>

N = 27
Note: 20 words per category

Table 37
Comparison of threat salience ratings for PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific threat</td>
<td>4.46</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Negative</td>
<td>7.01</td>
<td>19</td>
<td>.000</td>
</tr>
<tr>
<td>Positive</td>
<td>3.95</td>
<td>19</td>
<td>.001</td>
</tr>
<tr>
<td>General threat</td>
<td>-2.56</td>
<td>19</td>
<td>.019</td>
</tr>
<tr>
<td>Uncategorised Neutral</td>
<td>2.23</td>
<td>19</td>
<td>.038</td>
</tr>
<tr>
<td>Categorised Neutral</td>
<td>2.14</td>
<td>19</td>
<td>.046</td>
</tr>
</tbody>
</table>

N = 28
Note: 20 words per category
3.5. Primary Analyses: Word Processing Paradigms

Mean response latencies were submitted to mixed model ANOVAs in order to investigate effects of word categories on response times. Separate ANOVAs were conducted for each effect (see section 2.1. for operationalised effects). The Alpha level for testing significance was set at $p < .05$. Estimates of effect size ($\eta^2$) reported are partial eta squared statistics (not eta squared statistics). After Freeman and Beck (2000), partial $\eta^2$ is deemed to more clearly quantify effect size, with small effects ranging from 2% to 12% of variance, medium effects ranging from 13% to 44%, and large effects where 45% or more of the variance was accounted for by the observed effect (cf. Cohen, 1988).

Task order effects were assessed for both the emotional Stroop task and the emotional lexical decision task, using one way ANOVAs. No significant order effects were observed (all $p > .05$).

3.6. Classical Stroop Task

In the classical Stroop (1935) task, participants are asked to identify the colour ink in which a stimulus is presented, while ignoring the meaning of the stimulus itself. Evidence suggests (e.g. MacLeod, 1991; Stroop, 1935; Williams et al., 1996) that it takes longer to identify the colour ink when the item itself is an incongruent stimulus (e.g. the word “red” presented in green ink), compared to a congruent stimulus (e.g. the word “red” presented in red ink), and this effect has been termed “Stroop interference” (see section 1.7.1.).

Incorrect responses were excluded from the following analyses. The overall percentage of incorrect responses was 4.0%, and no participant was excluded because of unacceptably high error rates. Consistent with previous studies (e.g. Freeman & Beck, 2000), trials with latencies less than 350 ms and greater than 2 standard deviations (SDs) above the mean for each word category (for each participant) were removed. The former were considered to correspond to anticipatory responses and the latter were excluded to contain the tail of the distribution.
3.6.1. Controls versus Survivors of Sexual Assault

In order to test for differences between controls and survivors mean colour naming latencies for congruent and incongruent colour name words, a mixed design ANOVA was performed with word type (congruent / incongruent) as the within subjects factor and group (survivor / control) as the between subjects factor. The result of the ANOVA indicated a significant main effect of group ($F(1,54) = 29.29, p<.001, \eta^2 = .352$) and a significant interaction between word type and group ($F(1, 54) = 11.66, p<.01, \eta^2 = .178$).

Decomposition of the main effect indicated that survivors of sexual assault were significantly slower to name both congruent and incongruent colour name words compared to controls. Mean and standard deviation RTs and ANOVA data for each word category, for survivors of sexual assault and non-victimised controls are shown in table 38. Figure 6 presents a graphical representation of the interaction between word type and group.

Table 38
Mean and standard deviation RTs and ANOVA data for each classical Stroop word category, for controls and survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Controls</th>
<th>Survivors</th>
<th>$F$</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent Colour Name</td>
<td>876.45</td>
<td>1167.13</td>
<td>12.50</td>
<td>1, 54</td>
<td>.001</td>
</tr>
<tr>
<td>Colour Name</td>
<td>(225.06)</td>
<td>(372.40)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incongruent Colour Name</td>
<td>908.70</td>
<td>1309.68</td>
<td>25.06</td>
<td>1, 54</td>
<td>.000</td>
</tr>
<tr>
<td>Colour Name</td>
<td>(220.66)</td>
<td>(361.90)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N = 56$
Figure 6
Interaction between group and word category for classical Stroop stimuli
In order to test for differences between controls’ colour naming latencies for congruent and incongruent colour name words, an ANOVA was performed with word type (congruent / incongruent) as the within subjects factor. The result of the ANOVA indicated that although controls took longer to respond to incongruent colour name words compared to congruent colour name words, the difference did not reach significance ($F(1, 27) = 3.08$, $p = .091$, $\eta^2 = .102$). Figure 7 presents the means and standard errors for RTs to congruent and incongruent colour name words for controls.

In order to test for differences between survivors’ colour naming latencies for congruent and incongruent colour name words, an ANOVA was performed with word type (congruent / incongruent) as the within subjects factor. The result of the ANOVA indicated a classical Stroop interference effect, with survivors of sexual assault taking significantly longer to colour name incongruent colour name words, compared to congruent colour name words ($F(1, 27) = 28.81$, $p < .001$, $\eta^2 = .516$). Figure 8 presents the means and standard errors for RTs to congruent and incongruent colour name words for survivors of sexual assault.

In summary, as expected, survivors of sexual assault demonstrated a significant classical Stroop interference effect, with response latencies for incongruent colour-name words significantly longer compared to congruent colour name words. Contrary to expectation, for controls the classical Stroop interference effect was not significant. There was however, a trend towards a classical Stroop effect ($p = .095$), with response latencies for incongruent words tending to be slower compared to congruent words in controls.
Figure 7
Means and standard errors for RTs to congruent and incongruent colour name words for controls

Figure 8
Means and standard errors for RTs to congruent and incongruent colour name words for survivors of sexual assault
3.6.2. Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

In order to test for differences between matched controls, PTSD positive and PTSD negative survivors mean colour naming latencies for congruent and incongruent colour name words, a mixed design ANOVA was performed. The within subjects factor was word type (congruent / incongruent), and the between subjects factor was symptomatic group (matched controls, PTSD positive survivors and PTSD negative survivors). The result of the ANOVA indicated a significant main effect of symptomatic group ($F(1,39) = 32.67, p<.001, \eta^2 = .456$). There was no significant interaction between word type and symptomatic group ($F(2, 39) = 2.31, p>.05, \eta^2 = .106$). Table 39 presents the mean and standard deviations for incongruent and congruent colour name words for the three groups.

Decomposition of the main effect indicated that in comparison to matched controls, PTSD positive survivors were significantly slower to colour name both congruent ($F(1,27) = 6.12, p<.05$) and incongruent ($F(1,27) = 10.31, p<.01$) colour name words. Similarly, in comparison to matched controls, PTSD negative survivors were significantly slower to colour name both congruent ($F(1,25) = 13.07, p<.01$) and incongruent ($F(1,25) = 18.99, p<.001$) colour name words. For PTSD positive and PTSD negative survivors of sexual assault, there was no significant difference in mean colour naming latencies for congruent ($F(1,26) = 1.37, p>.05$) or incongruent ($F(1,26) = 1.06, p>.05$) colour name words.

In order to test for differences between matched controls’ colour naming latencies for congruent and incongruent colour name words, an ANOVA was performed with word type (congruent / incongruent) as the within subjects factor. The result of the ANOVA indicated a classical Stroop interference effect, with matched controls taking significantly longer to respond to incongruent colour name words compared to congruent colour name words ($F(1, 13) = 5.17, p<.05, \eta^2 = .284$). Figure 9 presents the means and standard errors for RTs to congruent and incongruent colour name words for matched controls.

In order to test for differences between PTSD positive survivors’ colour naming latencies for congruent and incongruent colour name words, an ANOVA was performed with word type (congruent / incongruent) as the within subjects factor. The result of the ANOVA indicated a classical Stroop interference effect, with PTSD positive survivors taking significantly longer to respond to incongruent colour name words compared to congruent colour name words ($F(1, 14) = 18.98, p<.01, \eta^2 = .576$). Figure 10 presents the
means and standard errors for RTs to congruent and incongruent colour name words for PTSD positive survivors of sexual assault.

In order to test for differences between PTSD negative survivors’ colour naming latencies for congruent and incongruent colour name words, an ANOVA was performed with word type (congruent / incongruent) as the within subjects factor. The result of the ANOVA indicated a classical Stroop interference effect, with PTSD negative survivors taking significantly longer to respond to incongruent colour name words compared to congruent colour name words ($F(1, 12) = 9.81, p < .01, \eta^2 = .450$). Figure 11 presents the means and standard errors for RTs to congruent and incongruent colour name words for PTSD negative survivors of sexual assault.

In summary, as expected, matched controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault demonstrated significant classical Stroop interference effects, with response latencies for incongruent colour-name words significantly longer compared to congruent colour name words.

Table 39
Mean and standard deviation RTs for each classical Stroop word category, for matched controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault

<table>
<thead>
<tr>
<th>Word type</th>
<th>Matched Controls</th>
<th>PTSD Positive Survivors</th>
<th>PTSD Negative Survivors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent Colour</td>
<td>821.45 (213.60)</td>
<td>1090.86 (350.92)</td>
<td>1255.13 (390.77)</td>
</tr>
<tr>
<td>Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incongruent Colour</td>
<td>876.37 (237.49)</td>
<td>1244.15 (361.73)</td>
<td>1385.29 (361.21)</td>
</tr>
<tr>
<td>Name</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N = 42$
SDs in parentheses
Figure 9
Means and standard errors for RTs to congruent and incongruent colour name words for matched controls

Figure 10
Means and standard errors for RTs to congruent and incongruent colour name words for PTSD positive survivors of sexual assault
Figure 11
Means and standard errors for RTs to congruent and incongruent colour name words for PTSD negative survivors of sexual assault
3.7. Emotional Stroop Task

For the sake of clarity, the emotional Stroop results are presented in separate sections, according to the following group dichotomisations (see section 1.11.1.2.):

1. Controls ($N = 28$) versus Sexual assault survivors ($N = 28$)

2. Matched subset of controls ($N = 14$) versus PTSD positive survivors of sexual assault ($N = 15$) versus PTSD negative survivors of sexual assault ($N = 13$)

Note that for the PTSD group comparison, the control group comprised a random selection of 14 of the original 28 matched control participants.

Each section follows the following structure:

- Specific differences were compared using ANOVAs for the following effects (see section 2.1.):

  i. Lexical Effects: Few emotional Stroop studies of attentional biases have investigated the effect of non-words on colour-naming RTs. Foa et al. (1991) included a non-word category to control for semantic content on performance, however the authors did not elaborate on either lexical or semantic effects. The current study investigates lexical effects on colour-naming by contrasting RTs for non-words with RTs for neutral word categories.

  ii. Category Effects: The current study included two neutral word categories, uncategorised neutral and categorised neutral. In order to assess the effect of word categorisation, irrespective of emotional valence, ANOVAs were performed between RTs for uncategorised neutral and RTs for neutral word categories.

  iii. Emotionality Effects: Positive emotionality effects and negative emotionality effects were investigated separately. To examine positive emotionality effects, RTs for positive words were contrasted with RTs for uncategorised neutral words. To examine negative emotionality effects, RTs for negative words were contrasted with RTs for uncategorised neutral words.
iv. Threat Effects: Specific threat and general threat effects were investigated separately. To examine specific threat effects, ANOVAs were performed between RTs for the specific threat word category and RTs for the categorised neutral word category. Since the specific threat words share a common theme (i.e. sexual assault), they were contrasted with categorised neutral words in order to account for possible word categorisation effects (see section 1.10.2.). On the other hand, RTs for the general threat word category were contrasted with RTs for the uncategorised neutral word category to investigate general threat effects.

Following these ANOVA analyses, for each significant wordtype effect, analyses were performed between response latencies and anxiety and mood measure scores in order to test for anxiety effects and mood congruency effects (see section 3.7.3.).

The following criteria applies to all the emotional Stroop analyses. Incorrect responses were excluded from the following analyses. The percentage of incorrect responses was 1.1% overall and no participants were excluded based on their error rates. After Freeman and Beck (2000) latencies that were less than 350 ms and greater than 2SD above the mean for each word category were excluded.
3.7.1. Controls versus Survivors of Sexual Assault

3.7.1.1. Lexical Effect and Categorisation Effects

Controls were significantly slower to colour-name non-words compared to uncategorised neutral words ($F(1,27) = 4.90, p < .05, \eta^2 = .154$). Controls’ RTs for non-words and categorised neutral words were comparable ($F(1,27) = 1.70, p > .05, \eta^2 = .059$). Moreover, a significant word categorisation effect was observed for controls ($F(1,27) = 9.44, p < .01, \eta^2 = .259$). Controls’ colour-naming RTs for uncategorised neutral words were significantly slower compared to categorised neutral words. Figure 12 presents the means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for controls.

A significant lexical effect was observed for survivors of sexual assault, such that survivors were significantly slower to colour-name non-words compared to uncategorised neutral words ($F(1,27) = 11.16, p < .01, \eta^2 = .292$), and categorised neutral words ($F(1,27) = 10.42, p < .01, \eta^2 = .278$). A significant word categorisation effect was not observed for survivors of sexual assault ($F(1,27) = .548, p > .05, \eta^2 = .020$). Figure 13 presents the means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for survivors of sexual assault.

3.7.1.2. Emotionality Effects

In order to test for differences between controls’ mean colour naming latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that controls’ RTs for uncategorised neutral words were significantly longer compared to negative words ($F(1,27) = 5.62, p < .05, \eta^2 = .172$), however RTs for positive words and uncategorised neutral words were comparable ($F(1,27) = 1.61, p > .05, \eta^2 = .056$). Figure 14 presents the means and standard errors for controls for RTs to positive words, negative words and uncategorised neutral words.

In order to test for differences between survivors’ mean colour naming latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that survivors’ RTs for negative words were significantly longer
compared to uncategorised neutral words ($F(1,27) = 4.19, p = .05, \eta^2 = .134$), however RTs for positive words and uncategorised neutral words were comparable ($F(1,27) = .002, p > .05, \eta^2 = .000$). Figure 15 presents the means and standard errors for survivors of sexual assault for RTs to positive words, negative words and uncategorised neutral words.
Figure 12
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for controls.

Figure 13
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for survivors of sexual assault.
Figure 14
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for controls.

Figure 15
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for survivors of sexual assault.

3.7.1.3. General Threat Effects
In order to test for differences between controls’ colour naming latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant difference in RTs for general threat words and uncategorised neutral words for controls ($F(1,27) = 3.13, p > .05, \eta^2 = .104$). Figure 16 presents the means and standard errors for RTs to general threat words and uncategorised neutral words, for controls.

In order to test for differences between survivors’ colour naming latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that for survivors of sexual assault, a significant general threat effect was observed ($F(1,27) = 8.85, p < .01, \eta^2 = .247$). Survivors of sexual assault took significantly longer to colour-name general threat words compared to uncategorised neutral words (figure 17).

### 3.7.1.4. Specific Threat Effects

In order to test for differences between controls’ colour naming latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant specific threat effect for controls ($F(1,27) = 5.16, p < .05, \eta^2 = .160$), with RTs significantly longer for specific threat words compared to categorised neutral words. Figure 18 presents the means and standard errors for RTs to specific threat words and categorised neutral words, for controls.

In order to test for differences between survivors’ colour naming latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant specific threat effect for survivors of sexual assault ($F(1,27) = 4.38, p < .05, \eta^2 = .140$), with RTs taking significantly longer for specific threat words compared to categorised neutral words (figure 19).

Figure 16
Means and standard errors for RTs to general threat words and uncategorised neutral words, for controls.

Figure 17
Means and standard errors for RTs to general threat words and uncategorised neutral words, for survivors of sexual assault.
Figure 18
Means and standard errors for RTs to specific threat words and categorised neutral words, for controls.

Figure 19
Means and standard errors for RTs to specific threat words and categorised neutral words, for survivors of sexual assault.
3.7.1.5. Emotional Stroop Difference Scores

In order to simplify the comparison of wordtype effects, difference scores were calculated for emotionality effects, general threat effects and specific threat effects. Positive emotionality effects were expressed as the difference between positive RTs and uncategorised neutral RTs. Negative emotionality effects were expressed as the difference between negative RTs and uncategorised neutral RTs. General threat effects were expressed as the difference between general threat and uncategorised neutral RTs, whereas specific threat effects were expressed as the difference between mean specific threat and categorised neutral RTs (see section 2.1. for operationalised effects).

Huynh-Feldt adjustments for degrees of freedom were used where the assumption of homogeneity of variances was violated.

A mixed design ANOVA with effect type as the within subjects factor and group as the between subjects factor revealed a significant main effect of group ($F(1,54) = 9.46, p<.01, \eta^2 = .149$). There was also a significant interaction between effect type and group was observed ($F(2.68, 144.54) = 3.23, p<.05, \eta^2 = .056$).

Decomposition of this main effect using a series of one-way ANOVAs indicated that the magnitude of the general threat effect and negative emotionality effect was significantly greater for survivors of sexual assault, compared to controls. There was no significant difference in specific threat or positive emotionality effects between the two groups (table 40).

Table 40
Mean and standard deviation interference / facilitation RTs for controls and survivors of sexual assault.

<table>
<thead>
<tr>
<th>Effect Type</th>
<th>Controls</th>
<th>Survivors</th>
<th>F</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotionality</td>
<td>- 7.62 (31.75)</td>
<td>.31 (38.67)</td>
<td>.70</td>
<td>1, 54</td>
<td>.406</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>-21.99 (49.09)</td>
<td>38.92 (100.57)</td>
<td>8.29</td>
<td>1, 54</td>
<td>.006</td>
</tr>
<tr>
<td>General Threat</td>
<td>-15.09 (45.11)</td>
<td>34.15 (60.74)</td>
<td>11.86</td>
<td>1, 54</td>
<td>.001</td>
</tr>
<tr>
<td>Specific threat</td>
<td>13.40 (31.22)</td>
<td>35.79 (90.50)</td>
<td>1.53</td>
<td>1, 54</td>
<td>.221</td>
</tr>
</tbody>
</table>

$N = 56$
SDs in parentheses
3.7.2. Matched Controls versus PTSD Positive Survivors versus PTSD Negative Survivors

Consistent with prior studies of sexual assault related attentional biases and PTSD (e.g. Foa et al., 1991; Cassiday et al., 1992; Freeman & Beck, 2000), in this section attentional biases are compared between matched controls, PTSD positive survivors of sexual assault, and PTSD negative survivors of sexual assault (see section 1.11.1.2.).

3.7.2.1. Lexical Effect and Categorisation Effects

For a matched subset of controls, a significant lexical effect was not observed. The subset of controls demonstrated comparable RTs for non-words and uncategorised neutral words ($F(1,13) = 2.11, p > .05, \eta^2 = .139$), and non-words and categorised neutral words ($F(1,13) = .009, p > .05, \eta^2 = .001$). No significant word categorisation effect was observed ($F(1,13) = 2.44, p > .05, \eta^2 = .158$). Although the subset of controls were slower to colour-name uncategorised neutral words compared to categorised neutral words, the difference did not reach significance (figure 20).

Although PTSD positive survivors of sexual assault were slower to colour-name non-words compared to uncategorised neutral words, the difference did not reach significance ($F(1,14) = 3.07, p > .05, \eta^2 = .180$). However, PTSD positive survivors were significantly slower to colour-name non-words compared to categorised neutral words ($F(1,14) = 10.61, p < .01, \eta^2 = .431$). There was a significant word categorisation effect for PTSD positive survivors of sexual assault ($F(1,14) = 8.35, p < .05, \eta^2 = .374$). PTSD positive survivors’ colour-naming RTs for uncategorised neutral words were significantly slower compared to categorised neutral words (figure 21).

PTSD negative survivors were significantly slower to colour-name non-words compared to uncategorised neutral words ($F(1,12) = 11.24, p < .01, \eta^2 = .484$). Although PTSD negative survivors’ RTs for non-words were slower compared to categorised neutral words, the difference did not reach significance ($F(1,12) = 1.37, p > .01, \eta^2 = .102$). A significant difference in RTs between uncategorised neutral and categorised neutral words was observed for PTSD negative survivors of sexual assault ($F(1,12) = 5.16, p < .05, \eta^2 = .301$). PTSD negative survivors’ RTs for uncategorised neutral words were significantly faster compared to categorised neutral words (figure 22).
Figure 20
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for a matched subset of controls.
Figure 21
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for PTSD positive survivors of sexual assault.

Figure 22
Means and standard errors for RTs to uncategorised neutral words, non-words and categorized neutral words, for PTSD negative survivors of sexual assault.
3.7.2.2. Emotionality Effects

In order to test for differences between matched controls’ mean colour naming latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that for a matched subset of controls, RTs for negative words were faster compared to uncategorised neutral words, however the difference did not reach significance ($F(1,13) = 1.47, p > .05, \eta^2 = .102$). Further, while the subset of controls were slower to colour-name positive words compared to uncategorised neutral words, the difference did not reach significance ($F(1,13) = 3.12, p > .05, \eta^2 = .194$). Figure 23 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for a matched subset of controls.

In order to test for differences between PTSD positive survivors’ mean colour naming latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that although PTSD positive survivors’ RTs for negative words were slower compared to uncategorised neutral words, the difference did not reach significance ($F(1,14) = 2.98, p > .05, \eta^2 = .175$). Further, while PTSD positive survivors’ were faster to colour-name positive words compared to uncategorised neutral words, the difference did not reach significance ($F(1,14) = 2.25, p > .05, \eta^2 = .139$). Figure 24 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

In order to test for differences between PTSD negative survivors’ mean colour naming latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that although PTSD negative survivors’ RTs for negative words were slower compared to uncategorised neutral words, the difference did not reach significance ($F(1,12) = 2.03, p > .05, \eta^2 = .145$). Further, while PTSD negative survivors were slower to colour-name positive words compared to uncategorised neutral words, the difference did not reach significance ($F(1,12) = 1.63, p > .05, \eta^2 = .120$). Figure 25 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD negative survivors of sexual assault.
Figure 23
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for a matched subset of controls.
Figure 24
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

Figure 25
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD negative survivors of sexual assault.
3.7.2.3. General Threat Effects

In order to test for differences between matched controls’ colour naming latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that for a matched subset of controls, there was no significant general threat effect ($F(1,13) = .602, p > .05, \eta^2 = .044$). Although not reaching significance, the subset of controls were faster to colour-name general threat words compared to uncategorised neutral words (figure 26).

In order to test for differences between PTSD positive survivors’ colour naming latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant difference in RTs for general threat words and uncategorised neutral words for PTSD positive survivors of sexual assault ($F(1,14) = 2.73, p > .05, \eta^2 = .163$). Although PTSD positive survivors were slower to colour-name general threat words compared to uncategorised neutral words, the difference did not reach significance (figure 27).

In order to test for differences between PTSD negative survivors’ colour naming latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant general threat effect for PTSD negative survivors of sexual assault ($F(1,12) = 6.66, p < .05, \eta^2 = .357$). PTSD negative survivors’ RTs for general threat words were significantly longer compared to uncategorised neutral words (figure 28).

3.7.2.4. Specific Threat Effects

In order to test for differences between matched controls’ colour naming latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant specific threat effect for a matched subset of controls ($F(1,13) = 1.29, p > .05, \eta^2 = .091$). Although the matched subset of controls were slower to colour-name specific threat words compared to categorised neutral words, the difference did not reach significance (figure 29).
In order to test for differences between PTSD positive survivors’ colour naming latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant specific threat effect for PTSD positive survivors of sexual assault ($F(1,14) = 6.23, p < .05, \eta^2 = .308$), with RTs for specific threat words significantly longer compared to categorised neutral words (figure 30).

In order to test for differences between PTSD negative survivors’ colour naming latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that no significant specific threat effect was observed for PTSD negative survivors of sexual assault ($F(1,12) = .151, p > .05, \eta^2 = .012$). Although PTSD negative survivors were slower to colour-name specific threat words compared to categorised neutral words, the difference did not reach significance (figure 31).
Figure 26
Means and standard errors for RTs to general threat words and uncategorised neutral words, for a matched subset of controls.
Figure 27
Means and standard errors for RTs to general threat words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

Figure 28
Means and standard errors for RTs to general threat words and uncategorised neutral words, for PTSD negative survivors of sexual assault.
Figure 29

Means and standard errors for RTs to specific threat words and categorised neutral words, for a matched subset of controls.

<table>
<thead>
<tr>
<th>Word Category</th>
<th>Reaction Time (ms): Mean ± 2 SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>specific threat</td>
<td>400</td>
</tr>
<tr>
<td>categorised neutral</td>
<td>500</td>
</tr>
</tbody>
</table>
Figure 30
Means and standard errors for RTs to specific threat words and categorised neutral words, for PTSD positive survivors of sexual assault.

Figure 31
Means and standard errors for RTs to specific threat words and categorised neutral words, for PTSD negative survivors of sexual assault.
3.7.2.5. Emotional Stroop Dichotomised Groups Difference Scores

In order to simplify the comparison of wordtype effects, difference scores were calculated for emotionality effects, general threat effects and specific threat effects. Positive emotionality effects were expressed as the difference between positive RTs and uncategorised neutral RTs. Negative emotionality effects were expressed as the difference between negative RTs and uncategorised neutral RTs. General threat effects were expressed as the difference between general threat and uncategorised neutral RTs, whereas specific threat effects were expressed as the difference between mean specific threat and categorised neutral RTs (see section 2.1. for operationalised effects).

Huynh-Feldt adjustments for degrees of freedom were used where the assumption of homogeneity of variances was violated.

A mixed design ANOVA with effect type as the within subjects factor and group as the between subjects factor revealed that the effect of group was not significant ($F(2,39) = 1.85$, $p = .170$, $\eta^2 = .087$). However a significant interaction between effect type and group was observed ($F(5.62, 109.53) = 3.01$, $p < .05$, $\eta^2 = .134$). Table 41 presents the means and standard deviation interference / facilitation RTs for PTSD positive and PTSD negative survivors of sexual assault, and a subset of matched controls.

Table 41
Mean and standard deviation interference / facilitation RTs for matched controls, PTSD positive and PTSD negative survivors of sexual assault.

<table>
<thead>
<tr>
<th>Effect Type</th>
<th>Matched Subset of Controls</th>
<th>PTSD Positive</th>
<th>PTSD Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotionality</td>
<td>9.07 (19.20)</td>
<td>-12.32 (31.79)</td>
<td>14.87 (41.92)</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>-10.60 (32.69)</td>
<td>58.34 (130.92)</td>
<td>16.50 (41.72)</td>
</tr>
<tr>
<td>General Threat</td>
<td>-10.10 (48.67)</td>
<td>26.93 (63.07)</td>
<td>42.48 (59.33)</td>
</tr>
<tr>
<td>Specific Threat</td>
<td>12.14 (39.92)</td>
<td>58.84 (91.29)</td>
<td>9.18 (85.28)</td>
</tr>
</tbody>
</table>

$N = 56$
SDs in parentheses
3.7.3. Anxiety and Mood Congruency Analyses between Significant Word Type Effects and Anxiety and Affect Scores

In order to investigate the possible effects of anxiety and mood congruency on threat and emotionality effects, ANOVAs were performed between difference scores (interference / facilitation) and anxiety and affect scores. It was anticipated that high state and trait anxiety scores would be associated with slowed colour naming responses for specific threat and general threat words. Further it was anticipated that that high positive affect scores would be associated with slowed colour naming responses for positive words, whereas high negative affect scores would be associated with slowed colour naming responses for negative words. The findings of these analyses did not reach statistical significance (all $p > .05$), and therefore will not be reported here.

3.7.4. Emotionality Effects versus Threat Effects

One of the key questions of the current thesis is whether the observed threat effects are indeed threat effects or whether they can be attributed to an underlying emotionality effect. For the emotional Stroop task, both controls and survivors of sexual assault elicited significant negative emotionality effects and significant threat effects. However, these effects were deemed too weak (see Table 42) for additional analyses to inform the threat and emotionality ANOVA findings any further. Future researchers, with larger sample sizes may wish to directly assess the contribution of threat and emotionality salience to observed threat effects, by performing an ANOVA in which differences between threat salience and emotional salience on RTs for each word trial are compared.

3.7.5. Emotional Stroop - Summary

Table 42 presents a summary of the emotional Stroop findings for controls and survivors overall, as well as the symptomatic and asymptomatic dichotomised groups. The table summarises whether significant effects appeared to reflect interference or facilitation and also the effect size (partial statistics $\eta^2$) for these findings.
Table 42
Emotional Stroop findings interference and facilitation findings for emotionality effects, general threat and specific threat effects.

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>Survivors</th>
<th>Matched Controls</th>
<th>PTSD Positive</th>
<th>PTSD Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotionality</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>Facilitation</td>
<td>Interference</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>General Threat</td>
<td>NS</td>
<td>Interference</td>
<td>NS</td>
<td>NS</td>
<td>Interference</td>
</tr>
<tr>
<td>Specific Threat</td>
<td>Interference</td>
<td>Interference</td>
<td>NS</td>
<td>Interference</td>
<td>NS</td>
</tr>
</tbody>
</table>

\[ \eta^2 = .172 \quad \eta^2 = .134 \]

\[ \eta^2 = .247 \quad \eta^2 = .357 \]

\[ \eta^2 = .160 \quad \eta^2 = .140 \quad \eta^2 = .308 \]

NS = Not Significant
3.8. Emotional Lexical Decision Task

Consistent with the emotional Stroop findings (section 3.7.), for the sake of clarity, the emotional lexical decision task results are presented in separate sections, according to the following group dichotomisations (see section 1.11.1.2.):

1. Controls ($N = 28$) versus Sexual assault survivors ($N = 28$)

2. Matched subset of controls ($N = 14$) versus PTSD positive survivors of sexual assault ($N = 15$) versus PTSD negative survivors of sexual assault ($N = 13$)

Note that for the PTSD group comparison, the control group comprised a random selection of 14 of the original 28 matched control participants.

Each section follows the following structure:

- Specific differences were compared using ANOVAs for the following effects (see section 2.1.):
  
  i. Lexical Effects: The lexical decision task by design is a lexical task and as such, response latencies for non-words should be greater than response latencies for words. The current study investigates lexical effects by contrasting non-words with neutral word categories.
  
  ii. Category Effects: The current study included two neutral word categories, uncategorised neutral and categorised neutral. In order to assess the effect of word categorisation, irrespective of emotional valence, ANOVAs were performed between RTs for uncategorised neutral and RTs for neutral word categories.
  
  iii. Emotionality Effects: Positive emotionality effects and negative emotionality effects were investigated separately. To examine positive emotionality effects, RTs for positive words were contrasted with RTs for uncategorised neutral words. To examine negative emotionality effects, RTs for negative words were contrasted with RTs for uncategorised neutral words.
  
  iv. Threat Effects: Specific threat and general threat effects were investigated separately. To examine specific threat effects, ANOVAs were performed between RTs for the specific threat word
category and RTs for the categorised neutral word category. Since the specific threat words share a common theme (i.e. sexual assault), they were contrasted with categorised neutral words in order to account for possible word categorisation effects (see section 1.10.2.). On the other hand, RTs for the general threat word category were contrasted with RTs for the uncategorised neutral word category to investigate general threat effects.

Following these ANOVA analyses, for each significant wordtype effect, analyses were performed between response latencies and mood measure scores, in order to test for anxiety effects and mood congruence effects (see section 3.8.3.).

The following criteria applies to all the emotional lexical decision task analyses. Incorrect responses were excluded from the following analyses. The percentage of incorrect responses was 4.6% overall, and no participants were excluded based on unacceptably high error rates. After Freeman and Beck (2000) trials with latencies that were less than 350 ms and greater than 2 SD above the mean for each word category were excluded for each participant.
3.8.1. Controls versus Survivors of Sexual Assault

3.8.1.1. Lexical Effects and Categorisation Effects

For controls, there was a significant lexical effect, such that RTs for non-words were significantly slower compared to uncategorised neutral words ($F(1,27) = 80.20$, $p < .001$, $\eta^2 = .748$), and categorised neutral words ($F(1,27) = 125.88$, $p < .001$, $\eta^2 = .823$). There was a significant word categorisation effect for controls ($F(1,27) = 17.04$, $p < .001$, $\eta^2 = .387$). Controls’ RTs for uncategorised neutral words were significantly slower compared to categorised neutral words (figure 32).

For survivors, there was a significant lexical effect, such that RTs for non-words were significantly slower compared to uncategorised neutral words ($F(1,27) = 82.24$, $p < .001$, $\eta^2 = .753$), and categorised neutral words ($F(1,27) = 119.56$, $p < .001$, $\eta^2 = .816$). There was a significant word categorisation effect for survivors of sexual assault ($F(1,27) = 13.42$, $p < .01$, $\eta^2 = .332$). Survivors’ RTs for uncategorised neutral words were significantly slower compared to categorised neutral words (figure 33).

3.8.1.2. Emotionality Effects

In order to test for differences between controls’ mean lexical decision response latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that controls’ RTs for uncategorised neutral words were significantly slower compared to negative words ($F(1,27) = 5.53$, $p < .05$, $\eta^2 = .170$), and positive words ($F(1,27) = 18.63$, $p < .001$, $\eta^2 = .408$). Figure 34 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for controls.

In order to test for differences between survivors’ mean lexical decision response latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that survivors’ RTs for negative words were comparable to uncategorised neutral words ($F(1,27) = .705$, $p > .05$, $\eta^2 = .025$), however survivors’ RTs for positive words were significantly faster compared to uncategorised neutral words ($F(1,27) = 21.69$, $p < .001$, $\eta^2 = .445$). Figure 35 presents the means and standard errors for
RTs to positive words, negative words and uncategorised neutral words, for survivors of sexual assault.
Figure 32
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for controls.

Figure 33
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for survivors of sexual assault.
Figure 34
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for controls.

Figure 35
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for survivors of sexual assault.
3.8.1.3. General Threat Effects

In order to test for differences between controls’ lexical decision response latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant difference in RTs for general threat words and uncategorised neutral words for controls ($F(1,27) = 5.68, p < .05, \eta^2 = .174$). Controls took significantly longer to respond general threat words compared to uncategorised neutral words (figure 36).

In order to test for differences between survivors’ lexical decision response latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant difference in survivor’s RTs for general threat words and uncategorised neutral words ($F(1,27) = 5.26, p < .05, \eta^2 = .163$). Survivors of sexual assault took significantly longer to respond to general threat words compared to uncategorised neutral words (figure 37).

3.8.1.4. Specific Threat Effects

In order to test for differences between controls’ lexical decision response latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that for controls, there was no significant specific threat effect ($F(1,27) = 1.79, p > .05, \eta^2 = .062$). Controls were slower to respond to specific threat words compared to categorised neutral words, however the difference did not reach statistical significance (figure 38).

In order to test for differences between survivors’ lexical decision response latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant specific threat effect for survivors of sexual assault ($F(1,27) = 5.68, p < .05, \eta^2 = .174$), with RTs for specific threat words significantly longer compared to categorised neutral words (figure 39).
Figure 36
Means and standard errors for RTs to general threat words and uncategorised neutral words, for controls.

Figure 37
Means and standard errors for RTs to general threat words and uncategorised neutral words, for survivors of sexual assault.
Figure 38
Means and standard errors for RTs to specific threat words and categorised neutral words, for controls.

Figure 39
Means and standard errors for RTs to specific threat words and categorised neutral words, for survivors of sexual assault.
3.8.1.5. Emotional Lexical Decision Difference Scores

In order to simplify the comparison of wordtype effects, difference scores were calculated for emotionality effects, general threat effects, and specific threat effects. Positive emotionality effects were expressed as the difference between positive RTs, and uncategorised neutral RTs. Negative emotionality effects were expressed as the difference between negative RTs, and uncategorised neutral RTs. General threat effects were expressed as the difference between general threat and uncategorised neutral RTs, whereas specific threat effects were expressed as the difference between mean specific threat and categorised neutral RTs (see section 2.1. for operationalised effects).

Huynh-Feldt adjustments for degrees of freedom were in the event that the assumption of homogeneity of variances was violated.

A mixed design ANOVA with effect type as the within subjects factor and group as the between subjects factor revealed that the effect of group was not significant ($F(1,54) = .707, p = .404, \eta^2 = .013$). No significant interaction between effect type and group was observed ($F(2.19, 118.07) = 2.48, p = .083, \eta^2 = .044$). Table 43 presents the mean and standard deviation interference / facilitation RTs and ANOVA data for survivors of sexual assault and controls.

Table 43
Mean and standard deviation interference / facilitation RTs and ANOVA data for controls and survivors of sexual assault.

<table>
<thead>
<tr>
<th>Effect Type</th>
<th>Controls</th>
<th>Survivors</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Threat</td>
<td>13.66 (54.01)</td>
<td>27.40 (60.86)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>General Threat</td>
<td>21.72 (48.23)</td>
<td>31.71 (73.19)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Positive Emotionality</td>
<td>-32.48 (39.82)</td>
<td>-51.68 (58.72)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>-18.68 (42.01)</td>
<td>12.09 (76.21)</td>
<td>&gt;.05</td>
</tr>
</tbody>
</table>

N = 56
SDs in parentheses
3.8.2. Matched Controls versus PTSD Positive Survivors versus PTSD Negative Survivors

Consistent with prior emotional Stroop studies of sexual assault related attentional biases and PTSD (e.g. Foà et al., 1991; Cassiday et al., 1992; Freeman & Beck, 2000), in this section attentional biases are compared between a matched subset of controls, PTSD positive survivors of sexual assault, and PTSD negative survivors of sexual assault (see section 1.11.1.2.).

3.8.2.1. Lexical Effects and Categorisation Effects

There was a significant lexical effect for a matched subset of controls, such that RTs for non-words were significantly slower compared to uncategorised neutral words ($F(1,13) = 61.82, p < .001, \eta^2 = .826$) and categorised neutral words ($F(1,13) = 140.79, p < .001, \eta^2 = .915$). There was no significant word categorisation effect for the subset of controls ($F(1,13) = 4.28, p > .05, \eta^2 = .248$). Although the subset of controls were slower to respond to uncategorised neutral words compared to categorised neutral words, the difference did not reach significance (figure 40).

A significant lexical effect was observed for PTSD positive survivors of sexual assault, such that RTs for non-words were significantly slower compared to uncategorised neutral words ($F(1,14) = 56.10, p < .001, \eta^2 = .800$) and categorised neutral words ($F(1,14) = 80.64, p < .001, \eta^2 = .852$). There was also a significant word categorisation effect for PTSD positive survivors of sexual assault ($F(1,14) = 17.98, p < .01, \eta^2 = .562$). PTSD positive survivors’ RTs for uncategorised neutral words were significantly slower compared to categorised neutral words (figure 41).

There was a significant lexical effect for PTSD negative survivors of sexual assault, such that RTs for non-words were significantly slower compared to uncategorised neutral words ($F(1,12) = 32.77, p < .001, \eta^2 = .732$), and categorised neutral words ($F(1,12) = 42.58, p < .001, \eta^2 = .780$). There was no significant difference in RTs between uncategorised neutral and categorised neutral words for PTSD negative survivors of sexual assault ($F(1,12) = 4.17, p > .05, \eta^2 = .258$). Although PTSD negative survivors were slower to respond to uncategorised neutral words compared to categorised neutral words, the difference did not reach significance (figure 42).
Figure 40
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for a matched subset of controls.
Figure 41
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for PTSD positive survivors of sexual assault.

Figure 42
Means and standard errors for RTs to uncategorised neutral words, non-words and categorised neutral words, for PTSD negative survivors of sexual assault.
3.8.2.2. Emotionality Effects

In order to test for differences between matched controls’ mean lexical decision response latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that matched controls’ RTs for negative words were faster compared to uncategorised neutral words, however the difference did not reach significance ($F(1,13) = 1.24, p > .05, \eta^2 = .087$). Further, while the subset of matched controls were faster to respond to positive words compared to uncategorised neutral words, the difference did not reach significance ($F(1,13) = 4.41, p > .05, \eta^2 = .253$). Figure 43 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for a matched subset of controls.

In order to test for differences between PTSD positive survivors’ mean lexical decision response latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that although PTSD positive survivors’ RTs for negative words were slower compared to uncategorised neutral words, the difference did not reach significance ($F(1,14) = 3.82, p > .05, \eta^2 = .214$). Further, PTSD positive survivors were significantly faster to respond to positive words compared to uncategorised neutral words ($F(1,14) = 6.94, p < .05, \eta^2 = .332$). Figure 44 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

In order to test for differences between PTSD negative survivors’ mean lexical decision response latencies for positive, negative and uncategorised neutral words, ANOVAs were performed with word type (positive, negative, uncategorised neutral) as the within subjects factor. The results of the ANOVAs indicated that although PTSD negative survivors’ RTs for negative words were faster compared to uncategorised neutral words, the difference did not reach significance ($F(1,12) = .314, p > .05, \eta^2 = .026$). Further, PTSD negative survivors were significantly faster to respond to positive words compared to uncategorised neutral words ($F(1,12) = 16.59, p < .01, \eta^2 = .580$). Figure 45 presents the means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD negative survivors of sexual assault.
Figure 43
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for matched controls.
Figure 44
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

![Figure 44](image)

Figure 45
Means and standard errors for RTs to positive words, negative words and uncategorised neutral words, for PTSD negative survivors of sexual assault.

![Figure 45](image)
3.8.2.3. General Threat Effects

In order to test for differences between matched controls’ lexical decision response latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that for a matched subset of controls, there was a significant difference in RTs for general threat words and uncategorised neutral words ($F(1,13) = 9.26, p < .01, \eta^2 = .416$). The matched subset of controls were significantly slower to respond to general threat words compared to uncategorised neutral words (figure 46).

In order to test for differences between PTSD positive survivors’ lexical decision response latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant difference in PTSD positive survivors’ RTs for general threat words and uncategorised neutral words ($F(1,14) = 4.16, p > .05, \eta^2 = .229$). Although PTSD positive survivors were slower to respond to general threat words compared to uncategorised neutral words, the difference did not reach significance (figure 47).

In order to test for differences between PTSD negative survivors’ lexical decision response latencies for general threat words and uncategorised neutral words, an ANOVA was performed with wordtype (general threat / uncategorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant general threat effect ($F(1,12) = 1.33, p > .05, \eta^2 = .100$) for PTSD negative survivors of sexual assault. Although PTSD negative survivors were slower to respond to general threat words compared to uncategorised neutral words, the difference did not reach significance (figure 48).

3.8.2.4. Specific Threat Effects

In order to test for differences between matched controls’ lexical decision response latencies for specific threat words and categorised neutral words would differ, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that for a matched subset of controls, there was no significant specific threat effect ($F(1,13) = 4.44, p > .05, \eta^2 = .254$). Although controls were slower to respond to specific threat words compared to categorised neutral words, the difference did not reach significance (figure 49).
In order to test for differences between PTSD positive survivors’ lexical decision response latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was a significant difference in RTs for specific threat words and categorised neutral words for PTSD positive survivors of sexual assault ($F(1,14) = 6.11, p < .05, \eta^2 = .304$), with RTs for specific threat words significantly longer compared to categorised neutral words (figure 50).

In order to test for differences between PTSD negative survivors’ lexical decision response latencies for specific threat words and categorised neutral words, an ANOVA was performed with wordtype (specific threat / categorised neutral) as the within subjects factor. The result of the ANOVA indicated that there was no significant specific threat effect ($F(1,12) = 1.58, p > .05, \eta^2 = .116$) for PTSD negative survivors of sexual assault. Although PTSD negative survivors were slower to respond to specific threat words compared to categorised neutral words, the difference did not reach significance (figure 51).
Figure 46
Means and standard errors for RTs to general threat words and uncategorised neutral words, for a matched subset of controls.
Figure 47
Means and standard errors for RTs to general threat words and uncategorised neutral words, for PTSD positive survivors of sexual assault.

![Figure 47](image1)

Figure 48
Means and standard errors for RTs to general threat words and uncategorised neutral words, for PTSD negative survivors of sexual assault.

![Figure 48](image2)
Figure 49
Means and standard errors for RTs to specific threat words and categorised neutral words, for a matched subset of controls.
Figure 50
Means and standard errors for RTs to specific threat words and categorised neutral words, for PTSD positive survivors of sexual assault.

Figure 51
Means and standard errors for RTs to specific threat words and categorised neutral words, for PTSD negative survivors of sexual assault.
3.8.2.5. Emotional Lexical Decision Task Group Dichotomisation Difference Scores

In order to simplify the comparison of wordtype effects, difference scores were calculated for emotionality effects, general threat, and specific threat effects. Positive emotionality effects were expressed as the difference between positive RTs, and uncategorised neutral RTs. Negative emotionality effects were expressed as the difference between negative RTs, and uncategorised neutral RTs. General threat effects were expressed as the difference between general threat and uncategorised neutral RTs, whereas specific threat effects were expressed as the difference between mean specific threat and categorised neutral RTs (see section 2.1. for operationalised effects).

Huynh-Feldt adjustments for degrees of freedom were used in the event that the assumption of homogeneity of variances was violated.

A mixed design ANOVA with effect type as the within subjects factor and group as the between subjects factor indicated that the effect of group was not significant ($F(2, 39) = .945, p=.397, \eta^2= .046$). No significant interaction between effect type and group was observed ($F(4.41, 86.03) = 1.28, p= .281, \eta^2= .062$). Table 44 presents the mean and standard deviation interference / facilitation RTs for specific threat, general threat and emotionality effects, for a matched subset of controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault.

Table 44
Mean and standard deviation interference / facilitation RTs for specific threat, general threat and emotionality effects, for a matched subset of controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault.

<table>
<thead>
<tr>
<th>Effect Type</th>
<th>Matched Subset of Controls</th>
<th>PTSD Positive</th>
<th>PTSD Negative</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotionality</td>
<td>-21.86 (38.95)</td>
<td>-41.17 (60.51)</td>
<td>-63.81 (56.48)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>-10.68 (35.84)</td>
<td>33.58 (66.54)</td>
<td>-12.69 (81.61)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>General Threat</td>
<td>39.01 (47.97)</td>
<td>24.64 (76.96)</td>
<td>37.84 (71.88)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Specific Threat</td>
<td>27.77 (49.33)</td>
<td>27.43 (78.65)</td>
<td>27.37 (42.90)</td>
<td>&gt;.05</td>
</tr>
</tbody>
</table>

$N=56$
SDs in parentheses
3.8.3. Anxiety and Mood Congruency Analyses between Significant Word Type Effects and Anxiety and Affect Scores

In order to investigate the possible effects of anxiety and mood congruency on threat and emotionality effects, ANOVAs were performed between difference scores (interference / facilitation) and anxiety and affect scores. It was anticipated that high state and trait anxiety scores would be associated with lexical decision responses for specific threat and general threat words. Further it was anticipated that that high positive affect scores would be associated with lexical decision responses for positive words, whereas high negative affect scores would be associated with lexical decision responses for negative words. The findings of these analyses did not reach statistical significance (all $p > .05$), and therefore will not be reported here.

3.8.4. Emotionality Effects versus Threat Effects

For the emotional lexical decision task, the pattern of findings suggest that the observed threat effects are indeed threat effects, and not attributable to emotionality. Recall that in the emotional lexical decision task threat effects were characterised by interference, whereas emotionality effects were characterised by facilitation (see table 45). Accordingly, it is not necessary to perform any further analyses here.

3.8.5. Lexical Decision Task – Summary:

Table 45 presents a summary of the emotional lexical decision task findings for controls and survivors overall, as well as the symptomatic and asymptomatic dichotomised groups. The table summarises whether significant effects appeared to reflect interference or facilitation and also the effect size (partial statistics $\eta^2$) for these findings.
Table 45
Emotional lexical decision task interference and facilitation findings for emotionality effects, general threat and specific threat effects.

<table>
<thead>
<tr>
<th></th>
<th>Controls</th>
<th>Survivors</th>
<th>Matched Controls</th>
<th>PTSD Positive</th>
<th>PTSD Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotionality</td>
<td>$\eta^2 = .408$</td>
<td>$\eta^2 = .445$</td>
<td>NS</td>
<td>$\eta^2 = .332$</td>
<td>$\eta^2 = .580$</td>
</tr>
<tr>
<td>Negative</td>
<td>Facilitation</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Emotionality</td>
<td>$\eta^2 = .170$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Threat</td>
<td>$\eta^2 = .174$</td>
<td>$\eta^2 = .163$</td>
<td>$\eta^2 = .416$</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Specific Threat</td>
<td>NS</td>
<td>Interference</td>
<td>NS</td>
<td>Interference</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$\eta^2 = .174$</td>
<td></td>
<td></td>
<td>$\eta^2 = .304$</td>
</tr>
</tbody>
</table>

NS = Not Significant
4. Discussion

Chapter Overview

The discussion begins with a brief recapitulation of the background theories and hypotheses relevant to the study, together with a summary of the study aims and hypotheses. This is followed by a discussion of the representativeness and sexual assault characteristics of the clinical sample, group anxiety and affect characteristics, and experimental word stimuli emotionality and threat salience ratings. The discussion then moves on to consider attentional biases in the word processing paradigms, beginning with the classical Stroop paradigm, followed by the emotional Stroop paradigm and then the emotional lexical decision task paradigm. The emotional Stroop task and emotional lexical decision task are necessarily presented separately, due to the large volume of findings to be discussed. The discussion of these findings follows a systematic structured format beginning with a brief recapitulation of significant effects and effect sizes. Although results are definitively reported in the results section, it was considered important to remind the reader of each finding as it arises at salient points in the discussion. The discussion of the experimental word processing paradigms continues with a statement about whether the observed effects are consistent with interference or facilitation, their relationship to prior literature and whether the thesis hypotheses were supported. The discussion then compares the emotional Stroop and emotional lexical decision task paradigms. This is followed by a discussion of the relationship of traumatic stress symptoms and attentional bias effects, theoretical, experimental and clinical implications, study limitations and future research directions. The penultimate section of the discussion considers the core strengths of the thesis and the discussion concludes with a summary of key conclusions.

4.1. Introduction

A common reaction following sexual assault trauma is a persistent preoccupation with and re-experiencing of the traumatic event (see section 1.3). Attentional bias cognitive models (see section 1.4.2.) propose that the inability of trauma survivors to forget the trauma results from “hypervigilance”, or a dramatic increase in sensitivity to cues in the environment, which constantly reinforce one’s preoccupation with the traumatic event. Previous researchers, (e.g. Foa et al., 1991, Cassiday et al., 1992) have reported attentional biases for sexual assault related information, however there remains some disagreement regarding the specificity to threat salience of these effects.
The threat hypothesis (see section 1.4.2.1.) proposes that trauma survivors selectively process threatening stimuli that are consistent with the focus of their anxiety (Foa et al., 1991; Martin et al., 1991). In contrast, the emotionality hypothesis (see section 1.4.2.1.) proposes that trauma survivors may show comparable attentional biases for emotional salience in general (Martin et al., 1991).

For the current study, attentional biases were measured using covert emotional processing in two word processing experimental paradigms, the emotional Stroop (see section 1.8.1.) and emotional lexical decision task (see section 1.8.2.) paradigms. In the emotional Stroop paradigm, salient words have been reported to be associated with increased response latencies, and this effect has been termed “Stroop interference” (Williams et al., 1996). In the emotional lexical decision task, decreased response latencies have been associated with words having emotional salience (Niedenthal & Setterlund, 1994).

The aim of the current study was to administer both the emotional Stroop and emotional lexical decision task paradigms, and for both paradigms to directly test and compare predictions of the threat and emotionality hypotheses, in clinical and control populations.

Recall from section 1.11.2., the study consisted of a series of contingent hypotheses categorised as predictions of emotionality effects, general threat effects and specific threat effects. Briefly, to summarise, it was hypothesised that both clinical and control groups would elicit emotionality effects, general threat effects and specific threat effects, however the magnitude of these effects was expected to be greater for clinical participants compared to control participants.

4.2. Clinical Group Demographics

The essential characteristics of the clinical group recruited for the current study appear to be consistent with data from Australian police reports and victimisation surveys (see section 1.2.2.). For example, the present clinical group comprised 26 females (92.86%) out of 28 participants, which is comparable with the sex ratios reported in the “Crime Report 2002” (81%, see section 1.2.2.1.) and “Crime and Safety Survey” (86%, see section 1.2.2.2.).
Furthermore, 75% of the survivors of sexual assault recruited for the current study indicated that they knew the identity of their assailant. In comparison, the “Crime Report 2002” (section 1.2.2.1.) and a recent “Crime and Safety Survey” (section 1.2.2.2.) reported that 63% and 58% of sexual assaults respectively, were perpetrated by someone known to the victim.

One noteworthy difference between the characteristics of the current clinical group and the police report and victimisation survey statistics reported in section 1.2.2., concerns the experience of multiple assaults. For the current clinical group, 82% of survivors had experienced multiple assaults, compared to 34% (“Crime and Safety Survey”, section 1.2.2.2.) and 45% (“Women’s Safety Survey”, section 1.2.2.3.), respectively. It is possible that the discrepancy in these figures reflects the size of the current clinical group in comparison to the larger samples recruited to participate in the prior surveys. However, it is recommended that future research investigates whether survivors of multiple assaults are more likely to report their experiences, or to seek help (e.g. counselling), compared to survivors of a single assault.

4.3. Group Anxiety and Affect Measures

As expected, survivors of sexual assault were significantly more anxious and depressed compared to controls. There was however, no difference in state positive affect between survivors and controls (see section 3.3.)

For survivors of sexual assault, mean scores on the rape symptomatology measure (sections 2.3.4. & 3.1.), and PTSD symptomatology measure (sections 2.3.5. & 3.1.1.) were highly correlated (see section 3.1.2.) and these scores appear to be consistent with established norms (Falsetti et al., 1993; Kilpatrick, 1988).

4.4. Experimental Word Stimuli Ratings

As discussed in section 1.10.4. and 3.4, extensive analyses were conducted on participants’ ratings of the experimental word categories, in order to confirm the ANEW norms (see section 2.3.8.) for the survivors of sexual assault and controls under investigation.
Comparison of emotionality ratings for the experimental stimuli indicated that survivors’ ratings differed significantly from the ANEW norms for negative and positive word categories. Similarly, controls’ ratings of emotionality for specific threat, negative and positive words differed significantly from the ANEW norms. In general, both survivors and controls rated each word category in the same direction as the ANEW norms, but with lower emotionality ratings. These differences suggest that there is a need to analyse standardised lists of emotional words, to check for differences between established norms and participant ratings of emotionality.

In testing predictions of the emotionality hypothesis, emotional stimuli ideally ought to be controlled for emotionality. That is, the positive word category ought to be as emotional as the threat and negative word categories. Accordingly, for the current study emotional stimuli were selected with this criterion in mind (see section 2.3.8.).

Selection of controlled emotional stimuli does not necessarily guarantee that participants in a particular study will judge the stimuli in a similar fashion. For the current study, survivors of sexual assault rated the positive and negative words as significantly less emotional than the threat stimuli, and the negative words were rated as significantly more emotional than the positive words. Controls rated the positive and general threat words as significantly more emotional than the negative words. Controls’ emotionality ratings for the positive, specific threat and general threat words were comparable, as were ratings for specific threat words and negative words. The finding that survivors and controls did not rate the emotional word categories as equally emotionally salient may complicate testing of the emotionality hypothesis in the current study, but statistical control is possible if required.

A comparison of threat salience ratings for survivors and controls showed that, as expected, the specific and general threat word categories were rated as significantly more threatening than other word categories. However, whereas survivors rated the specific and general threat word categories as equally threatening, controls rated the general threat words as significantly more threatening than the specific threat words. For controls, the greater threat salience ratings for general threat rather than specific threat words may be consistent with suggestions that salience is associated with the extent to which stimuli are related to the personal concerns of participants (e.g. Mathews & Klug, 1993). Put simply, for controls
the threat salience of the specific sexual assault related words was lower than that of the general threat words.

4.5. Attentional Bias Effects and Word Processing Paradigms
4.5.1. Classical Stroop Paradigm

The classical colour-naming Stroop task was employed in the current study as a practice task prior to the administration of the emotional Stroop task variant. It was anticipated that the classical Stroop task would familiarise participants with the basic Stroop procedure (i.e. naming colours rather than reading words), as well as demonstrating the phenomenon of Stroop interference, prior to introducing emotional valence in the emotional Stroop task.

Although controls were slower to colour-name incongruent colour-name words compared to congruent colour-name words (i.e. classical Stroop interference), the difference did not reach statistical significance (p = .095).

For the current study, a classical Stroop interference effect was observed for survivors of sexual assault, such that survivors’ colour-naming response latencies were significantly longer for incongruent colour-name words, compared to congruent colour-name words (partial $\eta^2 = .516$).

For the symptomatic / asymptomatic group dichotomisation, significant classical Stroop interference effects were observed for matched controls (partial $\eta^2 = .284$), PTSD positive survivors of sexual assault (partial $\eta^2 = .576$), and PTSD negative survivors of sexual assault (partial $\eta^2 = .450$).

4.5.2. Lexical Effects

In an attempt to verify word processing, lexical effects were examined for both the emotional Stroop and emotional lexical decision tasks. Lexical effects are discussed for controls overall and survivors of sexual assault overall. For the sake of completeness, lexical effects were examined for the symptomatic and asymptomatic group dichotomisation, however the presence or absence of symptoms was not the focus of the process of verifying word processing and therefore will not be discussed here (see section 3.7.2.1 and section 3.8.2.1. for these findings).
For the emotional Stroop task, significant lexical effects were observed for both controls (non-words x uncategorised neutral words, partial $\eta^2 = .154$, non-words x categorised neutral words, not significant) and survivors of sexual assault (non-words x uncategorised neutral words, partial $\eta^2 = .292$, non-words x categorised neutral words, partial $\eta^2 = .278$).

For the emotional lexical decision task, significant lexical effects were observed for both controls (non-words x uncategorised neutral words, partial $\eta^2 = .748$, non-words x categorised neutral words, partial $\eta^2 = .823$) and survivors of sexual assault (non-words x uncategorised neutral words, partial $\eta^2 = .753$, non-words x categorised neutral words, partial $\eta^2 = .816$).

It is noteworthy that larger effect sizes for lexical effects were observed in the emotional lexical decision task, compared to the emotional Stroop task. These differences may be attributed to the difference in the cognitive sets between these two word processing paradigms. Whereas the lexical decision task is, by design, a lexical task in which participants are asked to discriminate word trials from non-word trials, the emotional Stroop task does not involve any overt lexical component. When performed correctly, participants identify the colour ink in which words are presented while ignoring word meaning.

4.5.3. Categorisation Effects

Recall from section 2.3.8. that, in order to control for the effects of semantic relatedness in emotional word categories, it is necessary to include a category of semantically related neutral words. In order to verify the effects of categorisation, response latencies for uncategorised neutral words were compared to response latencies for categorised neutral words (see sections 3.7.1.1. and 3.8.1.1.). Categorisation effects are discussed for controls overall and survivors of sexual assault overall. For the sake of completeness, categorisation effects were examined for the symptomatic and asymptomatic group dichotomisation, however the presence or absence of symptoms was not the focus of the process of controlling for semantic relatedness and therefore will not be discussed here (see section 3.7.2.1. and section 3.8.2.1. for these findings).

For the emotional Stroop task, a significant categorisation effect was observed for controls (partial $\eta^2 = .259$), but not for survivors of sexual assault.
For the emotional lexical decision task, significant categorisation effects were observed for both controls (partial $\eta^2 = .387$), and survivors of sexual assault (partial $\eta^2 = .332$).

These findings vindicate the inclusion of a categorised neutral word category in the design of the current study, in order to control for the possible confounding effects of semantic relatedness.

4.5.4. Experimental Word Processing Paradigms

Recall from section 1.8.1. and 1.8.2., that the emotional Stroop task and emotional lexical decision task are generally used to quantify the extent to which emotional stimuli engage attentional resources. In contrast to the extensive research using the emotional Stroop paradigm (see Williams et al., 1996 for review), the use of the emotional lexical decision task as a measure of anxiety related attentional biases is still in its infancy. However, similar unresolved issues arguably apply to both experimental paradigms. It remains unclear whether attentional biases are sensitive to threat salience specifically, and/or emotional salience in general. Moreover, it is not clear whether attentional biases are sensitive to specific psychopathology (see sections 1.8.1. & 1.8.1.1. and sections 1.8.2. & 1.8.2.1.).

Since Foa et al. (1991) (see section 1.8.1.), a pattern has emerged in the literature suggesting that attentional biases may be a question of magnitude rather than clinical specificity. Accordingly, for both experimental paradigms, the current study hypothesised that both controls and survivors of sexual assault may elicit positive and negative emotionality attentional biases, general threat attentional biases, and specific threat attentional biases, although the magnitude of these effects was expected to be greater for survivors compared to controls (see section 2.1. for operationalised effects).

Similarly, for the symptomatic and asymptomatic group dichotomisation, the magnitude of the emotionality, general threat, and specific threat effects was expected to be greater for PTSD positive survivors of sexual assault compared to PTSD negative survivors and controls. For PTSD negative survivors, the magnitude of the emotionality and threat effects was expected to be greater in comparison to controls (see section 2.1.).
It should be noted that an unexpected pattern emerged in the emotional lexical decision response latency data. As discussed in section 1.8.2., emotionally salient stimuli are traditionally associated with decreased response latencies in the emotional lexical decision task, and speeded lexical decisions have therefore been traditionally interpreted as reflecting emotional salience (Niedenthal & Setterlund, 1994). However, for many of the lexical decision findings discussed in the following sections, delayed lexical decisions were observed for emotional words, in comparison to neutral words. Although this pattern is not consistent with traditional interpretations of lexical decision task latencies and emotional salience (cf. Niedenthal & Setterlund, 1994), extrapolating from cognitive models of emotional interference in the Stroop paradigm, it could be argued that delayed lexical decisions may also reflect attentional biases for emotionally salient information (cf. Geer & Bellard, 1996).

The following sections discuss emotionality effects, general threat and specific threat effects, first for controls and survivors of sexual assault overall, and then for the symptomatic and asymptomatic group dichotomisation. For the sake of clarity, emotional Stroop task findings and emotional lexical decision task findings are discussed separately. Due to the large volume of findings from the two word processing tasks, this approach is preferable (despite some necessary repetition) to risking unnecessary confusion by discussing the tasks simultaneously. A separate section is included (section 4.6.) in which the emotional Stroop task and emotional lexical decision task are directly compared.

The discussion of findings for the emotional Stroop and emotional lexical decision task will therefore follow a structured format, according to the following pattern:

1. A statement about whether a significant effect was observed
2. If a significant effect was observed, a statement about the effect size
3. A statement about whether the observed effect reflects interference or facilitation
4. A discussion of the observed effects’ relationship to prior literature
5. A statement about whether the thesis hypothesis was supported and the magnitude of effects across groups

For each paradigm, findings are discussed firstly for controls and survivors of sexual assault overall, and then second for the symptomatic and asymptomatic
dichotomised groups. Where a non-significant finding is observed for controls or survivors overall, such findings will not subsequently be discussed for the dichotomised groups.

4.5.5. Emotional Stroop Task: Controls versus Survivors of Sexual Assault

4.5.5.1. Positive and Negative Emotionality Effects

For the emotional Stroop task, there was no significant difference in controls’ colour naming response latencies for positive words and uncategorised neutral words, and therefore no evidence of a positive emotionality effect.

There was however, evidence of a negative emotionality effect, with controls’ colour naming response latencies for negative words significantly faster compared to uncategorised neutral words. For the effect in controls (partial $\eta^2 = .172$), 17% of the observed variance was accounted for. For the emotional Stroop task for controls, salience for negative information appears to be associated with facilitation.

For the emotional Stroop task, survivors of sexual assault did not evince a positive emotionality effect, that is, there was no significant difference in survivors’ colour naming latencies for positive words and uncategorised neutral words.

There was however evidence of a negative emotionality effect for survivors of sexual assault, such that colour naming latencies for negative words were significantly slower compared to uncategorised neutral words. For the effect in survivors (partial $\eta^2 = .134$), 13% of the observed variance was accounted for. For the emotional Stroop task for survivors of sexual assault, salience for negative information appears to be associated with interference.

It is noteworthy that the negative emotionality effect observed for controls appeared to be characterised by facilitation, whereas the negative emotionality effect for survivors (and other salience effects subsequently) appeared to be characterised by interference. Traditionally, information processing biases in the emotional Stroop task have been characterised by interference (see MacLeod, 1991 for review). However, there have been examples in the literature in which facilitation has been observed in the emotional Stroop task, and has been interpreted as reflecting information processing biases (e.g. Koven, Heller, Banich & Miller, 2003; MacLeod, 1998). Despite these examples of emotional Stroop facilitation, the current thesis subscribes to the traditional view that processing
biases are characterised by interference in the emotional Stroop task. The finding of facilitation for controls for negative information is suggested to be an anomaly in the current findings.

The emotionality findings for controls are partially consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.). Furthermore, the absence of a positive emotionality effect appears to be consistent with the findings of Mogg et al. (1993), who observed that increased anxiety was not associated with selective processing of positive stimuli. However, the absence of a positive emotionality effect in the emotional Stroop task appears to conflict with the findings of Mogg and Marden (1990), who observed significantly slower colour naming response latencies for positive words compared to neutral words, for high trait anxious individuals. Similarly, Dalgleish (1995) observed that anxious individuals took longer to colour name positive words compared to neutral words.

The emotional Stroop emotionality findings for survivors of sexual assault appear to be partially consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.).

The hypothesis that both controls and survivors of sexual assault would elicit positive and negative attentional biases was partially supported. The absence of any positive emotionality effects was not consistent with predictions of the emotionality hypothesis for the current study. Regarding negative emotionality effects, survivors showed a Stroop interference effect for negative words relative to neutral words. Recall from section 3.7.3., that there was no evidence of a mood congruency effect. The observed interference effect for negative words in survivors therefore cannot be attributed to mood congruency.

4.5.5.2. General Threat Effects

For the emotional Stroop task, controls did not elicit a general threat effect, such that there was no significant difference between response latencies for general threat words and uncategorised neutral words.

For the emotional Stroop task, survivors of sexual assault demonstrated delayed colour naming latencies for general threat words compared to uncategorised neutral words. For the effect size in survivors of sexual assault (partial $\eta^2 = .247$), 25% of the observed
variance was accounted for. In the emotional Stroop paradigm, it is concluded that salience for general threat information appears to be associated with interference.

The absence of a significant difference between general threat words and neutral words for controls appears to be partially consistent with the findings of Mogg, Mathews, Bird and Macgregor-Morris (1990). In a study investigating the effects of stress and anxiety on the processing of threat stimuli, Mogg et al. did not observe slowed colour naming response latencies for general threat words compared to neutral words, in a group of low trait anxious individuals. For high trait anxious individuals however, a general threat effect was observed, such that colour naming response latencies for general threat words were significantly slower compared to neutral words.

The finding of a significant difference between general threat words and neutral words for survivors of sexual assault appears to be consistent with Cassiday et al. (1992) who observed delayed colour naming response latencies for moderate (general) threat words compared to neutral words, in a group of PTSD rape victims. Similarly, the current general threat findings appear to be consistent with Field et al. (2001) who observed delayed colour naming latencies for general threat words compared to neutral words, for re-victimised and non-re-victimised survivors of sexual abuse. In contrast, Foa et al. (1991) reported no evidence of Stroop interference for general threat words compared to neutral words, in an investigation of rape related attentional biases and PTSD. Similarly, Freeman and Beck (2000) observed no difference in colour naming response latencies for general threat and neutral words in either PTSD or non-PTSD sexual abuse groups.

The hypothesis that both controls and survivors of sexual assault would elicit attentional biases for general threat information, and that the magnitudes of these effects would be greater for survivors was only partially supported. For the emotional Stroop task, survivors were slower to colour name general threat words compared to neutral words, whereas controls were not. Recall from section 3.7.3., that there was no evidence of any effect of anxiety. The observed interference effect for general threat words in survivors therefore cannot be attributed to state or trait anxiety.

4.5.5.3. Specific Threat Effects

For the emotional Stroop task, controls demonstrated Stroop interference for specific threat stimuli, such that colour naming response latencies for specific threat words
were significantly longer compared to categorised neutral words. For the effect in controls (partial $\eta^2 = .160$), 16% of the observed variance was accounted for. Therefore, it appears that salience for specific threat information is associated with interference in the emotional Stroop task.

For the emotional Stroop task, survivors of sexual assault demonstrated delayed colour naming latencies for specific threat stimuli, compared to categorised neutral words. For the effect in survivors of sexual assault (partial $\eta^2 = .140$), 14% of the observed variance was accounted for. Therefore, in the emotional Stroop paradigm, salience for specific threat information appears to be associated with interference.

The delayed colour naming latencies for specific threat words observed for controls in the emotional Stroop task appears to be consistent with prior findings reported for non-clinical participants. For example, Richards and French (1990) and Richards et al. (1992) observed delayed colour naming response latencies for anxiety related words compared to neutral words, in groups of non-clinically anxious participants. Furthermore, Mogg, Kentish and Bradley (1993) reported that increased trait anxiety in a non-clinical control sample (anxiety manipulated through mood induction) was associated with greater subliminal threat interference, such that colour naming latencies for threat words were significantly longer compared to neutral words. Similarly, in a study of cognitive interference in adult sexual assault related PTSD, Freeman and Beck (2000) observed longer colour naming latencies for sexual assault related words compared to neutral words in a control group, although the magnitude of this effect was smaller compared to survivors.

The observation of delayed colour naming latencies for specific threat words for survivors of sexual assault in the emotional Stroop task appears to be consistent with specificity of threat salience in clinical populations (see section 1.8.). For example, in the emotional Stroop literature, Foa et al. (1991) observed Stroop interference for rape related threat words in a group of rape victims diagnosed with PTSD. Cassiday et al. (1992) observed Stroop interference for high threat words in PTSD and non-PTSD rape victim groups, although the magnitude of the effect was greater for the PTSD group. Similarly, Dubner and Motta (1999) observed longer colour-naming latencies for sexual abuse related words compared to neutral words in sexually and physically abused groups of children. Moreover, Freeman and Beck (2000) observed that both PTSD and non-PTSD sexual abuse groups were slower to colour-name sexual abuse related words compared to neutral words,
although the magnitude of the effect was greater for the PTSD group. Similarly, Field et al. (2001) reported that both re-victimised and non-re-victimised survivors showed Stroop interference for sexual assault related words (see section 1.8.1. for review).

The hypothesis that both controls and survivors of sexual assault would elicit specific threat attentional biases, and that the magnitude of these effects would be greater for survivors was partially supported. Both controls and survivors of sexual assault were significantly slower to colour-name specific threat words compared to categorised neutral words. For the emotional Stroop task, the mean difference score between specific threat and categorised neutral words (table 40), was greater for survivors compared to controls, although the difference did not reach statistical significance. Further, there was little difference in the effect sizes of the specific threat effects for controls (partial $\eta^2 = .162$) and survivors (partial $\eta^2 = .140$).

It is noteworthy that the control and survivor groups differed significantly in their state and trait anxiety scores (see section 3.3.1. and Table 10), yet no effects of state or trait anxiety were observed for specific threat information (see section 3.7.3.). Furthermore these findings together with the similarity in effect sizes for controls and survivors of sexual assault suggests that there may be something other than threat salience (e.g. emotional salience, cf. section 3.7.4) contributing to the observed specific threat effects for controls and survivors of sexual assault, in the emotional Stroop paradigm.

4.5.6. Emotional Stroop Task: Matched Controls versus PTSD Positive Survivors versus PTSD Negative Survivors

4.5.6.1. Positive and Negative Emotionality Effect

Consistent with the findings for controls and survivors overall, no evidence of any positive emotionality effects was observed for the emotional Stroop task, for the matched subset of controls, PTSD positive survivors, or PTSD negative survivors. That is, colour naming response latencies for positive words did not differ significantly from uncategorised neutral words. However, whereas controls and survivors demonstrated negative emotionality effects overall, no evidence of negative emotionality effects was observed for the matched subset of controls, PTSD positive survivors, or PTSD negative survivors. This absence may be attributed to reduced statistical power consequent to subdividing the sample. Greater statistical power would be needed before one could reach a reliable
conclusion concerning negative emotionality and the presence or absence of PTSD symptoms.

These findings appear to be inconsistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.). Similarly, these findings appear to be inconsistent with the findings of Mogg and Marden (1990) and Dalgleish (1995), who observed significantly longer colour naming latencies for emotional words in general, relative to neutral words, for anxious individuals. In the present study, the hypothesis that matched controls, PTSD positive survivors, and PTSD negative survivors would elicit positive and negative emotionality attentional biases to differing magnitudes was not supported.

4.5.6.2. General Threat Effects

Consistent with the findings for controls overall, for the emotional Stroop task, there was no evidence of a general threat effect for the matched subset of controls in the emotional Stroop task, that is, colour naming latencies for general threat and uncategorised neutral words did not differ significantly.

Inconsistent with the findings for survivors overall, for PTSD positive survivors of sexual assault, a general threat effect was not observed, that is, there was no significant difference in mean colour naming response latencies for general threat words and uncategorised neutral words.

However, for PTSD negative survivors of sexual assault, there was a significant difference between colour naming latencies for general threat words and uncategorised neutral words. For the effect in PTSD negative survivors of sexual assault (partial $\eta^2 = .357$), 36% of the observed variance was accounted for. Therefore, emotional salience for general threat information appears to be associated with interference in the emotional Stroop paradigm. Recall from section 3.7.3., that there was no evidence of any effects of state or trait anxiety. The observed interference effect for general threat words in PTSD negative survivors therefore cannot be attributed to state or trait anxiety.

The absence of a general threat effect for controls appears to be partially consistent with Mogg et al. (1990), who did not observe delayed colour naming latencies for general threat words compared to neutral words, in a group of low trait anxious individuals.
Furthermore, the absence of a general threat effect for PTSD positive survivors of sexual assault appears to be consistent with Foa et al. (1991) who reported no evidence of Stroop interference for general threat words compared to neutral words, in an investigation of rape related attentional biases and PTSD. Similarly, Freeman and Beck (2000) observed no difference in colour naming response latencies for general threat and neutral words in either PTSD or non-PTSD sexual abuse groups.

The finding of a significant difference between colour naming latencies for general threat words and neutral words for PTSD negative survivors appears to be partially consistent with the findings of Cassiday et al. (1992), who observed delayed colour naming latencies for moderate (general) threat words compared to neutral words in a group of PTSD rape victims. The present finding also appears to be consistent with Field et al. (2001) who observed delayed colour naming latencies for general threat words compared to neutral words, for victimised and re-victimised survivors of sexual abuse.

The hypothesis that matched controls, PTSD positive survivors, and PTSD negative survivors would elicit general threat attentional biases to differing magnitudes was only partially supported. For the emotional Stroop task, PTSD negative survivors, but not PTSD positive survivors or controls, showed an information processing bias for general threat information.

4.5.6.3. Specific Threat Effects

Inconsistent with the findings for controls overall, for the emotional Stroop task, a significant specific threat effect was not observed for the matched subset of controls, that is, there was no significant difference in colour naming response latencies for specific threat words and categorised neutral words.

Consistent with the findings for survivors overall, PTSD positive survivors of sexual assault demonstrated delayed colour naming latencies for specific threat words, such that, colour naming response latencies for specific threat words were significantly longer than colour naming response latencies for categorised neutral words. For the effect in PTSD positive survivors of sexual assault (partial η² = .308), 31% of the observed variance was accounted for. Therefore, salience for specific threat information appears to be associated with interference in the emotional Stroop paradigm.
For the emotional Stroop task, a significant specific threat effect was not observed for the PTSD negative survivors of sexual assault, that is, there was no significant difference in colour naming response latencies for specific threat words and categorised neutral words.

The absence of any specific threat effects for matched controls and PTSD negative survivors of sexual assault appears to be consistent with Foa et al. (1991), who observed a specific threat effect only for PTSD rape victims, and not for non-PTSD rape victims or controls.

The observation of a specific threat effect for PTSD positive survivors of sexual assault appears to be consistent with the specificity of threat salience in clinical populations (see section 1.8.). Since a specific threat effect was not observed for PTSD negative survivors of sexual assault, it appears that specific threat salience may be related to the presence of PTSD symptoms (cf. Foa et al., 1991; Cassiday et al., 1992; Dubner & Motta, 1999; Freeman & Beck, 2000; Field et al., 2001) (see section 1.8.1. for review). Recall from section 3.3.2., that PTSD positive survivors of sexual assault scored significantly higher on measures of state and trait anxiety compared to PTSD negative survivors of sexual assault. However, recall from section 3.7.3., that there was no evidence of state or trait anxiety effects. The observed interference effect for specific threat words for PTSD positive survivors of sexual assault therefore cannot be attributed to state or trait anxiety.

The hypothesis that matched controls, PTSD positive survivors, and PTSD negative survivors would elicit specific threat attentional biases was only partially supported, with PTSD positive survivors showing specific threat effects, in the emotional Stroop paradigm.

4.5.7. Emotional Lexical Decision Task: Controls versus Survivors of Sexual Assault

4.5.7.1. Positive and Negative Emotionality Effects

For the emotional lexical decision task, controls demonstrated speeded lexical decisions for positive words in comparison to uncategorised neutral words. For the effect in controls (partial $\eta^2 = .408$), 41% of the observed variance was accounted for. Therefore, emotional salience for positive information appears to be associated with facilitation in the emotional lexical decision task.
In addition, for the emotional lexical decision task, controls demonstrated significantly faster lexical decision response latencies for negative words compared to uncategorised neutral words. For the effect in controls (partial $\eta^2 = .170$), 17% of the observed variance was accounted for. Therefore, emotional salience for negative information appears to be associated with facilitation in the emotional lexical decision task.

For the emotional lexical decision task, survivors of sexual assault demonstrated a positive emotionality effect, such that lexical decision response latencies for positive words were significantly faster compared to neutral words. For the effect in survivors (partial $\eta^2 = .445$), 44.5% of the observed variance was accounted for. Salience for positive information appears to be associated with facilitation in the emotional lexical decision task.

For the emotional lexical decision task, there was no significant difference in survivors’ response latencies for negative words and uncategorised neutral words.

The emotionality findings for controls are consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.), who used the emotional Stroop paradigm to investigate attentional bias effects for emotional material in general, regardless of valence.

For survivors of sexual assault, the observed positive emotionality effect was consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.).

The hypothesis that both controls and survivors of sexual assault would elicit positive and negative attentional biases, and that the magnitude of these effects would be greater for survivors was partially supported. For the emotional lexical decision task, both controls and survivors of sexual assault elicited a positive emotionality effect, such that lexical decisions for positive words were significantly faster than neutral words. The mean difference score between positive words and uncategorised neutral words (table 43) was greater for survivors compared to controls, however the difference did not reach statistical significance. Further, there was little difference in the effect sizes of the positive emotionality effects for controls (partial $\eta^2 = .408$) and survivors (partial $\eta^2 = .445$).
In terms of negative emotionality effects, whereas controls demonstrated speeded lexical decisions for negative words compared to neutral words, survivors did not show any significant difference in lexical decisions for negative words compared to neutral words.

Recall from section 3.8.3., that there was no evidence of any mood congruency effects. The observed emotionality effects therefore cannot be attributed to mood congruency.

4.5.7.2. General Threat Effects

For the emotional lexical decision task, controls demonstrated delayed lexical decision response latencies for general threat words compared to uncategorised neutral words. For the effect in controls (partial $\eta^2 = .174$), 17% of the observed variance was accounted for. Therefore, in the emotional lexical decision task, salience for general threat information appears to be associated with interference.

For the emotional lexical decision task, survivors of sexual assault demonstrated delayed lexical decisions for general threat words compared to uncategorised neutral words. For the effect in survivors (partial $\eta^2 = .163$), 16% of the observed variance was accounted for. Therefore, threat salience for general threat words appears to be associated with interference in the emotional lexical decision paradigm.

The finding that controls demonstrated delayed lexical decisions for general threat words compared to neutral words appears to be partially consistent with Mogg et al. (1990), who used an emotional Stroop task to investigate the effects of anxiety on threat processing. Mogg et al. observed a general threat effect for trait anxious controls, such that colour naming response latencies for general threat words were significantly slower compared to neutral words.

The finding that survivors of sexual assault demonstrated delayed lexical decisions for general threat words compared to neutral words appears to be consistent with findings extrapolated from the emotional Stroop literature. For example, Cassiday et al. (1992) observed delayed colour naming response latencies for moderate (general) threat words compared to neutral words, in a group of PTSD rape victims. Similarly, the current general threat findings for survivors of sexual assault are consistent with the findings of Field et al. (2001) who observed delayed colour naming latencies for general threat words compared to neutral words, for re-
victimised and non-re-victimised survivors of sexual abuse. In contrast, the finding of a general threat effect for survivors of sexual assault is inconsistent with the emotional Stroop findings of Foa et al. (1991) and Freeman and Beck (2000) who observed no difference in response latencies for general threat words and neutral words for groups of rape victims and sexual abuse victims respectively.

The hypothesis that both controls and survivors of sexual assault would elicit general threat attentional biases, and that the magnitude of these effects would be greater for survivors was partially supported. For the emotional lexical decision task, both controls and survivors of sexual assault elicited delayed lexical decisions for general threat words compared to neutral words. Further, the mean difference scores (table 43) between general threat and neutral words was greater for survivors compared to controls, although the difference did not reach statistical significance. There was little difference in the effect sizes of the general threat effects for controls (partial $\eta^2 = .174$) and survivors (partial $\eta^2 = .163$). Recall from section 3.8.3., that in the present study there was no evidence of any state or trait anxiety effects. The observed interference effects for general threat words for controls and survivors therefore cannot be attributed to state or trait anxiety.

4.5.7.3. Specific Threat Effects

For the emotional lexical decision task, there was no significant difference between controls’ lexical decision response latencies for specific threat words and categorised neutral words.

For the emotional lexical decision task, survivors of sexual assault demonstrated delayed lexical decision latencies for specific threat stimuli, compared to categorised neutral words. For the effect in survivors (partial $\eta^2 = .174$), 17% of the observed variance was accounted for. Salience for specific threat information appears to be associated with interference in the emotional lexical decision paradigm.

The absence of a specific threat effect for controls in the lexical decision task appears to be consistent with the findings of Mogg et al. (1991). In a study of selective speeding of lexical decisions for threat words compared to neutral words, Mogg et al. observed no significant difference in lexical decisions for threat words and neutral words in a group of control participants.
From the emotional lexical decision task literature, the finding of a specific threat effect for survivors of sexual assault in the emotional lexical decision task may be consistent with the findings of Geer and Bellard (1996), who observed delayed lexical decisions for sexual related words, compared to neutral words (see section 1.8.2.).

The hypothesis that both controls and survivors of sexual assault would elicit specific threat attentional biases, and that the magnitude of these effects would be greater for survivors was partially supported. Survivors of sexual assault but not controls, were slower to respond to specific threat words compared to categorised neutral words. Recall from section 3.8.3., that there was no evidence of any state or trait anxiety effects. The observed interference effect for specific threat words for survivors therefore cannot be attributed to state or trait anxiety.

4.5.8. Emotional Lexical Decision Task: Matched Controls versus PTSD Positive Survivors of Sexual Assault versus PTSD Negative Survivors of Sexual Assault

4.5.8.1. Positive and Negative Emotionality Effects

For the emotional lexical decision task, no evidence of any positive or negative emotionality effects was observed for the matched subset of controls. That is, lexical decision response latencies for positive and negative words did not differ significantly from response latencies for uncategorised neutral words. Given the significant positive and negative emotionality effects observed for controls overall (see section 3.8.1.2.), it appears that a reduction of statistical power for the matched controls group, because of sample division, may account for the absence of significant emotionality findings here.

Consistent with the findings for survivors overall, for PTSD positive survivors of sexual assault, a positive emotionality effect was observed, such that lexical decision response latencies for positive words were significantly faster compared to uncategorised neutral words. For the effect in PTSD positive survivors (partial $\eta^2 = .332$), 33% of the observed variance was accounted for. Therefore, salience for positive information appears to be associated with facilitation in the emotional lexical decision paradigm.

Consistent with the findings for survivors overall, there was no evidence of a negative emotionality effect for PTSD positive survivors of sexual assault, that is, there was no significant difference between lexical decision response latencies for negative words and uncategorised neutral words.
Consistent with the findings for survivors overall, for PTSD negative survivors of sexual assault, a positive emotionality effect was observed, such that lexical decision response latencies for positive words were significantly faster compared to uncategorised neutral words. For the effect in PTSD negative survivors \((\text{partial } \eta^2 = .580)\), 58% of the observed variance was accounted for. Therefore, in the emotional lexical decision task paradigm, salience for positive information appears to be associated with facilitation.

Consistent with the findings for survivors overall, there was no evidence of a negative emotionality effect for PTSD negative survivors of sexual assault, that is, there was no significant difference between lexical decision response latencies for negative words and uncategorised neutral words.

The emotionality findings for controls are not consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.).

For survivors of sexual assault, the observed positive emotionality effects were consistent with the emotionality hypothesis proposed by Martin et al. (1991) (see section 1.4.2.1.).

The hypothesis that the matched subset of controls, PTSD positive survivors of sexual assault and PTSD negative survivors of sexual assault would elicit both positive and negative emotionality attentional biases was only partially supported. PTSD positive and PTSD negative survivors of sexual assault both demonstrated significant positive emotionality effects, however there was no significant difference in the magnitude of these effects (table 44). Recall from section 3.8.3., that there was no evidence of any mood congruency effects. The observed facilitation effects for positive words for PTSD positive and PTSD negative survivors therefore cannot be attributed to mood congruency.

4.5.8.2. General Threat Effects

Consistent with the findings for controls overall, for the matched subset of controls, lexical decision response latencies for general threat words were significantly slower compared to response latencies for uncategorised neutral words, in the lexical decision task. For the effect in matched controls \((\text{partial } \eta^2 = .416)\), 42% of the observed variance
was accounted for. Therefore, salience for general threat information appears to be associated with interference in the emotional lexical decision task paradigm.

Inconsistent with the findings for survivors overall, for the emotional lexical decision task, there was no significant difference in lexical response latencies for general threat words and uncategorised neutral words, for either PTSD positive survivors of sexual assault or PTSD negative survivors of sexual assault. These findings suggest that with the PTSD group dichotomisation there may not have been sufficient statistical power to show significant general threat effects here.

The finding of a significant general threat effect for the matched subset of controls appears to be consistent with Mogg et al. (1990), who observed slowed colour naming response latencies for general threat words compared to neutral words, in a group of trait anxious individuals.

The absence of significant difference between lexical decision latencies for general threat words and uncategorised neutral words for PTSD positive and PTSD negative survivors appears to be consistent with the emotional Stroop findings of Foa et al. (1991), Freeman and Beck (2000). These authors observed no difference in response latencies for general threat words and neutral words for groups of rape victims and sexual abuse victims respectively.

The hypothesis that matched controls, PTSD positive survivors, and PTSD negative survivors would elicit general threat attentional biases was only partially supported, with the matched subset of controls showing a general threat effect. Recall from section 3.8.3., that there was no evidence of any state or trait anxiety effects. The observed interference effect for general threat words for matched controls therefore cannot be attributed to state or trait anxiety.

4.5.8.3. Specific Threat Effects

Consistent with the findings for controls overall, for the emotional lexical decision task, a significant specific threat effect was not observed for the matched subset of controls, that is, there was no significant difference in lexical decision response latencies for specific threat words and categorised neutral words.
Consistent with the findings for survivors overall, for the emotional lexical decision task, PTSD positive survivors of sexual assault demonstrated delayed lexical decisions for specific threat words, such that response latencies for specific threat words were significantly longer than response latencies for categorised neutral words. For the effect in PTSD positive survivors (partial $\eta^2 = .304$), 30% of the observed variance was accounted for. Therefore, salience for specific threat information appears to be associated with interference in the emotional lexical decision paradigm.

For the emotional lexical decision task, a significant specific threat effect was not observed for PTSD negative survivors of sexual assault, that is, there was no significant difference in lexical decision response latencies for specific threat words and categorised neutral words.

The absence of any specific threat effects for matched controls and PTSD negative survivors of sexual assault appears to be consistent with Foa et al. (1991), who observed a specific threat effect only for PTSD rape victims and not for non-PTSD rape victims or controls.

From the emotional lexical decision task literature, the finding of a specific threat effect for PTSD positive survivors of sexual assault may be consistent with the findings of Geer and Bellard (1996), who observed delayed lexical decisions for sexual related words, compared to neutral words (see section 1.8.2.). Similarly, extrapolating from the emotional Stroop literature, the observation of a significant specific threat effect in the lexical decision task for PTSD positive survivors of sexual assault appears to be consistent with the specificity of threat salience in clinical populations (see section 1.8.). As the specific threat effect was observed only for PTSD positive survivors of sexual assault it appears that this effect may be associated with the presence of PTSD symptoms.

The hypothesis that PTSD positive survivors, PTSD negative survivors and controls would elicit specific threat attentional biases was only partially supported, with PTSD positive survivors showing a specific threat effect. Recall from section 3.8.3., that there was no evidence of any effects of state or trait anxiety. The observed interference effect for specific threat words for PTSD positive survivors therefore cannot be attributed to state or trait anxiety.
4.6. Comparison of Emotional Stroop and Emotional Lexical Decision Task

The current emotionality findings show a consistent pattern of facilitation for the emotional lexical decision task paradigm. However, for the emotional Stroop task paradigm, a significant negative interference emotionality effect was observed only for survivors of sexual assault.

Of note is the absence of significant positive emotionality effects for the emotional Stroop task in both control and clinical groups. Significant positive emotionality facilitation effects were observed only for the emotional lexical decision task, for both control and clinical groups, and the effect size statistics were in the medium to large range, as defined by Cohen (1988) (see section 3.5.). These findings arguably imply that the emotional lexical decision task may be more sensitive to positive emotionality than the emotional Stroop task. If future research was able to replicate the current findings by directly comparing the emotional Stroop and emotional lexical decision task paradigms, it may help account for why threat effects have been consistently observed in the prior literature for the emotional Stroop task whereas emotionality effects have not (see Ruiz-Caballero & Bermudez, 1997 for review).

It is noteworthy that for both the emotional Stroop task and emotional lexical decision task, the observed specific and general threat effects were characterised by delayed response latencies, consistent with interference. Whereas the current emotional Stroop findings are consistent with traditional interpretations of delayed colour naming latency and emotional salience, the current lexical decision task findings are not consistent with traditional interpretations of lexical decision latency and emotional salience. However, the current findings of interference for threat words in the lexical decision task appear to be consistent with studies that have observed delayed lexical decision RTs for sexual content words. For example, Geer and Bellard (1996) observed delayed lexical decision response latencies for sexual words, and correlational analyses suggested that emotionality ratings for sexual content words were negatively related to the social acceptability of the words. Geer and Bellard suggested therefore, that delayed lexical decisions may also be interpreted as reflecting attentional biases for emotionally salient information.

Despite the obvious differences in cognitive sets between the emotional Stroop task and the emotional lexical decision task, the current findings for specific and general threat effects (i.e. interference) suggest some commonalities in the processing of threat related
information between the two word processing paradigms. Together, threat appraisal, valence evaluation and elaborative processing may lead to delayed response latencies in word processing paradigms. For example, recall from section 1.5.4., that Mathews (1990) proposed that the cognitive processes most likely to be given priority are those involved in elaboration, which subsequently facilitates the retrieval of congruent information from memory. Such elaborative processing may arguably lead to delayed response latencies for threatening information in both the emotional Stroop and emotional lexical decision task paradigms, regardless of the different cognitive sets of the two paradigms.

4.7. PTSD Symptoms and Attentional Bias Effects

For the current emotionality findings, there did not appear to be any association between the presence or absence of symptoms and either positive or negative emotionality.

For the current threat findings however, there does appear to be an association between the presence or absence of symptoms and threat effects. For both the emotional Stroop task and the emotional lexical decision task, specific threat interference appears to be associated with the presence or absence of symptoms. Significant specific threat effects were observed for PTSD positive survivors of sexual assault, but not PTSD negative survivors of sexual assault for both paradigms. Furthermore, the effect sizes for the observed specific threat effects were comparable for both the emotional Stroop and emotional lexical decision task paradigms. It is noteworthy that the size of the specific threat effects observed for PTSD positive survivors of sexual assault were larger for both paradigms, compared to the size of the effects observed for survivors overall. These findings appear to be consistent with studies that advocate the specificity of threat salience in clinical populations (see section 1.8. for review).

The relationship between the presence or absence of symptoms and general threat effects requires further investigation. For the emotional Stroop task, a significant general threat effect was observed for PTSD negative survivors of sexual assault, but not PTSD positive survivors of sexual assault. For the emotional lexical decision task, there does not appear to be an association between the presence or absence of symptoms and general threat effects.

For all of the symptomatic and asymptomatic group analyses, it should be remembered that statistical power was reduced for the subdivision of control and clinical
samples, and that non-significant findings may have been consequential to insufficient power.

4.8. Theoretical and Experimental Implications

4.8.1. Theoretical Models of Anxiety and Attentional Biases

The findings of the current study for both survivors of sexual assault and controls appear to be consistent with such models. Recall from section 1.5., that pre-eminent models of attentional biases in anxiety advocate a role for pre-attentive processing in threat appraisal and valence evaluation, together with a role for selective attention in the allocation of processing resources to emotionally salient information.

4.8.2. Experimental Word Processing Paradigms

The current findings arguably have important implications for the emotional Stroop and emotionality literature. Significant positive emotionality effects were not observed for the emotional Stroop task. This finding may be of particular interest to advocates of the emotionality hypothesis (e.g. Martin et al., 1991). While the validity of the emotionality hypothesis is not in question here, the methodologies employed by researchers to elicit positive emotionality effects deserve careful consideration.

The finding of interference for threat related information in the emotional lexical decision task is potentially an important advance in the understanding of this word processing paradigm. Recall from section 1.8.2., that speeded lexical decisions have traditionally been associated with salience for emotional information. The current findings, together with the findings of Geer and Bellard (1996), suggest the possibility that prior lexical decision task studies may have discounted interference effects because they were not congruent with traditional interpretations of lexical decision response latencies and emotional salience.

4.9. Clinical Implications

4.9.1. Clinical Utility of Experimental Word Processing Paradigms

Currently, quantification of trauma related attentional biases is not generally used in clinical practice. However, the emotional Stroop and emotional lexical decision task paradigms potentially provide non-introspective methods of investigating cognitive representations of trauma. The clinical utility of such experimental paradigms warrants further investigation.
4.10. Study Limitations

4.10.1. Sample Size

At the outset, the current author encountered a general attitude that sexual assault studies are notoriously difficult for which to recruit participants. Similarly, the research culture within sexual assault service provider organisations in Australia is very much in its infancy. Indeed, 35.71 % of the survivors of sexual assault recruited for the current study were recruited through service providers, compared to 64.29 % who answered media advertisements. While the current research represents an important step in establishing a research culture within service provider organisations, it would have been even more valuable to observe findings from larger survivor populations (e.g. rather than dichotomising 28 survivors into symptomatic and asymptomatic groups, having 28 survivors in each dichotomised group).

4.10.2. Sample Representativeness

An aim when recruiting survivors of sexual assault for the current study was to maximise the representativeness of the sample, by exploring different recruitment avenues. A limitation of this approach is that in order to maximise representativeness, inclusion and exclusion criteria must be necessarily broad. It follows therefore that clinical groups may not be as homogenous, as one would like. For example, the survivor group included a mixture of treatment seekers and individuals who had never sought treatment, and thus individuals who had and had not received a formal psychiatric diagnosis. Further, the survivor group included a mixture of individuals who were currently taking medication for psychiatric conditions, those who had been diagnosed with a co-morbid disorder, and those who had not.

Similarly, maximising sample representativeness necessarily required a broad definition of sexual assault, which included survivors of child abuse, sexual assault and rape. Future researchers may aim to recruit enough participants for each type of survivor group, in order to compare the effects of different types of sexual trauma on attentional biases.

4.10.3. Number of Trials for each Word Category

One of the key strengths of the current study was the inclusion of word categories to adequately test predictions of the emotionality and threat hypotheses. However, with an increase in the number of word categories employed, comes a necessary decrease in the
number of trials per word category. The result is an increase in the variance of RTs for each word category, and thus reduced power to detect RT differences between categories.

4.10.4. Specific threat and general threat word categories

While every effort was made to select appropriate word stimuli for each word category, the specific threat and general threat word stimuli may not have been clearly distinguishable for survivors of sexual assault. Due to difficulties in recruiting large numbers of survivors, it was not possible to have a sub-group of survivors rate the experimental word stimuli in a pilot study. Exposing survivors to word stimuli prior to completing the information processing tasks would have risked cueing and / or priming effects. In the future it would be beneficial to have a sub-group of survivors, independent of the experimental study, rate the word stimuli for threat salience, and these ratings could then be compared to participants’ ratings.

4.11. Future Research Directions

4.11.1. Replication of Current Findings

The current findings ought to be replicated. Replication would elucidate the question of whether the emotional Stroop task is better able to quantify threat effects, but not emotionality effects. Replication of the emotional lexical decision task findings would provide further evidence of interference for threat in the emotional lexical decision task, and also support the utility of this paradigm for quantifying emotionality effects. There would be two key benefits to replicating the current findings. Firstly, replication would further advance our understanding of which paradigms are appropriate for investigating emotionality and threat effects. Secondly, with this information in mind, researchers may be able to subsequently decrease the number of word categories employed. The number of trials per word category could then be increased, thereby reducing the variance for RTs in each word category, and thus increasing statistical power.

In terms of the presence or absence of symptoms, the current findings ought to be replicated using a larger clinical sample. It would also be informative to investigate whether the current findings are specific to survivors of sexual assault, or whether they generalise to other categories of trauma survivors.
4.11.2. Emotional Processing

The emotional processing perspective of Brewin et al. (1996) in the context of trauma deserves consideration. The authors identified three possible outcomes of emotional processing: completion / integration, chronic emotional processing and premature inhibition of emotional processing (see Brewin et al., 1996 for review). Brewin et al. cautioned against designing studies where trauma survivors with current PTSD symptomatology are compared to individuals exposed to the same trauma but without current PTSD symptoms. The authors argued that the non-PTSD group could include individuals who have prematurely inhibited emotional processing, thereby masking possible PTSD symptoms. It was suggested that researchers should screen trauma survivors for indicators of inhibited emotional processing prior to dichotomising PTSD and non-PTSD groups. To this end, the development of an appropriate instrument to assess a participant’s stage of emotional processing may aid in the selection of more homogenous symptomatic and asymptomatic groups.

4.11.3. Brain Imaging

To date, attentional bias research has tended to focus on the circumstances in which biases manifest, rather than the mechanisms underlying trauma processing. There remains a need for future research to investigate the neurological mechanisms that mediate the processing of emotionally salient information. There is at least one neurobiological model of threat processing that lends itself well to a brain imaging study of trauma processing. LeDoux (1998) has formulated an influential neurobiological account of processing of threat salient information, which was derived from fear conditioning paradigms in animals. LeDoux argues that the effects of trauma in PTSD can be conceptualised as a form of classical conditioning, and his hypothesis focuses on the putative role of the amygdala in these processes. In essence, LeDoux postulates that trauma may bias information processing in such a manner that thalamic pathways to the amygdala predominate over cortical pathways subsuming “traditional” memory processes. These lower level processing networks are known to rapidly potentiate pathways to the amygdala, and are thereby capable of mediating profound fear reactions. Although strongly grounded in neuroanatomical and animal physiology studies, LeDoux’s model has not been tested in humans using non-conditioning paradigms. Part of the reason for this deficiency may be the relative absence of reliably characterised threat salient stimuli.
An important implication of LeDoux’s model is that because processing of threat salient stimuli is mediated by circuits centered on the amygdala, these processes may not be amenable to modification by traditional memory mechanisms, which are centered on cortico-hippocampal mechanisms. This in turn may imply that the efficacy of traditional psychotherapeutic interventions (including cognitive-behavioural therapies) may be intrinsically limited for PTSD and allied processes. LeDoux has suggested that novel interventions may be therefore be required for optimal efficacy in PTSD and trauma.

Having developed a suitable paradigm with which to test this model in clinical populations, it is here suggested that the potential importance of conducting a brain imaging study may extend far beyond the elucidation of fundamental cognitive and neurobiological theories.

Extrapolating from LeDoux’s model, it is hypothesised that processing of word stimuli (threat-salient, emotional or otherwise) may be associated with activation of fronto-temporal and fronto-hippocampal circuits in control populations. For a clinical population with trauma, the expectation holds for non-threat stimuli. However, it is hypothesised that processing of threat salient stimuli would be associated with activation of amygdala and associated circuits.

4.11.4. Research priorities

It is suggested that the next research priority should be to replicate and extend the current findings in a brain imaging study, in order to elucidate the neurological mechanisms that mediate the processing of emotionally salient information (cf. section 4.11.3.).


- The current thesis directly compares the utility of the emotional Stroop task and emotional lexical decision task for quantifying threat and emotionality effects.
- The current thesis employed, for the first time, a sufficient number and range of word categories that could adequately investigate both the threat and emotionality hypotheses.
- Consequent to these refinements, the current thesis distinguished between specific and general threat and between positive and negative emotionality.
- Similarly, the current thesis employed checks for lexical processing and semantic relatedness.
- A group of participants independent of the experimental tasks validated experimental stimuli in a pilot study. The current participants also validated the
emotional and threat salience of the experimental stimuli following the word processing paradigms.

- The current thesis employed a new measure of positive and negative affect (the STES), developed for the current thesis as an alternative to the PANAS. A measure of affect along a continuum of emotionality was required in order to be consistent with the word rating measures used in the current thesis. The STES data collected for the current study will be used in the future to further validate and assess the psychometric properties of this continuum measure of emotionality.

- The findings of the current study indicated that threat and emotionality effects may co-exist, and that the emotional lexical decision task may be better able to quantify emotionality effects than the emotional Stroop task.

- The findings of the current study indicated that both the emotional Stroop task and the emotional lexical decision task are able to quantify threat effects, and that there is little difference in the size of threat effects between the two word processing paradigms.

- The current emotionality findings suggest that there does not appear to be a relationship between the presence or absence of PTSD symptoms and positive and negative emotionality effects.

- The current specific threat findings suggest that there is a relationship between PTSD symptoms and specific threat effects.

4.13. Conclusions

4.13.1. Threat versus Emotionality Hypotheses

The findings of the current study indicate that threat and emotionality hypotheses may co-exist. For the emotional Stroop task, threat effects were deemed not large enough to warrant additional analyses to determine whether these effects were specific threat effects or whether they could be attributed to emotionality of the threat stimuli. For the emotional lexical decision task, the threat effects were characterised by interference and the emotionality effects were characterised by facilitation. Due to the difference in the direction of these effects (i.e. interference vs facilitation), we can be confident that the threat effects are attributable specifically to threat salience and not an underlying emotionality effect.

4.13.2. Asymptomatic versus Symptomatic Groups

For the emotionality findings presented in this thesis, there did not appear to be an association between the presence or absence of PTSD symptoms and either positive or
negative emotionality effects. For the current specific threat findings, a relationship does appear to exist between the presence or absence of PTSD symptoms and specific threat effects. For both word processing paradigms, specific threat effects were associated with the presence of PTSD symptoms. These findings appear to be consistent with clinical threat salience specificity. The current findings for general threat effects and asymptomatic and symptomatic groups were inconclusive, and therefore the relationship between the presence or absence of PTSD symptoms and general threat effects requires further investigation.

4.13.3. Emotional Stroop task versus Emotional Lexical Decision Task

The findings of the current thesis indicate that the emotional Stroop task may be better able to quantify threat effects rather than emotionality effects. No positive emotionality effects were observed for the emotional Stroop task, and interference negative emotionality effects were observed only in survivors of sexual assault. It was concluded that the emotional Stroop task appears to be more sensitive to threat effects than emotionality effects. In contrast, the findings for the emotional lexical decision task indicated a consistent pattern of interference for threat effects and a consistent pattern of facilitation for emotionality effects. Therefore the emotional lexical decision task may be an appropriate paradigm for quantifying both threat and emotionality effects.
5. References


Cattal, J.M. (1886). The time it takes to see and name objects. Mind, 11, 63-65.


APPENDIX A

Demographic Questionnaire
DEMOGRAPHIC INFORMATION QUESTIONNAIRE (1)

The following questionnaire will ask you some general demographic questions. Please circle your response and/or fill in the blanks as appropriate.

(1) Age:_____________

(2) Marital Status:
   (a) Single, never married
   (b) Cohabitating (not married)
   (c) Married
   (d) Divorced / Separated

(3) First Language (i.e. language spoken at home): ________________________

(4) How would you describe your understanding / grasp of the English Language?
   (a) Excellent
   (b) Very Good
   (c) Good
   (d) Fair
   (e) Poor

(5) Education Level:
   (a) Primary School
   (b) Secondary School
   (c) Completed Secondary School
   (d) Tertiary – Undergraduate
   (e) Tertiary – Postgraduate

(6) Occupation: _____________________________
DEMOGRAPHIC INFORMATION QUESTIONNAIRE (2)

The following questions will ask you to disclose some general information about the assault and your health. If you would feel more comfortable completing these questions with your health care professional, please feel free to do so.

(1) Duration since assault(s) (approximate): _______________________

(2) At what age(s) did the assault(s) occur:
   (a) Childhood
   (b) Teenage years
   (c) Adulthood

(3) Did you know the assailant?
   (a) Yes
   (b) No

(4) Please indicate whether you have experienced more than one assault:
   (a) Single assault
   (b) Multiple assaults

(5) Have you been diagnosed with Posttraumatic Stress Disorder (PTSD)?
   (a) Yes
   (b) No

(6) Have you been diagnosed with another disorder in addition to PTSD?
   (a) Yes
   Please indicate the nature of the disorder(s) ____________________________
   (b) No

(7) Approximately how long ago was this diagnosis made?
   (a) PTSD: ____________________________
   (b) Other: ____________________________

(8) Are you taking any medication?
   (a) Yes
   (b) No

(9) What type of medication are you taking? ______________________

(10) Approximately how long have you been taking this medication?
APPENDIX B

State Trait Anxiety Inventory

Omitted – Copyright Material
APPENDIX C

Affective State Measures (PANAS)

Omitted – Copyright Material
APPENDIX D

Affective State Measures (STES)
STATE – TRAIT EMOTIONALITY SCHEDULE (STES)

The following scale contains 15 items that can be used to describe different moods and emotional states. Please read each item carefully and then mark the appropriate response in the space next to each item. Please indicate the extent to which you feel this way right now, at this present moment. Use the following scale to record your answers:

0 – Not at all
1 – Somewhat
2 – Moderately
3 – Very much so
4 – Extremely

GUILTY  _____
SCARED  _____
EXCITED  _____
HOSTILE  _____
CRYING  _____
STRONG  _____
INDECISIVE  _____
LISTLESS  _____
CLEAR HEADED  _____
SPITEFUL  _____
MISERABLE  _____
ENERGETIC  _____
EXHAUSTED  _____
DESPERATE  _____
EFFICIENT  _____
STATE – TRAIT EMOTIONALITY SCHEDULE (STES)

The following scale contains 15 items that can be used to describe different moods and emotional states. Please read each item carefully and then mark the appropriate response in the space next to each item. Please indicate the extent to which you feel this way generally. Use the following scale to record your answers:

0 – Not at all
1 – Somewhat
2 – Moderately
3 – Very much so
4 – Extremely

EFFICIENT
DESPERATE
EXHAUSTED
ENERGETIC
MISERABLE
SPITEFUL
CLEAR HEADED
LISTLESS
INDECISIVE
STRONG
CRYING
HOSTILE
EXCITED
SCARED
GUILTY
APPENDIX E

Rape Symptomatology Measure (RAST)

Omitted – Copyright Material
APPENDIX F

PTSD Symptomatology Measure (MPSS)

Omitted – Copyright Material
APPENDIX G

Word Rating Measures - Instructions
WORD RATING PHASE – EMOTIONALITY RATINGS

Please rate the following experimental words for personal emotional significance ("emotionality"), that is, how far you consider that the word is positive or negative in valence. Read each item and then mark your answer in the space next to each word. Use the following scale to record your answers:

+3 – very positive  
+2 – moderately positive  
+1 – slightly positive  
0 – neutral  
-1 – slightly negative  
-2 – moderately negative  
-3 – very negative

WORD RATING PHASE – THREAT SALIENCE RATINGS

Please rate the following words for personal threat value, that is, how personally threatening you find each word. Read each item and then mark your answer in the space next to each word. Use the following scale to record your answers:

0 – Not at all threatening  
1 – Slightly threatening  
2 – Moderately threatening  
3 – Very threatening  
4 – Extremely threatening
APPENDIX H

Experimental Word & Non-word Stimuli
### EXPERIMENTAL WORD STIMULI:

<table>
<thead>
<tr>
<th>Positive Threat</th>
<th>General Threat</th>
<th>Uncategorised Neutral</th>
<th>Sexual Assault Congruent</th>
<th>Categorised Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>passion</td>
<td>killer</td>
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<td>rape</td>
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APPENDIX I

Participant Recruitment Notice (Survivors)
PARTICIPANT RECRUITMENT NOTICE

“AN INVESTIGATION INTO POST-TRAUMA RESPONSES AND THE EFFECT OF TRAUMA EXPOSURE ON HUMAN INFORMATION PROCESSING”

You are invited to participate in a PhD research study investigating the impact trauma exposure has on the ways in which survivors of sexual assault process different types of information. The purpose of the study is to further our understanding of some of the post-trauma reactions you may have experienced following the assault and how these reactions may affect styles of human information processing.

Please note that this study will conform to strict Ethical Guidelines and **CONFIDENTIALITY WILL BE MAINTAINED AT ALL TIMES.**

**TASKS:** Two computer tasks requiring simple button press responses, and a series of paper & pencil questionnaires

**LENGTH OF PARTICIPATION SESSION:** 1 – 1.5 HOURS

**LOCATION OF STUDY:** Northern Centre Against Sexual Assault (NCASA) / South Eastern Centre Against Sexual Assault (SECASA)

OR

Swinburne University, Hawthorn Campus – The choice is yours

**INCLUSION / EXCLUSION CRITERIA:** Please speak to your personal Counsellor / Advocate, or contact the Principal Investigator of the study (details below)

If you are interested in participating in this research study or you would like some further information about participation, please do not hesitate to phone the Principal Investigator, Shelley Cox (of Swinburne University) on (w) 9214 5341 or (mobile) 0402 451 629, or e-mail, scox@swin.edu.au. Please rest assured that any conversations / correspondence we have will be in the strictest confidence.

Alternatively you can speak to your personal Counsellor / Advocate at NCASA / SECASA about the study.
APPENDIX J

Media Listings
Volunteers (survivors of sexual assault and non-victimised controls) are being sought for a study investigating human information processing and trauma exposure.

The following inclusion / exclusion criteria apply:

**Inclusion Criteria:**
Sexual assault survivors with or without a diagnosis of posttraumatic stress disorder (PTSD)
Females and males aged between 18 and 60 years
Survivors of ANY type of sexual assault(s)
Assault(s) occurred more than one month ago
Can be diagnosed with a co-morbid disorder
Can be on medication

**Exclusion Criteria:**
History of neurological pathology causing seizures (e.g. epilepsy)
Individuals who are colour blind
Individuals who are dyslexic

The exclusion criteria for the non-victimised controls includes a history of any form of sexual assault / abuse, history of psychiatric illness or neurological pathology.

All participants will be asked to complete two computerised information-processing tasks and a series of questionnaires. The one-off participation session lasts between 1.5 and 2 hours. The study is completely confidential and has the support of various Counselling services.

Contact:
Shelley Cox
E-mail: scox@swin.edu.au
Ph. 9214 5341
APPENDIX K

Participant Recruitment Notice (Controls)
ATTENTION:

Participants are required to participate in a PhD study entitled:

“COGNITIVE BIASES IN LEXICAL PROCESSING”

Researcher: Shelley Cox  
(Ph. 97293261 / E-mail: scox@swin.edu.au)

Coordinating Supervisor: Prof. Con Stough

Co-Supervisor: Dr. Alex Sergejew

Participants required: MALES & FEMALES

Exclusion criteria: Any individual with a history of psychiatric illness and / or neurological pathology (including epilepsy) will not be permitted to participate. Moreover individuals who have experienced any form of sexual assault / rape will not be permitted to participate in this study.

Participation time: 1 HOUR

This research is concerned with how individuals process different types of information.

As a participant you will be asked to complete two computer tasks – a Stroop task and a lexical decision task. In the Stroop task you are required to identify the colours in which word stimuli are presented, and in the lexical decision task you are asked to decide whether the presented letter string is a word or a non-word. You will also be asked to complete two questionnaires assessing your mood and a questionnaire assessing the valence of word stimuli.

Please sign up on the Sign-Up Sheet marked “Cognitive Biases in Lexical Processing”.
“COGNITIVE BIASES IN LEXICAL PROCESSING”

Please write your name, contact number and / or e-mail address and preferred day/time (am / pm) in the space provided – I will contact you to arrange a suitable testing session. Please print clearly!

THANK YOU FOR YOUR PARTICIPATION!

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APPENDIX L

Participant Information Document and Informed Consent Form
PROJECT TITLE

An investigation into post-trauma responses and the effect trauma exposure has on human information processing

INVESTIGATORS

Associate Researcher: PROFESSOR CON STOUGH
Qualifications: BSc(Hons) PhD MAPS
Institution: Swinburne University of Technology
Department: School of Biophysical Sciences & Electrical Engineering – Swinburne Centre for Neuropsychopharmacology
Mailing Address: PO Box 218, Hawthorn, VIC, 3122
Role in this Project: Co-Supervisor
E-mail: cstough@swin.edu.au
Telephone: (w) 9214 8167
Fax: 9214 5230

Principal Investigator: SHELLEY COX
Qualifications: BA Psychology / Psychophysiology; BAppSc Psychophysiology Honours
Institution: Swinburne University of Technology
Department: School of Biophysical Sciences & Electrical Engineering – Swinburne Centre for Neuropsychopharmacology
Mailing Address: PO Box 218, Hawthorn, VIC, 3122
Role in this Project: Principal Researcher and PhD Scholar
E-mail: scox@swin.edu.au
Telephone: (w) 9214 5341, (Mob.) 0402 451 629
Fax: 9819 0856

Associate Researcher: A/Prof. ALEX SERGEJEW
Qualifications: PhD MB ChB
Institution: Mental Health Research Institute (MHRI)
Department: Brain Dynamics Laboratory
Mailing Address: Locked Bag 11, Parkville, VIC, 3052
Role in this Project: Co-ordinating Supervisor
E-mail: aas@mhri.edu.au
Telephone: (w) 9389 2966
Fax: 9387 5061
PARTICIPANT INFORMATION

You are invited to take part in the research project entitled "An investigation into post-trauma responses and the effect trauma exposure has on human information processing". This Participant Information contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all of the procedures involved in the project, before you decide whether or not to take part in it. Please read this Participant Information carefully. Feel free to ask any questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Please feel free to do this. Once you understand what the project is about and if you agree to take part in it, you will be asked to sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to participate in the research project. You will be given the Participant Information Sheet to keep as a record.

PARTICIPANT INCLUSION & EXCLUSION CRITERIA

Inclusion Criteria:
- Sexual assault survivors with a diagnosis of Posttraumatic Stress Disorder (PTSD)
- Sexual assault survivors without a diagnosis of PTSD
- Survivors of ANY type of sexual assault(s)
- Assault(s) occurred more than 1 month ago
- Can be diagnosed with a co-morbid disorder
- Can be on any form of medication

Exclusion Criteria:
- History of neurological pathology causing seizures (e.g. epilepsy)
- Individuals who are colour blind
- Individuals who are dyslexic

EXPLANATION OF PROJECT

The following study is designed to investigate the ways in which survivors of sexual assault process different types of information. The purpose of the study is to further our understanding of some of the reactions you may have experienced following the assault and how these reactions may affect human information processing.

If you agree to participate you will be asked to complete two computerised information processing tasks and also some questionnaires. The information processing tasks involve the presentation of letter strings on a computer screen. The word stimuli presented will include positive, negative, threat and neutral letter strings. The first computer task, the "Stroop" task, is a colour-naming task and is named after the researcher who designed it. In the Stroop task you will be asked to identify the colours in which the word stimuli are presented. The "lexical decision task" is a word – non-word discrimination task. In this task you will be asked to identify whether the presented letter strings are words or non-words. A "non-word" is simply a nonsense word. Your reaction times will be automatically recorded by the task computer. Before each computer task, you will be asked to complete a practice version of the task to familiarise yourself with it. Each practice task takes approximately 5 minutes to complete. The experimental tasks are simply longer versions of the practice tasks, and each will take approximately 15 minutes to complete.
It is important that you are aware that these computer tasks are NOT tests of ability – they do not measure how good or bad an individual is at completing them. What these computer tasks measure is speed of processing of particular types of information (e.g. positive, negative or neutral information). Whether or not an individual shows a preference for a particular type of information reflects an information processing style – this in NO way reflects on the person as an individual or on their personality. The Stroop and lexical decision computer tasks simply provide behavioural measures of information processing, and how individual processing styles may relate to post-trauma reactions.

After completing the computer tasks you will be asked to complete a series of questionnaires measuring common reactions resulting from exposure to a traumatic event, as well as general mood. You will also be asked to complete two questionnaires assessing the experimental word stimuli presented in the computer tasks. You will be asked to rate each word in terms of how positive or negative you consider each to be, and also the degree to which you think each word contains some threat value. The questionnaires will take approximately 30 minutes to complete.

*Past experience suggests the data collection session will take between 1 and 1.5 hours to complete.*

**POSSIBLE RISKS OF PROJECT**

It is important that you are made aware of the possibility that some of the experimental word stimuli may trigger thoughts related to the experience of being sexually assaulted. However, it is not expected or intended that the study will cause you distress. In the interests of your well being and comfort, data collection sessions will always be conducted in a setting where counsellors are accessible. You are free to take a break from the data collection session at any stage and if you do feel that the tasks are upsetting you are free to withdraw your consent, terminating your participation, without prejudice.

**PRIVACY CONFIDENTIALITY & DISCLOSURE OF INFORMATION**

All of the information you provide to the Principal researcher will be kept *strictly confidential*. This will be ensured with the use of a code number allocation system – you will *NOT* be identifiable by personal information or individual results. The task computer will automatically record your responses during the two computer tasks. Please note that the task computer is password protected, and data disks will be stored securely. The questionnaires will be transcribed from paper forms to computer files, and the originals will be destroyed (shredded). Again the computer used to view data files will be password protected and data disks store securely. Only the Principal researcher will have access to the raw information you provide. Once all information has been transferred to computer files, the co-ordinating supervisor will also have access to this data – it will not be possible for anyone to cross reference participant’s names with individual results – strict ethical guidelines relating to confidentiality will be adhered to at ALL times. Following completion of the study data will continue to be protected via physical security and coding. In accordance with National Health and Medical Research Council (NHMRC) guidelines, data will be retained for a period of six years after completion of the study, and may be used in future clinical research. It is envisaged that data may appear in scientific publications in the future, however no participant will be identifiable by name or individual results.

*CONFIDENTIALITY WILL BE MAINTAINED AT ALL TIMES.*
PROJECT RESULTS & OUTCOMES

A report of the project results and outcomes (in plain / non-scientific language) will be made available to you, should you wish to receive this. It is entirely your decision as to how you would like to receive the report – you can provide personal contact details (e.g. contact number, e-mail address, postal address) or you are more than welcome to indicate that a copy should be forwarded to your personal health professional who could pass the document on to you. Please indicate in the appropriate section of the informed consent form whether or not you would like to receive a project report and your preferred delivery method.

ETHICAL GUIDELINES

This project will be conducted according to the National Statement on Ethical Conduct in Research Involving Humans (June, 1999), produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The Ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of Swinburne University of Technology, and the Human Research Ethics Committee(s) of the external bodies supporting this research project. This information is available for you to view upon request.

QUERIES & CONTACTS

Any questions regarding the project entitled “An investigation into post-trauma responses and the effect trauma exposure has on human information processing” can be directed in the first instance to the Principal Investigator Shelley Cox, of the Swinburne Centre for Neuropsychopharmacology on telephone number 9214 5341, or e-mail scox@swin.edu.au. In the event that your query could not be satisfied please feel free to contact the Co-ordinating Supervisor, A/Prof. Alex Sergejew of the Mental Health Research Institute on telephone number 9389 2966 or e-mail aas@mhri.edu.au.

COMPLAINT PROCEDURE

In the event that you were unhappy about the way you were treated during your participation in the study, or have a query that could not be satisfied by Shelley Cox or A/Prof. Alex Sergejew, please feel free to contact the Director of the Swinburne Centre for Neuropsychopharmacology, Professor Con Stough on telephone number 9214 8167 or e-mail cstough@swin.edu.au.

In addition formal complaints can be directed to:

The Chair
Human Research Ethics Committee
Swinburne University of Technology
P O Box 218
HAWTHORN. VIC. 3122
Phone: (03) 9214 5223
INFORMED CONSENT AGREEMENT

PROJECT TITLE: An investigation into post trauma responses and the effect trauma exposure has on human information processing.

I have read, or have had read to me as appropriate, and I understand the Participant Information document. Any questions I have asked have been answered to my satisfaction.

I freely agree to participate in this project according to the conditions in the Participant Information. I realise that I am free to withdraw from this study at any time, thereby terminating my participation.

I will be given a copy of the participant information to keep for my own records.

The Principal Researcher has agreed not to reveal my identity and personal details if information about the project is published or presented in any public form. I understand that confidentiality will be maintained at all times.

Participants Name (printed) …………………………………………………………………………………

Signature ………………………………………… Date …………………………………………

Principal Investigator’s Name (printed) …………………………………………………………………

Signature ………………………………………… Date …………………………………………
FUTURE RESEARCH

In the future it is hoped that the behavioural data obtained from the present study may provide the justification for conducting a brain imaging study. Briefly, researchers would like to investigate similarities and differences in brain activation during human information processing, between sexual assault survivors diagnosed with PTSD and those who have not been diagnosed with PTSD. Comparisons would also be made with control participants. Any proposed study would adhere to strict ethical guidelines.

Please indicate by ticking the appropriate box whether you would be interested in participating in future research activities. Please be aware that your decision here WILL NOT jeopardise your treatment or participation in the current study. It is important you understand that you are not committing to participate in future research – you are simply registering your interest and you are free to change your mind at any time.

YES I would be interested in future research activities

NO I would not be interested in future research activities

If you have indicated that you may be interested in participating in future research activities, please indicate how the Principal Researcher can get in touch with you (e.g. contact number, e-mail address, contact via personal health professional). This information will not be disclosed to anyone, and only the Principal Researcher will have access to it.

Contact Information: …………………………………………………………………..

PROJECT REPORT

Please indicate whether you would like to receive a report of the project results and outcomes, by ticking the appropriate box:

YES I would like a copy of the project results and outcomes

NO I would not like a copy of the project results and outcomes

If you have indicated that you would like to receive a project report, please indicate your preferred delivery method (e.g. postal address, e-mail address, contact via personal health professional). This information will remain strictly confidential, and available only to the Principal Researcher.

Contact Information: …………………………………………………………………..