

**ATTENTION TRAINING AND TRAUMATIC STRESS SYMPTOMS: A  
CONTROLLED EVALUATION**

**A thesis submitted to the University of Manchester for the degree of  
Doctor in Clinical Psychology (ClinPsyD) in the Faculty of Medical and  
Human Sciences.**

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# THE UNIVERSITY OF MANCHESTER

## ABSTRACT OF THESIS

### **‘Attention training and traumatic stress symptoms: a controlled evaluation’**

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Many of the symptoms characteristic of PTSD such as hypervigilance towards threat, involve attentional processes. The first part of this thesis explored the role of attentional processes in the maintenance and treatment of PTSD. Although general models of anxiety give attentional processes central prominence cognitive models of PTSD (e.g., Foa & Riggs, 1993; Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000) assign an important role to trauma memory and place little or no emphasis on the role of attentional processes in maintaining symptoms. Models of anxiety have suggested that attentional bias is automatic (Mathews & Macleod, 2002) or strategic (Wells & Mathews, 1994). Wells’ (2000) Metacognitive Model of PTSD is one of the few models to emphasize thinking style and attention rather than memory. In this model attentional bias is thought to be strategic in nature. The evidence reviewed supports a role of attention in PTSD and suggests it may be beneficial to modify this process. Two different attention techniques based on models of bias are reviewed.

The second part of the thesis described a randomized controlled evaluation of attentional training technique (ATT; Wells, 1990) on traumatic stress symptoms in a sample of 60 university students, who had previously experienced a stressful life event. ATT is a technique used in metacognitive therapy to modify the control of attention. Participants were randomly assigned to either an ATT group (n = 29) or a control group (n = 31). An emotional attention set shifting task was included as an objective measure of attention. The results supported the hypotheses, ATT reduced intrusions and negative affect, increased self-report attention flexibility and modified performance on the attention set shifting task. The results are consistent with the metacognitive model of PTSD. Theoretical and clinical implications are discussed and the results add to studies suggesting positive effects of the technique across a range of disorders.

The third part critically reflected on methodological and ethical issues from the above research study. The interpretation of the findings is limited by the student population. It is acknowledged that the results are preliminary in nature but it is believed that the study provides useful insights into the role of attentional processes in the development and treatment of traumatic stress symptoms and provides a basis for studies in the future.

## **Declaration**

No portion of the work referred to in this thesis has been submitted in support of an application for another degree of qualification of this or any other university or institute of learning.

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## **Part 1: Literature Review**

### **The role of attentional processes in the maintenance and treatment of Post-Traumatic Stress Disorder (PTSD)**

This review was prepared in line with the journal guidelines for “Clinical Psychology Review”. A copy of the author information pack is available in Appendix A.

**Word Count: 11,210** (Excluding References)

## **Abstract**

Some of the most prevalent symptoms of PTSD such as hypervigilance towards threatening stimuli, increased startle response and difficulty concentrating involve attentional processes. The presence of attentional bias in individuals with PTSD is well established in the literature. It has been demonstrated using a variety of experimental paradigms. There is debate as to whether this attentional bias represents an automatic or strategic stage of information processing. Despite the apparent importance of attention bias in anxiety it does not figure prominently in most cognitive models of PTSD. Instead cognitive models of PTSD assign a special role to memory processes. An exception is presented by the Metacognitive Model of PTSD (Wells, 2000), where attentional control is central in emotional disorder. Research examining the direct modification of attentional processes across a range of anxiety disorders is reviewed. These attentional training strategies may be beneficial in the treatment of traumatic stress symptoms and suggestions for future research are provided.

**Keywords:** Attentional bias, PTSD, Metacognitive Therapy, attentional training

### **Highlights:**

Evidence supports the presence of attentional bias in PTSD.

Cognitive Models of PTSD assign an important role to memory but do not emphasize the role of attentional processes.

The Metacognitive Model of PTSD emphasizes the role of attentional control in maintaining disorder.

Attention training strategies may be beneficial in the alleviation of stress symptoms.

## *Introduction*

Impaired attentional processes have been identified as one of the primary cognitive factors involved in the etiology and maintenance of anxiety (Eysenck, Derahshan, Santos, & Calvo, 2007). The concept of attentional bias (i.e. the selective allocation of attentional resources to threat related stimuli) plays a central role in most theories of anxiety disorders (Devineni, Blanchard, Hickling & Buckley, 2004). A meta-analysis of attentional bias towards threat, included 172 studies (across different stimuli, samples and cognitive tasks) and yielded a robust effect size ( $d = 0.45$ ) (Bar-Heim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Although effects of attentional bias are robust, their implications for understanding emotional disorders remain inconclusive (Matthews & Wells, 2000).

PTSD is an anxiety-based disorder characterized by the allocation of attentional resources towards threatening stimuli (Harvey, Bryant & Rapee, 1996). Attentional bias assessed by the modified Stroop Task has been demonstrated for a number of clinical psychiatric conditions, but it is generally larger for PTSD than for any other disorder (Williams, Mathews, & MacLeod, 1996). A substantial number of studies have demonstrated the presence of attentional bias in PTSD (e.g. Bryant & Harvey, 1995, Beck, Freeman, Shipherd, Hamblen & Lackner, 2001). This is not surprising considering that some of the most prevalent symptoms in PTSD such as hypervigilance towards threat, difficulty concentrating, and exaggerated startle response appear to be related to attentional processes.

There is controversy in the literature in relation to how this attentional bias is measured and whether it reflects automatic or strategic stages of information processing (for a review see Cisler, Bacon & Williams, 2009). Posner and Snyder (1975) described automatic processing as that occurring without conscious effort and it is capacity free (i.e., does not require the additional allocation of processing resources). Conversely strategic processing involves conscious-controlled effort and is capacity-limited in nature. A strict dichotomy between automatic and strategic processing is discouraged and automaticity is conceptualized as a continuum (Bargh, 1992). Researchers have argued that attentional processes studied in PTSD don't fall directly into either category as many of the symptoms

are involuntary but not necessarily capacity free. (Bryant & Harvey, 1997; Wells & Matthews, 1994).

In this review cognitive models of attentional bias are described emphasizing different levels of control of attention: automatic (Mathews & MacLeod, 2002) and strategic (Wells & Matthews, 1994). Following this a brief summary of cognitive tasks used to assess attentional bias is presented. An overview of PTSD is provided, cognitive models of PTSD are discussed and literature relating to the presence of attentional bias in PTSD is reviewed. The focus has been narrowed to include: (1) social cognitive theories (Horowitz, 1982, 1986; Janoff-Bulman, 1989, 1992), (2) emotional processing theory (Foa & Riggs, 1993), (3) the cognitive model of PTSD (Ehlers & Clark, 2000), (4) dual representation theory (Brewin, Dalgeish, & Joseph, 1996), and (5), the metacognitive model (Wells, 2000). Evidence of attentional bias in PTSD has been divided into automatic and strategic stages of processing. Finally theoretically based treatment techniques that aim to modify attentional processes are summarized. Their potential applicability in the treatment of PTSD is discussed. It is important to note that this review has excluded treatment techniques that are intended for use as stress management or coping strategies in response to stress symptoms or whose explicit goal is altering awareness in the here and now (e.g. distraction, attention refocusing, autogenic relaxation, mindfulness, meditation) as the goal of these techniques is to alter affect and cognition rather than attention directly.

The review was limited to papers published in English and included review articles and empirical papers. No time constraints were imposed as an inclusion criterion. A number of methods were used to identify papers included in the review. Computerized searches were completed using 'Your JOURNALS@ Ovid' and 'PsychARTICLES Full Text' with combinations of key terms: attention, trauma, treatment, PTSD, traumatic stress symptoms, attentional processes, attentional control, attentional manipulations, attention training. Reference sections were manually searched from relevant articles and reviews. Finally additional literature was drawn on (e.g. Library databases were searched for relevant books and publications) in order to comprehensively review the role of attentional processes in PTSD.

### *Theories of Attention Bias in Anxiety*

Williams, Watts, MacLeod and Mathews (1988) described a processing stage model in which attention bias is viewed as automatic. This model maintains that the threat value of stimuli is determined at the automatic level by an affective decision mechanism (ADM). This system decides whether information is high or low in threat and the decision is influenced by trait anxiety. A resource allocation mechanism (RAM) is activated if stimuli are judged as threatening. When the RAM is activated, attentional resources will be allocated to threat. If stimuli are judged as non-threatening attention is focused at the task at hand and the new stimulus input is not attended to. This attention bias is determined by automatic or “preconscious” processes.

Consistent with Williams et al. (1998) Mathews and Mackintosh (1998) accounted for selective processing in anxiety via a ‘Threat Evaluation system’ (TES). In this model the meanings of stimuli are processed in parallel and compete for attentional resources. Input from a TES strengthens activation of threat related stimuli, to an extent influenced by anxiety level. Such activation can be opposed by voluntary task related effort, and the balance between these two processes determines the extent of the attentional bias.

Following from these models, Mathews and MacLeod (2002) propose that a certain information processing style (i.e. a preferential bias to process threat related stimuli) will expose the individual to a stream of information about possible dangers leading to increased anxiety. They maintain that for anxious individuals the level of threat sufficient to cause switching from an avoidant to a vigilant processing mode is low. Vulnerable individuals respond in an ‘all or nothing’ manner and are unable to disengage attention from threat related cues, no matter how irrelevant they are to current goals. McNally (1995) suggested that the automaticity hypothesis may have negative implications for treatment, as it may not be possible to modify this bias. However, attentional bias modification treatment studies have emerged from the work of Mathews and MacLeod (2002) and shall be discussed in more depth later in this review. It is suggested that manipulating attentional biases can cause changes in vulnerability to anxiety. The main idea is that cognitive tasks used to measure attention bias can be modified to implicitly manipulate attentional bias and reduce anxiety.

Mathews and Macleod (2002) reviewed two studies in which high trait anxious students ( $n = 20$ ) were matched for trait anxiety scores and randomly allocated to either an “avoid threat” condition or to a control condition (targets appeared equally at both neutral and threat locations). They were trained over 8 sessions over a 3 week period for a total of 6000- 7500 trials. Students reported significant reductions in trait anxiety from pre to post training. MacLeod, Rutherford, Campbell, Ebsworthy & Holker (2002) showed that non-anxious individuals could be trained to show bias towards threat. They trained individuals to either attend towards or away from threatening stimuli. They then exposed each group to a stressor task (an anagram) and the group that was trained to attend to threatening stimuli reported greater anxiety than the other group. They concluded anxiety results directly from the acquisition of attentional biases. According to this model it is the type of processing bias that is automatically elicited by events which causes vulnerability to anxiety, instead of biased processing being only a consequence of anxiety. This ‘model of automatic bias’ can be contrasted with the ‘controlled model of bias’ offered in the Self-Regulatory Executive Function Model (S-REF Model: Wells & Matthews, 1994)

The S-REF model (Wells & Matthews, 1994) argues that attentional bias is not simply a vulnerability factor for disorder caused by an automatic bias in processing threat stimuli. It is an outcome of the individual’s strategies for coping with threat. This model proposes that attentional bias is strategic and that it persists due to a variety of thought control or behavior strategies employed by the individual. Perseverative styles of thinking such as worry and rumination should be reduced and attention should be manipulated so that self-focus is reduced and attention to disconfirmatory information is increased.

Matthews and Wells (2000) reviewed literature related to the automaticity debate and concluded that the evidence for the presence of strategic processing of attentional bias towards threat is most convincing. They highlight a number of methodological issues in demonstrating automaticity such as the presentation intervals of stimuli in the masked Stroop task. Dagenbach, Carr, and Wilhelmson (1989) suggest that strategy may bias encoding processes without bringing the material encoded into consciousness. Wells and Matthews (1994a) summarize a number of experimental and simulation studies demonstrating strategy related bias such as evidence related to priming effects. Anxious individuals showed enhanced priming effects suggesting strategic rather than automatic processing (Richards & France, 1992; Richards, French, Johnson, Naparstek, & Williams,

1992). A distinction is also made between awareness and volition in highlighting how strategy dependent bias may operate. For instance once a person decides they should monitor for signs of threat, this decision may only interject into consciousness intermittently (Schneider, Dumais & Shiffrin, 1984). The S-REF model emphasizes the role of top-down processes and suggests that an increased understanding of how individuals allocate attention to threat and the control of attention is necessary for effective treatment of emotional disorders.

### ***Measuring Attentional Bias***

Cisler and Koster (2010) have divided attentional bias into three components: (1) facilitated attention (threat related stimuli are detected faster than neutral stimuli), (2) attentional disengagement (difficulty disengaging attention away from threatening stimuli) and (3) attentional avoidance (directing attention away from threatening locations). Most studies have used either facilitation or interference paradigms to test for attentional bias. Attentional biases have been observed using several different tasks which illustrates the generalisability of the phenomenon across measures of attentional performance.

The Modified Stroop Task (Stroop, 1935) requires individuals to name different words (e.g., threatening or neutral) on a computer screen. Participants are asked to identify the colour, in which the words are printed while ignoring the meaning of the words. It is hypothesised that longer response times (RT's) to colour name threat words compared to neutral words are evidence of attentional bias (attentional interference). A variant called the masked Stroop task is used to assess automatic processing. The stimulus is presented very briefly to prevent conscious recognition and then replaced by a backward mask in the same colour as the original stimulus. Increased response times indicate that the attentional bias occurred prior to conscious recognition. However this effect may not be exemplary as most studies do not establish recognition thresholds on an individual basis (Wells & Matthews, 1994). The utility of the task in the field of PTSD has been questioned as successful treatment after motor vehicle accident (MVA) related PTSD did not result in a decrease in attentional bias (Devineni et al., 2002). MacLeod, et al., (1986) suggest that delay in response time may occur as a result of emotional arousal associated with the threatening stimuli. While the task does assess attentional control it may confound vigilance and avoidance and it does not account for the measurement of spatial location (Cisler & Koster, 2010).

The Dot Probe Task (MacLeod, et al., 1986) relies heavily on spatial orientation in attentional processes. It displays two words or pictures on a computer screen simultaneously, one at the top and one at the bottom or to the left and right. Following a brief stimulus presentation, the stimuli disappear and a probe appears in a location previously occupied by one of the stimuli. The participant is asked to press a button indicating whether the top or bottom stimulus has been replaced by a probe. It is hypothesized that faster response times toward probes that replace threatening stimuli compared to probes that replace neutral stimuli are thought to indicate an attentional bias. In addition, the dot probe also has the same limitation as the Stroop task in that a delayed RT may represent vigilance toward threat or a delayed disengagement (Koster, Crombez, Verschuere & Houwer, 2004)

The visual search task (e.g. Rinck, Becker, Kellerman, & Roth, 2001) also allows for the assessment of spatial attentional allocation. Participants are asked to identify a target stimulus that is embedded in a matrix of distracting stimuli. For example, a target threatening word or picture might be displayed in a matrix of neutral words or pictures. Or a neutral target word or picture may be embedded in a matrix of threatening words or pictures. Attentional biases are inferred from faster response times to detect a threatening stimulus in a matrix of neutral stimuli relative to response times to detect neutral stimuli in neutral matrices.

The emotional spatial cueing task (e.g. Fox, Russo, Bowles, & Dutton, 2001) displays a single picture (e.g. an angry face) on a computer screen as a cue for a simple probe. This task also relies on spatial attentional control processes (Johnson, 2009). The probe may appear in the same location as the cue or on the opposite side of the screen. Individuals who take longer to disengage attention away from the location of an angry face cue when the probe appears in the opposite screen location are interpreted as having deployed a disproportionate amount of attention toward the angry face.

The Attentional Control Capacity for Emotional Representations (ACCE) Task (Johnson, 2009) adapted the explicit cueing task paradigm to measure ability to shift attention towards and away from emotional mental sets. Evidence suggests that individuals who are more efficient at shifting attention between tasks or inhibiting previous mental sets exhibit lower levels of rumination (Whitmer & Banich, 2007). Each trial begins with a cue

presented on a computer screen. This cue is either a solid bar or a patterned bar that informs participants whether they need to make an emotional or neutral judgment. The cue is replaced with a stimulus (a face with a shape between the eyes) on which the participant has to make a judgment. A solid bar serves as a cue to the participant to attend and respond to the emotional expression of the face (emotional mental set), whereas a patterned bar cues the participant to attend and respond to the type of shape between the eyes of the face (neutral mental set). For the emotional judgment they are asked to identify if the valence of the face is happy, angry or neutral. For the neutral judgment they are asked to identify the type of shape located between the eyes of the face, which could be a circle, square or triangle. Effective emotional attentional control is measured by 'switch cost', the time taken to switch between tasks. Possible advantages of the ACCE task are that it allows one to look at attentional engagement and disengagement from positive and negative stimuli in the domain of attentional control. This is important because theories of thought control difficulties (e.g. S-REF model; Wells & Mathews, 1994; Nolen-Hoeksema, 2000) posit inflexibility in attentional control as a factor in the development of intrusive thoughts and negative affect such as that seen in PTSD.

### ***Overview of PTSD***

A formal diagnosis of PTSD requires that the individual has been exposed to a traumatic event (Criterion A) that involves actual or threatened death or injury, and that their response consists of intense fear, helplessness, or horror (DSM-IV-TR; American Psychiatric Association, 2000). Symptom clusters include: (1) re-experiencing the traumatic event (Criterion B), (2) persistent avoidance (Criterion C) and (3) symptoms of increased arousal (Criterion D). The duration of symptoms must be at least one month (Criterion E) and the disturbance must cause significant impairment of functioning (Criterion E).

PTSD shares a number of clinical features with other emotional disorders and it is rarely diagnosed in isolation (Davidson & Foa, 1991). It has been estimated that 80% of PTSD sufferers receive an additional diagnosis (McFarlane, 1992). Sufferers from PTSD have a greater number of medical conditions than people without PTSD (Ouimette, Cronkite, Henson, Orins, Gima, et al., 2004), including somatisation, chronic pain and poor health (Schnurr & Green, 2003).

Although research suggests that 50-60% of people will experience a traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) only a minority go on to develop PTSD. The risk of developing PTSD after a traumatic event is 8.1% for men and 20.4% for women (Kessler et al., 1995). For younger urban populations an overall higher risk of 23.6% has been reported (Breslau, Davis, Andreski, & Peterson, 1991). Whilst many individuals report traumatic stress symptoms (e.g. intrusive thoughts) shortly after a trauma these symptoms usually subside without intervention (Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). However at least one third of individuals who initially develop PTSD remain symptomatic for 3 years or longer and are at risk of secondary problems such as substance misuse (Kessler et al., 1995).

Clinical researchers have attempted to identify what makes some individuals more vulnerable to developing PTSD. Buckley, Blanchard and Neill (2000) suggest that pre-trauma measures of intelligence (IQ) are predictive of the development of PTSD symptoms. One meta-analysis (Ozner, Lipsy & Weiss, 2003) identified 7 predictors of PTSD which yielded significant effect sizes: (1) previous trauma, (2) prior psychological adjustment (3) family history of psychopathology, (4) perceived life threat during trauma (5) post trauma social support (6) emotional responses at the time of the trauma and (7) dissociation during and immediately after the trauma. Prior characteristics such as previous trauma, family history and prior adjustment yielded the smallest effect size (weighted  $r = 0.17$ ) and dissociation the largest (weighted  $r = 0.35$ ). The authors suggest the mechanism by which dissociation occurs may be influenced by many factors such as hyper arousal mediated by personal and environment factors. They also emphasize the importance of further investigation into the specific processes by which these factors actually serve to influence the development of PTSD.

Theoretical models are important to explain the factors that render an individual vulnerable to the development of PTSD and to account for the range of symptoms experienced. They also have important implications for treatment techniques.

## *Models of PTSD*

### **Social Cognitive Theories**

Social cognitive theories include Horowitz's (1982, 1986) Stress Response Theory and Janoff-Bulman's (1989, 1992) Theory of Shattered Assumptions. They both emphasize the wider impact of the trauma on people's lives and the marked readjustments that need to be made to reintegrate the information with people's existing schemas. Horowitz (1982, 1986) proposes that individuals have a "completion tendency", which is an intrinsic drive to make their mental models coherent with current information. This maintains the trauma in an "active memory" resulting in re-experiencing symptoms (e.g. unwanted intrusions) when the person attempts to integrate the new trauma related information with pre-existing schemas. The individual adopts defensive responses, such as denial, to avoid the intense emotion that accompanies such symptoms. Defensive responses may prevent emotional processing of the event and lead to a persistence of symptoms. Janoff-Bulman's (1989, 1992) framework is consistent with Horowitz's "completion tendency". She advocates that people have intrinsic motivation to make sense of and find meaning in their experiences. She identified significant assumptions that may influence one's response to trauma such as 'the world is benevolent', 'the world is meaningful' and 'the self is worthy' (Brewin & Holmes 2003).

According to these models exposure therapy and cognitive therapy (e.g. challenging erroneous beliefs related to the trauma) is necessary for the trauma to be processed fully and for symptom alleviation (e.g. a reduction in intrusions). These models don't specify the cognitive processes involved in the persistent use of maladaptive coping strategies following trauma that leads to the persistence of symptoms in PTSD (Brewin & Holmes, 2003). While such models indicate the presence of schema driven processing of threat they do not specifically account for the role of attentional bias in PTSD. Treatment does not involve the direct modification of attentional processes.

## **Emotional Processing Theory (EPT)**

The EPT (Foa & Kozak, 1986; Foa & Riggs, 1993) holds that when a situation acquires a meaning of threat it forms a fear network in memory. This model proposes that PTSD is mediated by networks of mental representations of trauma related stimuli, responses (cognitive, behavioural and physiological) and information which links the stimulus and response elements together. Activation of these networks by threatening stimuli (e.g. reminders of the trauma) results in an attentional bias to potential threats, intrusive thoughts, and erroneous beliefs related to the trauma and an unrealistic sense of fear in the individual (Litz & Keane, 1989). The threshold for activation of the fear structure is lower in those with PTSD than individuals without. Attempts to prevent activation of the fear network leads to behavioral and cognitive avoidance. Integration of the trauma memory involves activation of the fear network, so that it is accessible for modification with the presentation of information that is incompatible with the fear network (Brewin et al. 1996). Foa and Rothbaum (1998) suggest that individuals with a negative cognitive processing style and pre-trauma views of the self as incompetent and the world as unsafe may be at greater risk of developing PTSD (Brewin & Holmes, 2003).

Based on this theory exposure allows habituation and permits emotional processing of the event and the need for avoidance is reduced (Foa, Steketee, & Rothbaum, 1989). In support of this theory evidence suggests that exposure is an effective treatment strategy in PTSD (Foa, Feske, Murdock, Kozak, & McCarthy, 1991; Foa, Dancu, Hembree, Jaycox, Meadows, et al., 1999). However other elements such as the hypothesis that improvement in symptoms is related to change in memory structures, has received less support (Brewin & Holmes, 2003). While this theory acknowledges that activation of fear networks leads to an attentional bias towards threat, and that individuals may attempt to avoid threatening stimuli to prevent activation of fear networks, it does not describe in detail the role of attentional processes or levels of attention in the etiology and maintenance of symptoms and treatment does not focus on the modification of attentional processes. Attentional bias appears to be viewed as automatic resulting from “spreading activation” in the fear network.

## **Dual Representation Theory (DRT)**

This model proposed by Brewin, et al., (1996) attempts to integrate social cognitive and fear network approaches by proposing that traumas give rise to two types of memory: a ‘verbally accessible memory’ (VAM) system comprising of information that was consciously processed during the trauma and a ‘situationally accessible memory’ (SAM) system that is automatically accessible through appropriate situational cues. These different types of memory system are used to explain processes involved in emotionally processing the trauma and PTSD symptoms (e.g. intrusive thoughts). VAMs contain information that has received adequate processing and is integrated with autobiographical memories. These memories can be verbally communicated to others but information is limited to what was consciously attended to. Due to the impact of heightened arousal and anxiety on attention, only certain parts of the traumatic event might have received sufficient processing to become verbally accessible (Brewin et al., 1996). Emotions that accompany VAMs include those experienced at the time of the trauma and also those generated by retrospective appraisals. SAMs differ in that they are involuntarily triggered by reminders of the trauma. They contain information obtained from lower level perceptual processing of the trauma that was not consciously attended to. When these memories are activated they are re-experienced in the present and this representation of ongoing threat accounts for the presence of attentional biases. SAMs do not use a verbal code and are difficult to communicate verbally. They are difficult to control and when triggered people can experience intense emotions. Distressing symptoms such as flashbacks are accounted for by SAMs.

Healthy emotional processing involves the management of flashbacks and the resolution of negative cognitions (Brewin & Holmes, 2003). Brewin (2001) has linked these memory structures to findings in cognitive neuroscience proposing that the hippocampus and amygdala provide a plausible neural basis for these separate memory systems. Unlike previous theories this theory has not led to the development of a specific therapeutic model. While preliminary evidence in support of this model is derived from clinical and analogue studies (e.g. Brewin & Saunders, 2001; Holmes, Brewin & Hennessy, 2002) a great deal more research is necessary before the basic ideas are supported. This theory has placed slightly greater emphasis on attentional processes than previous theories. The impact of heightened arousal and anxiety on attention is held responsible for difficulties encoding and retrieving trauma information. SAMs are held

accountable for the persistence of threat and the presence of attentional bias. However the components of this attentional bias are not elaborated on and treatment implications do not implicate the modification of attentional control facilitating emotional processing.

### **Cognitive Model of PTSD**

Ehlers and Clark (2000) have developed a cognitive model, which suggests that PTSD persists when individuals process the trauma in a way that leads to a sense of serious current threat. A feeling of constant threat results from an excessively negative evaluation of the trauma and a disturbance in the memory of the event. This is characterized by poor elaboration and contextualization, strong associative memory and strong perceptual priming (a reduced perceptual threshold for these stimuli). This model provides an account of the importance of cognitive processing styles such as persistent use of rumination and maladaptive behavioral strategies (e.g. avoidance of trauma reminders to control anxiety) in maintaining disorder. Such strategies maintain disorder by preventing cognitive change and otherwise healthy adaptation and restoration of these appraisal and memory systems (Agar, Kennedy, & King, 2006; Brewin & Holmes, 2003).

In accordance with this theory treatment implications are proposed as follows: (1) elaboration and integration of the trauma memory (2) modification of problematic appraisals of the trauma and (3) cessation of dysfunctional behavioral and cognitive strategies that prevent memory elaboration and lead to a persistence of symptoms. This model proposes that disrupted memory may be maintained by a number of maladaptive coping strategies, however again an important role is assigned to memory and attentional processes are not the direct focus of treatment.

### **The Metacognitive Model of PTSD**

The Metacognitive Model of PTSD (Wells 2000; Wells & Sembi, 2004a) is based on the S-REF Model (Wells & Matthews, 1994) which emphasizes the importance of attentional control in emotional disorders. The S-REF model suggests that how individuals respond to thoughts is more important than the content of thoughts. According to the Metacognitive Model for PTSD (Wells, 2000) stress symptoms such as intrusive thoughts are normal and necessary after trauma. They are a sign that an individual is attempting to emotionally process the trauma and adjust to the event in a way that enhances future

coping. For most people this process (reflexive adaptive process, RAP), continues uninterrupted and symptoms naturally subside. However symptoms persist and lead to PTSD when this process is interrupted by a self-focused style of thinking called the cognitive attentional syndrome (CAS). The CAS in PTSD consists of: 1) worrying, rumination and 'gap filling' (going over memory) 2) attentional strategies of threat monitoring (e.g. scanning the street for signs of danger) and 3) maladaptive coping strategies (e.g. checking, avoidance, thought suppression). The CAS causes persistent threat related processing called "trauma lock" and is driven by beliefs about thinking (metacognitive beliefs) (Wells, 2009; Wells & Sembi, 2004).

Two types of metacognitive belief, positive and negative, are implicated (Wells, 2000). Positive metacognitive beliefs relate to the perceived usefulness of strategies such as worry (e.g. 'if I worry I will be prepared'), rumination (e.g. 'I must go over the event to make sense of it'), gap filling (e.g. 'It is important not to have gaps in my memory') and threat monitoring (e.g. If I look out for signs of danger I will prevent another attack). Negative metacognitive beliefs concern the uncontrollability, danger and negative evaluation of thoughts (e.g. 'my worrying is uncontrollable'; 'If I keep thinking about the trauma I will lose my mind'). Such beliefs and the persistent use of maladaptive thought control and attentional strategies are an attempt to regulate emotion but they backfire as they maintain a sense of threat and result in persistence of traumatic stress symptoms, and the development of PTSD.

### **Evidence for the Metacognitive Model of PTSD**

This model predicts that worry and rumination disrupt natural recovery and lead to an increase in symptoms and the development of PTSD. The use of worry and rumination as coping strategies to control intrusive thoughts has been positively associated with a vulnerability to stress and psychopathology (Wells & Davies, 1994). Two studies using analogue samples manipulated post stress-exposure and found that increased worry led to an increase in intrusive thoughts (Butler, Wells, & Deswick, 1995; Wells & Papageorgiou, 1995). Warda and Bryant (1998) reported that survivors of motor vehicle accidents (MVA's) who developed acute stress disorder (ASD) used worry and punishment based thought control strategies in comparison to those without ASD. In a prospective study of survivors of MVA's, worry as a thought control strategy predicted the development of PTSD three months later (Holeva, Tarrier & Wells, 2001).

Roussis and Wells (2006; 2008) provided further support for the model when they found that thought control strategies and metacognitive beliefs were positively associated with stress symptoms using student samples. Roussis and Wells (2006) assessed college student (n = 171) cross-sectionally and found that ‘worry’ and positive and negative metacognitions were positively associated with stress symptoms. Roussis and Wells (2008) assessed college student (n = 101) twice over a three month period. Consistent with predictions of the MCT Model of PTSD (Wells, 2000) the use of worry as a thought control strategy was positively predictive of stress symptoms.

A longitudinal study found rumination after stressful life events was associated with increased levels of subsequent stress symptoms and depression (Nolen-Hoeksema, 2000). A study conducted with children (O’Kearney, Speyer, and Kenardy, 2007) found that children who continually went over the event in an attempt to make sense of it were more likely to experience an increase of intrusive thoughts.

Bennett and Wells (2010) found that beliefs about the trauma predicted PTSD symptoms while memory disorganisation, often believed to be significant in PTSD did not. This is in agreement with a previous study (van Minnen, Wessel, Dijkstra & Roelofs, 2002) which failed to find a significant association between memory disorganization and posttraumatic stress symptoms. These findings suggest that instead of attempting to integrate the trauma memory, it may be more effective to target metacognitive beliefs and the unhelpful coping strategies that arise from them.

### **Implications for Treatment**

Wells (2000) proposes treating PTSD by modifying and removing features of the CAS such as worry, rumination and threat monitoring. Wells and Sembi (2004a) describe the metacognitive treatment for PTSD. Patients are socialized to the metacognitive model of PTSD and the experience of symptoms such as intrusive thoughts are normalized. Individuals learn a new way of responding to their thoughts through techniques such as detached mindfulness and attention modification. Unhelpful coping strategies (e.g. worrying, gap filling, threat monitoring) are banned and metacognitive beliefs (e.g. “I must not have gaps in my memory”), are challenged and modified.

The effectiveness of MCT for PTSD has been demonstrated in several studies (e.g. Colbear & Wells, 2008; Wells & Sembi, 2004b; Wells, Welford, Fraser, King, Mendel, et al. 2008). In all studies the length of treatment was relatively short (5 – 11 sessions) and was associated with significant reductions in traumatic stress symptoms, anxiety and depression. This treatment may have a number of potential advantages over standard CBT. Often patients find exposure work distressing due to an initial increase in anxiety and stress symptoms (e.g. Tarrier, Pilgrim, Sommerfield, Farragher, Reynolds, et al., 1999). Metacognitive therapy for PTSD differs from standard CBT, in that it does not involve the use of exposure (imaginal reliving) (e.g. Foa & Kozak, 1986) and may be more acceptable to the patient. This type of therapy may also reduce the possible risk of vicarious traumatization of the therapist.

### ***Interim Summary***

In summary, even though general cognitive models of anxiety give attentional processes a central prominence, specific cognitive models of PTSD predominantly focus on memory processes and little or no emphasis is placed on attentional processes. Treatment is aimed at reintegration of the trauma memory through exposure and cognitive restructuring. An exception is the Metacognitive Model of PTSD (Wells, 2000) based on the S-REF model where the role of attentional control is given central importance and little or no emphasis is placed on the role of memory in the maintenance of disorder.

### ***Attentional bias in PTSD***

It has been proposed that voluntary strategic processing is an important influence on attentional bias and is considerably more widespread than automatic bias in emotional disorder (for a review see Matthews & Wells, 2000). What is the evidence base supporting a role of attention in PTSD? Buckley, et al., (2000) reviewed studies assessing attentional bias in PTSD using a variety of experimental tasks, and concluded that individuals with PTSD show an attentional bias towards trauma related stimuli, indicative of strategic processing. Evidence for the presence of automatic processing was inconclusive.

Some studies have suggested that there is an attentional bias operating very early in processing (e.g. Harvey et al., 1996; Bryant & Harvey, 1997). Harvey et al., (1996) used the masked Stroop Task, which indicated slowed color naming following the masked

presentation of trauma words in motor vehicle accident (MVA) survivors with PTSD in comparison to MVA survivors without PTSD and non-MVA participants. These results suggested attentional bias for threat could be demonstrated at a preconscious stage of processing. Stimuli presentation was rapid aimed to target preconscious automatic processes.

In a follow up study Bryant and Harvey (1997) found similar effects using the Modified Dot Probe Task, which illustrated speeded reaction time to threat words. They reported a facilitation effect for threat words relative to neutral words in an MVA- PTSD group. This facilitation effect was not present in the two comparison groups. However, comparable results were not obtained using an auditory recognition task (Trandel & McNally, 1987). This task requires subjects to listen to a binaural audiotape consisting of white noise with target words of different emotional valence played intermittently over the noise. Individuals with PTSD did not identify more threat words in comparison to other groups. Strong conclusions can't be drawn as the number of studies and number of participants is small. Further studies concerning automatic processes are warranted.

Most of the literature investigating attentional bias in PTSD has used the (unmasked) modified Stroop task (Buckley et al., 2000). Predictions in relation to this task include: 1) PTSD patients will take more time to name the color of trauma words than non-trauma words 2) This effect should be specific to PTSD i.e. traumatized individuals who don't suffer from PTSD and other anxious groups should not show this interference effect. Foa, Feske, Murdock, Kozak and McCarthy (1991) found that rape victims with PTSD took longer to respond to rape specific words relative to rape victims without PTSD and a non-traumatized control group. In comparison to the control groups the PTSD group illustrated differential responding to type of word as well e.g. slower response times to rape specific words than other words. Cassidy, McNally and Zeitlin, (1992) found similar results, rape victims with PTSD showed delayed response times for the PTSD words, while the control groups (rape victims without PTSD and non-traumatized controls) did not. These effects have also been demonstrated in MVA survivors with PTSD and survivors of a ferry accident (e.g. Bryant & Harvey, 1995, Beck, et al., 2001; Thrasher, Dalgleish, & Yule, 1994).

Bryant and Harvey (1995) found that an MVA-PTSD group showed stronger interference for strong threat words in comparison to the control groups (an MVA- driving

phobia group and a low anxiety group) who did not demonstrate this interference effect. Beck et al., (2001) found that colour naming was significantly slower in a PTSD/pain group in comparison with two other groups (a no PTSD/Pain group and a no PTSD/ No pain group). The PTSD/Pain group showed significant response delays to both accident and pain related words, whereas the No PTSD/pain group showed delays to pain stimuli only. Similar effects have been demonstrated for war veterans (e.g. McNally, English, & Lipke, 1993; McNally et al. 1990), and burn victims (Sveen, Dyster-Aas, & Willebrand, 2009; Willebrand, Norlund, Kildal, Gerdin, Ekselius, et al., 2002).

In summary, there is evidence of attentional bias for threat and emotion material in PTSD. This effect has been demonstrated in different attention-task paradigms and following different forms of trauma exposure. There is limited support for the concept that such biases operate automatically due to limitations of the paradigms used that cannot rule out controlled processing. However, the distinction between levels of control of attention is important as it presents different clinical implications and gives rise to different treatment techniques. These techniques will focus on either retraining automatic processes or on practicing flexible control of attention irrespective of the occurrence of events.

### ***Modification of Attentional Biases***

A number of treatment techniques have been developed from theoretical models (e.g. Mathews & MacLeod, 2002; Wells & Matthews, 1994) with the aim of modifying attentional bias and improving attentional control. These different attention training techniques are grounded in the two different theoretical models. Mathews and MacLeod (2002) advocate the use of an implicit technique targeting automatic processes. Wells (1990) has developed an explicit attention training technique targeting strategic processes. While he does not rule out the contribution of automatic processes he argues that strategic processing is predominantly responsible for perseverative processing and failure to down regulate distressing emotion.

### **Attentional Training Technique (ATT)**

The ATT (Wells, 1990) is an externally focused auditory exercise, derived from the S-REF Model. It was developed with the aim of treating the CAS by reducing self-focus and directly modifying the control of attention. This allows for the processing of corrective

information and facilitates metacognitive change. Training in this strategy following exposure to trauma, may disrupt preservative processing (e.g. rumination) allowing healthy emotional processing to take place and reduce symptoms such as intrusive thoughts. The ATT consists of three categories of auditory attentional exercises: (1) selective attention (focusing attention on individual sounds and spatial locations), (2) attention switching (rapidly shifting attention between different sounds and spatial locations and (3) divided attention (attending to as many simultaneous sounds and spatial locations as possible). The procedure is designed so that it consistently loads attention. Between 6 and 9 sounds are typically introduced in combination with spatial locations.

Participants are asked to focus on a visual fixation point and remain visually focused throughout the exercise. The aim is to follow the instructions irrespective of intrusive thoughts. They should be treated as additional noise, which are not given attentional priority. ATT should be presented with a treatment rationale individually tailored to the specific disorder. This is important to facilitate understanding of the technique and enhance motivation for homework compliance. It should not be used as a coping strategy or as a form of distraction or avoidance of intrusive thoughts (Wells, 2009).

Table 1 summarizes ten research studies investigating the impact of ATT in a variety of samples. A growing body of research has investigated the impact of ATT for a variety of emotional disorders including: panic disorder (Wells, 1990; Wells, White & Carter, 1997), social phobia (Wells et al., 1997; McEvoy & Perini, 2009), hypochondrias (Papageorgiou & Wells, 1998; Cavanagh & Franklin, 2000), major depression (Papageorgiou & Wells, 2000; Siegle, Ghinassi, & Thase, 2007), obsessional intrusive thoughts (Watson & Purdon, 2008), treatment of auditory hallucinations (Valmaggia, Bouman, & Schuurman, 2007) and traumatic stress symptoms (Nassif & Wells, 2011).

Two studies have supported the effect of ATT in three patients who met the DSM III-R criteria (American Psychiatric Association, 1987) for Panic Disorder (PD). The first study (Wells, 1990) used a reversal design and revealed that a procedure evoking external attentional focus eliminated panic attacks and reduced self-reported tension; whereas self-focused autogenic training (Schultz & Luthe, 1969) increased the frequency of panic attacks and the intensity of anxiety. Wells et al., (1997) replicated these treatment effects of ATT in a systematic replication case series (Sidman, 1960) using a withdrawal design.

Follow up data indicated symptom reduction was maintained at follow-up. Limitations of these studies include the small sample size, use of self-report measures and the possible role of non-specific factors such as placebo effects.

Another reversal methodology (Wells et al., 1997) supported the effects of ATT in reducing anxiety and negative beliefs in a diagnosed case of social phobia. Similar to a previous study (Wells, 1990) this involved reversing the mechanisms of ATT by a self-focused manipulation and then successfully reducing symptoms again by reintroducing ATT. Results were maintained at follow-up. McEvoy and Perini (2009) investigated whether supplementing cognitive behavioral group therapy (CBGT) with ATT could lead to significant improvements across outcome measures in comparison to a control group who received CBGT with relaxation training (RT). They reported that both groups showed similar improvement across outcome measures. However this study was flawed as both conditions received CBGT based on a cognitive model of social phobia (Clarke & Wells, 1995) which involves shifting attention to external focus which means that both groups received an externally focused attentional manipulation of some kind, which is likely to limit the “added value” of ATT.

Papageorgiou and Wells (1998) investigated the effects of ATT in a case series with three patients who satisfied DSM-III-R (APA, 1987) for hypochondrias. They received an average of 9 sessions and were instructed to practice twice a day. ATT produced clinically significant effects in self-report measures of affect, illness related behavior, cognitions and somatosensory amplification. Treatment gains were maintained at follow-up. Measures of self-focused attention indicated that the ATT procedure appeared to act on attentional processes as hypothesized.

Cavanagh and Franklin (2000) conducted a randomized controlled trial evaluating the impact of ATT on hypochondriasis. They allocated patients to six sessions of ATT and a no treatment control. The ATT group showed a significant improvement in a range of outcome measures in comparison to the control group who showed no improvement. Outcome measures included degree of health worry, disease conviction and behavioural measures at post-treatment and results were maintained at 18 months follow up.

Papageorgiou and Wells (2000) evaluated the effectiveness of ATT in the treatment of recurrent major depression in a consecutive single case series of 4 patients. They were assigned to no treatment baselines of 3 to 5 weeks and received 5 to 8 weekly sessions of

ATT. All patients showed clinically significant reductions in anxiety and depression, and scores fell within the normal range on completion of ATT. Attentional and metacognitive factors showed similar improvements. Treatment gains were maintained at follow up.

Siegle, Ghinassi and Thase (2007) randomly assigned depressed patients to ATT plus treatment as usual or just treatment as usual. Patients who received 2 weeks of the ATT showed significantly greater improvements in depression and rumination than those receiving treatment as usual. In a sub sample the neuropsychological effects were examined using functional magnetic resonance imaging (fMRI) and pupil dilation. Preliminary fMRI data showed neuropsychological changes in amygdala activity in the attention training group. Again the small sample size limits the generalisability of results.

Valmaggia, Bouman and Schuurman (2007) assessed the impact of ATT on auditory hallucinations in a patient with a diagnosis of schizophrenia who had failed to respond to earlier treatment. They appeared to find an improvement in symptoms but no firm conclusion could be drawn as no baseline information had been collected. This patient had also received CBT and the possibility of carry over effects must be considered.

Watson and Purdon (2007) designed a study to investigate the effectiveness of ATT in the reduction and reappraisal of intrusive thoughts in an analogue sample of 108 individuals with obsessive compulsive symptoms. Participants were randomly assigned to different groups: an ATT condition (one session), a thought replacement condition, a distraction condition and a no intervention condition. They asked students to identify a distressing intrusive thought and spend seven minutes monitoring their stream of consciousness for the occurrence of that thought. They then obtained ratings of distress associated with that thought, and rated their success at dismissing that thought from consciousness. They reported none of the active interventions including ATT were superior to the control. However results should be interpreted with caution. It is likely that insignificant results were due to methodological issues. ATT is not intended for use as a coping strategy, as this transforms it into a cognitive avoidance strategy (Wells, 2009). It is unclear if it was administered with a disorder specific rationale and no homework practice was involved, moreover one session of ATT is unlikely to be an effective dose.

Nassif and Wells (2011) explored the impact of ATT on traumatic stress symptoms in a sub-clinical sample of university students (n = 42). They included students who had

experienced a stressful life event and still experienced intrusive thoughts about it that they rated as distressing. Participants were asked to narrate their stressful life event and record the number of intrusions they experienced when listening back to it. The experimental group received ATT (3 to 4 sessions) and the control group completed a filler task. Both groups were then asked to listen to their stressful narrative for a second time and re-rate the number of intrusion they experienced. The ATT group showed a reduction in the incidence of intrusions that was three times greater in the group that received ATT compared to the control group and the effect size was large ( $d = 0.95$ ). They also reported an increase in attention flexibility and a reduction in self-focus, supporting the theoretical basis for ATT. The study was limited by the use of self-report measures and the small sample size.

### **Attention Bias Modification Treatment (ABMT)**

ABMT has been described as a new and promising treatment for anxiety disorders (Bar-Haim, 2010; Hakamata, Lissek, Britton, Fox, Leibenluft, et al., 2010). Central to the rationale of ABMT is the idea that cognitive tasks (e.g. The Dot Probe Task) that have demonstrated the existence of attentional bias in anxious individuals can be implicitly modified to manipulate attention biases and reduce anxiety (Bar-Haim, 2010). It is hypothesized that attention bias in anxiety involves both cortical and subcortical processes (Dickie & Armony, 2008). It is suggested that techniques targeting top-down processes (e.g. CBT, ATT) may fail to modify this subcortical component which may be more efficiently reached by ABMT with its more repetitive computer based training methods (LeDoux, 2000; Pine, Helfenstein, Bar-Haim, Nelson, & Fox, 2009).

Most studies (e.g. Mathews & MacLeod, 2002) use variants of the dot probe task. Table 2 summarizes 11 studies using this task. Attentional bias towards threat is revealed when participants are faster at responding to probes that replace threat related stimuli than neutral stimuli. In a training protocol intended to induce threat attentional bias away from threat and towards neutral stimuli, targets appear more frequently at the location of the neutral stimuli than the threat. These tasks are based on the assumption that an implicitly learned bias away from threat is induced through a systematic repetition of 10's or 100's of trials. A number of studies have investigated the impact of ABMT. In a meta-analysis Hakamata et al. (2010) reviewed 12 RCT's to summarise the effect of ABMT on anxiety. Data from 12 publications ( $n = 467$ ) met inclusion criteria and indicated that ABMT produced greater reductions in anxiety than control training, with a medium effect size

(Hedge's  $d = .61$ ,  $p < 0.001$ ). These studies have assessed the impact of ABM in clinical and non-clinical populations.

Two studies have investigated the impact of AMBT in the treatment of pathological worrying. Amir, Beard, Burns and Bomyea, (2009a) reported that 8 sessions of AMBT reduced attentional bias and decreased scores on self-report measures of anxiety and depression. Participants who met DSM criteria for GAD were randomly assigned to an Attention modification program ( $n = 14$ ) (AMB) and an attention control condition ( $n = 15$ ) (ACC). Each condition involved 240 trials. For the AMB group on 66% of these trials probes directly followed the neutral word. In the ACC group during trials the probe appeared with equal frequency in the position of the threat and neutral word. This study was limited by the small sample size and lack of follow up data.

Hazen, Vasey and Schmidt (2009) found similar results in a sample of 24 university students reporting severe worry, included on the basis of a score of 60 or above on the PSWQ. They were randomly assigned (12 in each group) to receive 5 (30 minute) sessions of either attentional retraining or sham training. There were 216 trials on each session. The treatment group received attentional retraining for threat stimuli (ARTS) procedure; probes followed the neutral word on nearly all trials (similar to MacLeod et al. 2002.) All included one threat and one neutral word. On 204 (94.4%) of these trials, the probes appeared in the position of the neutral words. In the SHAM ARTS condition probes appeared in equal frequency in the position of threat-relevant and neutral words. Effect sizes indicated training was perhaps more effective for general anxiety symptoms than worry (see table 2). The small sample size meant an inability to test whether or not changes in symptoms due to treatment were mediated by changes in threat bias. Another limitation is the lack of follow up data beyond one week post assessment.

Three dot probe studies using neutral and disgust faces as cue stimuli applied ABM protocols to reduce social anxiety. Schmidt, Richey, Buckner and Timpano (2009) applied AT protocols to reduce social anxiety in patients ( $N = 36$ ) with a primary diagnosis of generalized SAD. Treatment involved 8 sessions over four weeks, each had 160 trials (128 critical trials) Participants were randomly assigned to either an AT group (designed to reduce vigilance for threat) or to a control dot-probe task group. 72% in the AT group no longer met diagnostic criteria for SAD compared to 11% in the control group. This study was limited by the small sample size.

Amir, Beard, Taylor, Klumpp, Elias and Burns (2009b) found similar results suggesting that AMP facilitated attention disengagement from threat from pre to post-assessment and reduced clinician and self-reports of anxiety. Both studies found that treatment effects were maintained at four month follow up. Using a similar design, Amir, Weber, Beard, Bomyea and Taylor, (2008), reported the AMP group showed significantly less attention bias to threat after training and lower levels of anxiety in response to a public speaking challenge than did the participants in the ACC group. Their speeches were also judged as superior in quality in comparison to the control group.

Finally, Dandeneau and Pruessner (2007) examined the impact of ABM training on individuals with low self-esteem. They used a visual search task to repeatedly train participants to locate a single smiling face in a matrix of frowning faces. They found that those who were trained to modify their attentional bias to reduce vigilance for social threat showed lower self-reported stress related to their final exams.

Following from the work of MacLeod et al., (2002), Elder, Ricon and Bar Haim (2008) investigated the association between attention bias and anxiety in a sample of 7 – 12 year old children (N = 26). Children were randomly assigned to two groups (Standard training away from threat and standard training towards threat). They successfully induced a bias in non-anxious children who received training towards threat in comparison to the control group. Both groups reported increased depression scores following stress-induction. Only children in the attention training group reported an increase in anxiety scores.

Klump and Amir (2010) attempted to induce bias towards threat in anxious students. They had three conditions: 1) standard training away from threat, 2) placebo training condition and 3) training towards threat. The third condition was to test the prediction that enhanced attentional control rather than a more efficient attentional disengagement is achieved through training. Response time in relation to attentional training was largely inconclusive. Both groups who were trained to attend toward and away from threat exhibited a relative decrease in anxiety during a subsequent speech challenge compared to a control group.

In a different line of research investigating the potential preventative impact of ABMT on anxiety, See, MacLeod and Bridle (2009) administered dot probe training to Singaporean students before moving to Australia. Half of the participants were randomly assigned to attention training away from threat words and half received placebo control training, not designed to change attention patterns. Training appeared to reduce anxiety response to the upcoming stressor and reduced state anxiety upon arrival in Australia.

### **Summary of Both Techniques and Future Directions**

A number of methodological limitations are evident from these studies. Both techniques cite the use of standardised outcome measures. These may be subject to response bias and future research should include more objective measures. The inclusion of an emotional attention set shifting task would be useful to examine the impact of ATT and AMBT on attentional control.

Hakamata et al., (2010) reviewed AMBT studies and reported that procedural factors predicted response in that the nature of stimuli and their location moderated outcome. Studies that used a top bottom stimulus presentation achieved better results than those using a side-by-side presentation, as did studies that used words instead of pictures. They also reported that length of training appeared to moderate effects on attention bias but not anxiety symptoms. This indicates the clinical meaningfulness of AMBT is uncertain and warrants further investigation. The use of analogue populations greatly limits generalisability of results. Only one study screened all participants using DSM criteria (Amir et al., 2009). Lack of follow up data reported by AMBT studies makes it difficult to estimate whether effects are long lasting. Lasting effects of training on both attention bias and anxiety should be measured in follow-up assessments.

In contrast, most ATT studies have employed clinical populations and have reported significant reductions in symptoms and change in beliefs (Papageorgiou & Wells, 2000) with treatment gains maintained at follow up (e.g. Canvanagh & Franklin, 2000). A pilot study (Siegle, Ghinassi, and Thase, 2007) has also successfully examined the neuropsychological effects of ATT on depressed patients, using functional magnetic resonance imaging (fMRI) and reported changes in amygdala activity in the brain. However, the small sample sizes and lack of control groups limit interpretation of the data.

It is unclear for both techniques how many training sessions or trials would yield the highest therapeutic gain. In ABMT there is also considerable variability in the number of sessions and the number of trials per session. This ranges from 7500 trials delivered over ten sessions (Mathews & MacLeod, 2002) to a single session of 160 trials (Amir et al., 2008) that lasts approximately 8 minutes. The number of sessions of ATT, including number of practice sessions has also varied between studies. As few as three to four sessions has been shown to be effective in significantly reducing traumatic stress symptoms in a student population with subclinical symptoms (Nassif & Wells, 2011).

While ATT was originally designed as part of a treatment package these studies support its effectiveness as a stand-alone treatment approach (e.g. Wells et al., 1997). AMBT on the other hand appears to have been developed as a standalone technique. It is currently unclear if AMBT should remain a standalone treatment or become an established part of existing treatment. Future research of AMBT should examine whether threat content should be congruent with the type of specific anxiety disorder being treated. It is also unclear if the contingencies being trained should remain implicit or be explicitly spelled out for patients. For AMBT it is unclear whether anxiety reducing effects are specific to threat-related attentional training or a more general attention control process. The attention training bias modification studies generally do not include systematic testing of the general attentional control hypothesis. ATT studies have incorporated measures of self-focus and attention flexibility to test the mechanisms that may mediate symptom reduction (e.g. Nassif & Wells, 2011). Future research should perhaps look at comparing treatment as usual with treatment as usual and attention modification.

### ***Conclusions***

The effects of attentional bias in PTSD have been widely established (e.g. Buckley et al. 2000). The present paper distinguished between two level of control of attention: automatic and strategic. Most cognitive models of anxiety related bias implicate automatic processes but the S-REF model implicates strategic processing. Most cognitive models of PTSD apart from the metacognitive model implicate memory rather than attention. They do not give a comprehensive account of attentional processes. Treatment predominantly involves prolonged exposure and cognitive restructuring, giving little emphasis to attentional control. The metacognitive model of PTSD (Wells, 2000) suggests that instead of focusing on the integration of trauma memory, treatment should reduce threat

monitoring, strengthen executive control processes (to reduce worry and rumination) and ban maladaptive coping strategies (e.g. avoidance). Hence, the metacognitive model of PTSD (Wells, 2000; Wells & Sembi, 2004a) aims to modify attentional bias, as a strategic process, by targeting the CAS, an inflexible attentional style of thinking that maintains PTSD. A growing body of research offers support for the theoretical basis of the model (e.g. Roussis & Wells, 2006, 2008) and treatment effectiveness for PTSD (e.g. Colbear & Wells, 2008).

A review of the studies of PTSD (e.g. Buckley et al. 2000) indicates that attentional bias occurs at a strategic stage in processing while studies investigating automatic attentional bias are inconclusive. Commonly used tasks to measure attentional bias such as the Stroop task and the dot probe have been criticized (Derryberry & Reed, 2002) and it has been suggested (Johnson, 2009) that an emotional attention set shifting task would be a useful adjunct in the assessment of attentional control in emotional disorders.

Treatment techniques have been developed from theoretical models of attentional bias (e.g. Mathews & MacLeod, 2002; Wells & Matthews, 1994) with the aim of modifying attentional bias and improving attentional control. Mathews and MacLeod (2002) advocate the use of an implicit technique targeting automatic processes. Wells and Matthews (1994) propose attentional bias to threatening stimuli is related to metacognitive knowledge and the individual's strategies they consciously employ in an attempt to regulate their emotion. Wells (1990) has developed an explicit attention training technique targeting strategic processes.

Evidence supporting the effects of ATT appears to be more consistent than for AMBT. A greater number of studies have used clinical samples and the effects have been maintained at follow up but sample sizes are small. Techniques such as these may be important for individuals suffering from PTSD who can't tolerate the initial distress and increase in symptoms associated with techniques such as exposure and drop out of therapy. Treatment focusing on modifying attention is an important avenue for future research. Randomised controlled trials in both clinical and subclinical samples evaluating the impact of attentional training on traumatic symptoms are warranted. These studies should use objective measures in conjunction with standardized self-report measures and results should be investigated over longer term follow-up.

**Table 1: Summary of ATT studies reviewed**

| Study                            | Disorder/<br>Symptoms | N  | Sample   | Screening<br>Measure(s) | Design  | Intervention(s)  | Outcome<br>Measure(s)   | Results  | FU Data<br>(Months) |
|----------------------------------|-----------------------|--|----------|-------------------------|---|--|---|--|---------------------|
| Wells (1990)                     | PD                    | 1  | Clinical | SCID                    | Single case study<br>(2 treatment A-B-C-B design)   | No TR BL<br>ATT plus HW<br>Autogenic training<br>ATT plus HW   | Panic Diary<br>PQRST,<br>STAI-S<br>Anxiety<br>Likert scale (0 – 10) | No longer satisfied DSM-III-R criteria for PD.   | 3 & 12              |
| Wells, White & Carter (1997)     | PD<br>SP              | 3  | Clinical | SCID                    | Systematic replication case series<br><br>(2 PD: A-B-A 'withdrawal' design)<br><br>(1 SP: A-B-A-C-A-B 'true reversal' design) | <b>Pt 1:</b> No TR BL<br>ATT plus HW<br><br><b>Pt 2:</b> No TR BL<br>ATT plus HW<br>No TR<br><br><b>Pt 3:</b> No TR BL<br>ATT plus HW<br>No TR<br>Autogenic training<br>No TR<br>ATT plus HW | Panic Diary<br>BAI<br>Rating Scales                                 | No longer satisfied DSM-III-R criteria for PD or SP.   | 3- 6                |
| Papageorgiou & Wells, (1998)     | Hypochondriasis       | 3  | Clinical | SCID                    | Single case series (A-B-A design )  | 8 – 10 weekly sessions plus HW practice  | BAI, GDS, SSAS, VAS   | No longer satisfied DSM-III-R criteria for Hypochondriasis.  | 6                   |
| Papageorgiou & Wells, (2000)     | Recurrent MD          | 4  | Clinical | SCID                    | Single Case Series (A-B design)   | 5 -8 weekly sessions of ATT, plus HW practice  | BDI, BAI, ATQ, RS, PSCS, MCQ  | No longer satisfied DSM-III-R criteria for MD<br>Clinically significant improvements (SCID, BDI, BAI, ATQ, RS, PSCS & MCQ) | 3, 6 & 12           |
| Siegle, Ghinassi, & Thase (2007) | MD                    | TAU plus ATT (n = 15)<br><br>TAU (n = 8) | Clinical | SCID                    | RCT   | TAU (medication, group psychotherapy, milieu therapy)<br><br>TAU plus ATT  | BDI-II, RRS<br>fMRI, pupil dilation                                 | Significant reduction in symptoms and depressive rumination.<br>Neuropsychological changes in ATT group                    | No FU               |

|  |   |   |          |                        |                    |   |  |   |       |
|--|---|---|----------|------------------------|--------------------|---|--|---|-------|
| Valmaggia, Bouman, & Schuurman, (2007) | Auditory Hallucinations<br>(Diagnosis of Schizophrenia) | 1   | Clinical | PSYRATS                | Single case series | 8 sessions plus HW  | PSYRATS  | Reduction in AH subscale (PSYRATS)<br>Change in content, tone, perceived mastery of voice                             | No FU |
| Watson & Purdon (2008)                 | Obsessional Intrusive Thoughts                          | 108<br>ATT (n = 25)<br>TRI (n =26)<br>DI (n =29)<br>CON (n =28) | Analogue | OCI                    | RCT                | 1 session ATT (no HW)   | OCI, III, DASS-21                                      | All groups showed similar decreases across measures.<br><br>List of several reasons for absence of group differences. | No FU |
| McEvoy & Perini, 2009                  | Social Phobia   | 81<br><br>CBGT + ATT (n =39 )<br><br>CBGT + CON (n = 42)        | Clinical | SCID                   | RCT                | 12 groups (6 in each condition)<br><br>7 weekly 4 hour sessions of CBGT with either ATT or relaxation | CIDI-Auto, SPS, SIAS, BDI, BDI-II, ACS, MCQ, WAI, GAS. | Both groups achieved similar improvements on all measures.  | No FU |
| Nassif & Wells, 2011                   | Intrusive Thoughts                                      | 42<br><br>ATT (n = 21)<br>CON (n = 21)                          | Analogue | Distress rating of 30% | RCT                | 3 – 4 sessions  | Number of intrusions DMQ                               | Reduction in number of intrusions in ATT group compared to control  | No FU |

Note: N =

Sample Size; FU = Follow-up; PD = Panic Disorder, SCID = Structured Clinical Interview for DSM-IV Axis IV disorders; TR = treatment; BL = baseline; ATT = Attention training Technique; HW = homework; PQRST = Personal Questionnaire Rapid Scaling Technique; STAI-S = State-Trait Anxiety Inventory, State Version; DSM –III-R = Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised; SP = Social Phobia; BAI = The Beck Anxiety Inventory; GDS = Geriatric Depression Scale; SSAS = Somatosensory Amplification Scale; VAS = Visual Analogue Scale (0 – 100); MD = Major depression; BDI = The Beck Depression Inventory; ATQ = Automatic Thoughts Questionnaire; RS = The short form of the Rumination Scale; PSCS = The Private Self Consciousness Scale; MCQ = the Meta-cognitions Questionnaire; RCT = Randomized Controlled Design TAU = Treatment As Usual; RRS = Ruminative Response Style Questionnaire; fMRI = Functional magnetic resonance imaging; PSYRATS = The Psychotic Symptom Rating; CON = control; DI = distraction instructions; TRI = thought replacement instructions; OCI = Obsessive Compulsive Inventory; III = Interpretation of Intrusions Inventory; DASS-21 = Depression Anxiety Stress Scales – 21; GCBT = Group Cognitive Behavioural Therapy; CIDI – auto = Composite International Diagnostic Interview-Auto; SPS = Social Phobia Scale; SIAS = Social Interaction Anxiety Scale; ACS = Attention Control Scale; WAI = The 36-item Working Alliance Inventory; GAS = The 20 –item Group Attitude Scale; DMQ = The Detached Mindfulness Questionnaire.

**Table 2: Summary of AMBT studies using the Modified Dot Probe Task**

| Study <sup>1</sup>              | Population                | N                         | Paradigm (Stimuli) | Threat content | Attention redirection | No of sessions (trials) | Stressor        | Outcome Measure   | Results Hedges d <sup>3</sup> Post-Training (Post-stressor) |
|---------------------------------|---------------------------|---------------------------|--------------------|----------------|-----------------------|-------------------------|-----------------|---|---|
| Mathews & MacLeod (2002, Expt7) | High anxious              | 29<br>ABMT=15<br>CON=14   | Dot Probe (words)  | Negative       | Neutral               | 10 (750)                | Exam            | STAI-T  | 5.79***   |
| Mathews & MacLeod (2002, Expt8) | High anxious              | 30<br>ABMT=14<br>CON=16   | Dot Probe (words)  | Negative       | Neutral               | 8 (600)                 | None            | STAI-T  | 5.76  |
| Amir et al. (2008)              | Socially anxious students | 48<br>ABMT=22<br>CON = 26 | Dot-Probe (faces)  | Disgust        | Neutral               | 8 (160)                 | None            | STAI-T,<br>LSAS<br>SPAI,<br>BDI-II<br>HAM-D<br>SDS          | -0.10<br>0.43<br>-0.33<br>1.12***<br>.058<br>.89**          |
| Amir et al. (2009a)             | GAD Patients              | 29<br>ABMT=14<br>CON =15  | Dot-Probe (faces)  | Negative       | Neutral               | 8 (280)                 | None            | STAI-T<br>STAI-S<br>BDI-II,<br>WDQ<br>PSWQ<br>HRSA<br>HAM-D | 1.06**<br>1.63***<br>0.09<br>0.72<br>0.44<br>0.99*<br>0.43  |
| Amir et al. (2009b)             | High anxious              | 94<br>ABMT=47<br>CON=47   | Dot-Probe (faces)  | Disgust        | Neutral               | 1(128)                  | Public speaking | STAI-S  | 0.11 (1.07)***  |

<sup>1</sup> Unless otherwise stated studies used a between subjects design

<sup>2</sup> Control groups go through a normal dot-probe task (probe appears in either location with equal frequency)

<sup>3</sup> Mean Effect Sizes( Hedge's d), definition of categories for d: no effect (0 – 0.2), low effect (0.2-0.5), medium effect (0.5-0.8), and high effect (>0.8)

|                         |                           |                           |                   |          |                  |          |               |  |  |
|-------------------------|---------------------------|---------------------------|-------------------|----------|------------------|----------|---------------|--|--|
| Hazen et al. (2009)     | High Worry Students       | 24<br>ABMT=12<br>CON =12  | Dot Probe (words) | Negative | Neutral          | 5 (1080) | None          | PSWQ<br>HRSA<br>BDI                      | 1.10<br>0.79<br>1.00                     |
| Schmidt et al. (2009)   | SP Patients               | 36<br>ABMT=18<br>CON = 18 | Dot-Probe (faces) | Disgust  | Neutral          | 8 (160)  | None          | BSPS<br>LSAS<br>SPAI<br>STAI-T<br>BDI-II | 1.22**<br>1.84<br>1.46<br>3.98<br>1.12** |
| See et al.(2009)        | Non-selected              | 40<br>ABMT=22<br>CON =18  | Dot Probe (words) | Negative | Neutral          | 15 (192) | Moving abroad | STAI-S<br>STAI-T                         | n/a (0.60 )<br>n/a (0.79*)               |
| Eldar & Bar-Haim (2010) | Low anxious students      | 30<br>ABMT=15<br>CON = 15 | Dot-Probe (faces) | Angry    | Neutral          | 1 (480)  | None          | STAI-S                                   | 0.01                                     |
|                         | High anxious students     | 30<br>ABMT=15<br>CON = 15 | Dot-Probe (faces) | Angry    | Neutral          | 1 (480)  | None          | STAI-S                                   | -3.4                                     |
| Klump & Amir (2010)     | Socially anxious students | 53<br>ABMT=31<br>CON = 22 | Dot-Probe (faces) | Disgust  | Neutral & Threat | 1 (480)  | Speech Task   | STAI-S                                   | -0.6 (0.36)                              |

**Note: Adapted from** “Attention Bias Modification Treatment: A Meta-Analysis towards the Establishment of Novel Treatment for Anxiety,” by Hakamata et al. (2010), *Biological Psychiatry*; 68, 982–990. ABMT = attention bias modification training; CON = Control; GSP = Generalised Social Phobia; STAI-T = State-Trait Anxiety Inventory-Trait; LSAS = Liebowitz Social Anxiety Scale (clinician-administered); SPAI = Social Phobia and Anxiety Scale; BDI-II, Beck depression inventory-II; HAM-D, Hamilton Rating Scale of Depression (clinician-administered); SDS, Sheelen Disability Scale; STAI-S = State-Trait Anxiety Inventory-State; GAD = Generalized Anxiety Disorder; BSPS, Brief Social Phobia Scale (clinician-administered); PSWQ, Penn State Worry Questionnaire; WDQ = Worry Domains Questionnaire; HRSA, Hamilton Rating Scale of Anxiety (clinician-administered); SIAS, Social Interaction Anxiety Scale; SPS, social phobia scale; FNES, Fear of Negative Evaluation Scale.

\* p <0.05, \*\*p <0.01, \*\*\*p<0.001,

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## **Part 2: Empirical Paper**

### **Attention training and traumatic stress symptoms: a controlled evaluation.**

This empirical paper was prepared in line with the journal guidelines for “Behaviour Research and Therapy”. A copy of the author information pack is available in Appendix B.

**Word Count: 8, 140** (Excluding References)

## Abstract

Attention training technique (ATT; Wells 1990) is a specific technique used in metacognitive therapy to modify metacognition and the control of attention. It aims to reduce self-focused attention, increase attention flexibility and change metacognitive strategies so that the person may discontinue preservative cognitive styles and threat monitoring behaviours. The present study investigated the impact of ATT on traumatic stress symptoms, in a sample of 60 university students, following exposure to a stressful life event. Participants were randomly assigned to either an ATT group (n = 29) or a control group (n = 31). An emotional attention set shifting task was included as an objective measure of attention flexibility. The results supported the hypotheses that ATT significantly reduces intrusions and negative affect in individuals who have experienced a stressful life event. The technique also reduced self-focused attention and increased attention flexibility on subjective and objective measures. The results suggest that ATT can be beneficial in reducing traumatic stress symptoms and the results add to studies suggesting positive effects of the technique across a range of disorders.

**Keywords:** attention training, post traumatic stress disorder, intrusions, metacognition, attentional control

### Highlights:

Intrusive thoughts and an attentional bias towards threatening information are prevalent symptoms of PTSD.

The metacognitive model of PTSD (Wells, 2000) emphasizes the importance of attentional control in emotional disorders.

Results add to the growing body of evidence supporting the effectiveness of ATT.

Future research should examine the impact of ATT on traumatic stress symptoms in a clinical population.

## Introduction

Research suggests that 50 – 60% of people will experience a traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). A triggering event or trauma is the most reliable predictor of PTSD and is necessary for a diagnosis (American Psychiatric Association, APA, 2000). Whilst the majority of people adapt to traumatic events and continue to resume their regular routine, a significant minority fail to adapt successfully. The risk of developing PTSD after a traumatic event is 8.1% for men and 20.4% for women (Kessler et al., 1995). Furthermore research suggests that depressive symptomology affects between 30% and 50% of persons diagnosed with PTSD (Nixon, Resick, & Nishith, 2004).

A common distressing symptom of PTSD is that of intrusive thoughts, which can be described as re-experiencing symptoms (DSM –IV TR criteria: APA; 2000). Intrusive thoughts have been defined as ‘distinct thoughts, images or impulses that enter conscious awareness on a recurrent basis, are difficult to control, and interfere with ongoing cognitive and behavioral activity’ (Clark, 2005). Cognitive models of PTSD emphasize difficulties encoding the trauma memory, as a key factor in the development of subsequent intrusions (e.g., Foa & Riggs, 1993; Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000).

PTSD is also characterized by an attentional bias towards the identification of threatening stimuli (Harvey, Bryant & Rapee, 1996, Beck, Freeman, Shipherd, Hamblen & Lackner,. 2001; Bryant & Harvey, 1995). Attention appears to be drawn to stimuli that remind an individual of past trauma and this can exacerbate the fear of future similar events (Williams, Mathews & MacLeod, 1996).

The main paradigm used to test this attentional bias has been the modified Stroop test (Stroop, 1935) that requires individuals to color name words that are emotionally laden. Attentional bias identified by the task has been demonstrated for a number of disorders but is generally larger for PTSD than any other group (Williams et al., 1996). The dot probe task (MacLeod, Mathews, & Tata, 1986) has also demonstrated attentional bias in PTSD (e.g. Bryant & Harvey, 1997) by measuring response latency to name neutral target words that are presented adjacent to or distant to threat words. However both tasks have been criticized for being ambiguous regarding the exact nature of threat related bias (Derryberry & Reed, 1994; Pollack & Tolley-Schnell, 2003). This ambiguity focuses on

whether delayed reaction time (RT) for negative material is due to vigilance or avoidance. Regardless of this point the delayed RT represents a bias of attentional control. For example individuals are supposed to be naming the color, not reading the word, so any slowed RT represents a failure to “shift attention away” from the emotional content (the negative word) to the affectively-neutral content (the color of the word).

### ***The Metacognitive Model of PTSD***

The metacognitive model of PTSD (Wells, 2000) is based on the Self-Regulatory Executive Function model (S-REF Model: Wells & Matthews, 1994) which emphasizes the importance of attentional control in emotional disorders. According to the metacognitive model (Wells, 2000) intrusive thoughts are normal and necessary after trauma. They are a sign that an individual is attempting to emotionally process the trauma and adjust to the event in a way that enhances future coping. For most people this process (reflexive adaption process, RAP), continues uninterrupted and symptoms naturally subside. Intrusions persist and become problematic when this process is interrupted by a self-relevant style of thinking called the cognitive attentional syndrome (CAS). The CAS causes persistent threat related processing called “trauma lock” and is driven by erroneous beliefs about thinking (Wells, 2009).

The CAS in PTSD consists of: 1) worrying, rumination and ‘gap filling’ (going over memory) 2) threat monitoring and 3) maladaptive coping strategies. Consistent with the model research indicates the use of worry as a strategy leads to an increase in intrusive thoughts (Wells & Davies, 1994; Roussis & Wells, 2006; 2008; Holeva, Tarrier & Wells, 2001). A longitudinal study found rumination after stressful life events was associated with increased levels of subsequent stress symptoms and depression (Nolen-Hoeksema, 2000). A recent study found that beliefs about trauma predicted PTSD symptoms while memory disorganisation, often believed to be significant in cognitive models of PTSD did not (Bennett & Wells, 2010). Attentional biases, such as threat monitoring (e.g. scanning the environment for signs of danger) are closely related to negative metacognitive beliefs (e.g. “If I look out for signs of danger I will be able to prevent another attack”). These strategies can block the down regulation of emotional processing and lead to an increase in intrusive thoughts (Wells, 2000). In accordance with this, it seems reasonable and likely that a technique that improves attentional control and reduces self-focused attention, characteristic of the CAS, would lead to a reduction in unwanted intrusions.

### ***The Attentional Training Technique (ATT)***

The ATT (Wells, 1990) is an externally focused auditory exercise, used in metacognitive therapy. It was developed with the aim of treating the CAS by reducing self-focus and directly modifying the control of attention. Training in this strategy following exposure to trauma, may make it easier for individuals to disrupt preservative processing (e.g. rumination, threat monitoring) allowing healthy emotional processing to take place and symptoms such as intrusive thoughts to subside. Specifically, when intrusions occur individuals are able to choose not to engage in the CAS thus ATT facilitates flexible control over processing. The ATT consists of three categories of auditory attentional exercises: (1) selective attention (focusing attention on individual sounds and spatial locations), (2) attention switching (rapidly shifting attention between different sounds and spatial locations and (3) divided attention (attending to as many simultaneous sounds and spatial locations as possible).

The procedure is designed so that it consistently loads attention. Between 6 and 9 sounds are typically introduced in combination with spatial locations. The aim is to follow the instructions irrespective of intrusive thoughts. They should be treated as additional noise, which are not given attentional priority. ATT should always be presented with a treatment rationale individually tailored to the specific disorder. This is important to facilitate understanding of the technique and enhance motivation for homework compliance. It should not be used as a coping strategy or as a form of distraction or avoidance of intrusive thoughts or emotion (Wells, 2009).

### ***Effectiveness of ATT***

A growing body of research supports the effectiveness of ATT for a range of emotional disorders including panic disorder (Wells, 1990; Wells, White & Carter, 1997), social phobia (Wells et al., 1997), hypochondrias (Papageorgiou & Wells, 1998; Canvanagh & Franklin, 2000), major depression (Papageorgiou & Wells, 2000), and the treatment of auditory hallucinations (Valmaggia, Bouman, & Schuurman, 2007). While it was originally designed as part of a treatment package these studies support its effectiveness as a stand-alone treatment approach. Clinically significant outcome measures

include significant reductions in symptoms and change in beliefs (e.g. Papageorgiou & Wells, 2000), with treatment gains maintained at follow up (e.g. Canvanagh & Franklin, 2000). A pilot study (Siegle, Ghinassi, and Thase, 2007) examined the neuropsychological effects of ATT on depressed patients, using functional magnetic resonance imaging (fMRI) and reported changes in amygdala activity in the brain.

To the authors' knowledge only one pilot study (Nassif & Wells, 2011) has explored the impact of ATT on traumatic stress symptoms. Forty-two students were randomly assigned to two sessions of ATT or two sessions of a filler task. All participants had experienced a significantly stressful life event in the past which still caused distress. This event was narrated, recorded and then listened to. This constituted the stressful stimulus used in the experiment. This study aimed to examine the effects of ATT on: 1) the number of intrusions in a student population who had been exposed to a distressing life event 2) the effects of ATT on metacognitive processes assessed by the Detached Mindfulness Questionnaire (DMQ, Nassif, 2009) and 3) to use data as a basis for power calculations in future studies. Each participant was seen twice. The experimental group received two sessions of ATT and implemented one to two sessions for homework. A significant reduction was found in number of intrusions in participants who received ATT in comparison to a control group. There were also significant between group differences on the metacognitive measure of attention flexibility. Attention flexibility increased significantly in the group that received ATT in comparison to the control group. Possible limitations of the study include the small sample which limits the power of the analyses. Furthermore, the sample tested was not clinical which means that results obtained cannot be generalized to PTSD sample. The study was also limited by the use of self-report measures and the length of time of the stressful narrative varied between participants. The present study attempted to improve on a number of these limitations.

### ***Current study***

The present study was designed to replicate and extend these findings by including a number of modifications: 1) A standardized measure of mood was included to further investigate the impact of ATT on negative affect 2) a computerized attention set shifting paradigm was included as an objective measure of attention flexibility, 3) length of time of the distressing narrative was controlled by imposing a time limit and 4) a larger sample

size was included, based on data from the pilot study, to increase the power of the analyses.

It was expected that there would be a significant reduction in intrusions and negative affect in the group who received attention training in comparison to the control group. It was also hypothesized that there would be a significant increase in attention flexibility in the group who received attention training. It was expected that this change in attention flexibility would be evident in a task involving emotional attention set shifting (Johnson, 2009).

**Primary hypotheses:**

Participants who receive metacognitive training by ATT, in comparison to a control group will:

1. Report a greater reduction in number of intrusions when exposed to reminders of their stressful life event.
2. Report a greater reduction in negative affect when exposed to reminders of their stressful life event.
3. Report a greater increase in self-report attention flexibility.

**Subsidiary hypotheses:**

4. ATT will lead to differences in attentional performance between groups. It is predicted that those who receive attentional training will show a greater change in emotional to neutral (EN) mental set switch cost for negative material in comparison to a control group. The impact of ATT on remaining switch cost scores is exploratory in nature.

## Method

### *Design*

This study used a mixed between within groups experimental design with one experimental group and one control group. The participants in each group were tested on two separate occasions. Principal statistical analyses included mixed between-within subjects Analysis of Variance (ANOVAS) to compare groups on the dependent variables. Analyses of covariance (ANCOVAS) were used to control for these variables at the start of the experiment.

### *Participants and setting*

Ethical approval was obtained from The University of Manchester School of Psychological Sciences Ethics Committee. The study was advertised on the university volunteer website. Ninety seven students from the University of Manchester completed the online screening questionnaire. When recruitment ceased 60 participants were utilised in the study. Inclusion criteria were: (1) The presence of a significantly stressful life event (2) The occurrence of intrusive thoughts in relation to the event (3) A distress rating of at least 30%<sup>4</sup> or more upon experiencing these intrusions (4) The stressful event had to have taken place at least a month before the experiment, to rule out the presence of acute stress disorder (ASD).

The age of participants ranged from 18 to 28 years. Twelve were male (mean age = 20.50, SD = 2.15) and 48 were female (mean age = 20.13, SD = 2.40). All participants were given the choice between receiving payment of £10 or 12 course credits for their participation. The stressful life events were clustered into 7 categories: Death of close family member/friend (10%), sexual assault (8.33%), physical assault (20%), motor vehicle accident (20%), unexpected illness (8.33%), accident/incident to self or other (18.33%) and a stressful period that resulted in a major change (15%).

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<sup>4</sup> This score was sufficient in the pilot study (Nassif & Wells; 2011) and was introduced to avoid possible floor effects so that the impact of ATT could be observed on symptoms.

## *Materials and measures*

### **Attention Training Technique**

A recorded CD (Copyright, Wells 2007) presented ATT in a standardised way to participants in the experimental group. Duration of ATT was 12 minutes, excluding the instructions given prior to the technique. The sounds included clock, church bells, bird song, insects, traffic and running water. Participants were asked to listen to the CD during both sessions and twice for homework practice. A copy of the recording is available at [www.mct-institute.com](http://www.mct-institute.com).

### **Attention Filler Task**

Participants in the control group were presented with a set of pages, each with letters or numbers printed on them. They were instructed to cross out specified numbers or letters on each page and when finished to move onto the next. They were advised that they had 12 minutes to complete the task.

### **The Attentional Control Capacity for Emotional Representations (ACCE) Task**

The ACCE Task (Johnson, 2009) was designed to measure one's ability to shift attention towards and away from emotional material. Evidence suggests that individuals who are more efficient at shifting attention between tasks or inhibiting previous mental sets exhibit lower levels of rumination (Whitmer & Banich, 2007). The task was presented on a computer and participants performed one of two judgments on a compound stimulus that consisted of a face with a shape centered between the eyes. For the emotional judgment they were to identify if the valence of the face was happy, angry or neutral. For the neutral judgment they were to identify the type of shape located between the eyes of the face, which could be a circle, square or triangle. Participants were instructed to use the number pad to make all responses, including the 1, 2, and 3 keys, using their index, middle, and ring fingers respectively. It was explained that all instructions would be given by the computer and participants were free to proceed on their own with the task. The task took 25 – 30 minutes to complete.

There were 3 blocks of 15 practice trials (face practice, shape practice, and then combined). During the practice trials the participants received feedback in the form of “Correct”, “Incorrect” and “No response detected.” Each trial began with a cue presented on a computer screen. This cue was either a solid bar or a patterned bar that informed participants whether they needed to make an emotional or neutral judgment. The cue was presented for either 200 or 1,500 milliseconds and then replaced with a stimulus (a face with a shape between the eyes) on which the participant had to make a judgment. The face-shape combination was presented until the participant responded or 5 seconds had lapsed. A solid bar served as a cue to the participant to attend and respond to the emotional expression of the face (emotional mental set), whereas a patterned bar cued the participant to attend and respond to the type of shape between the eyes of the face (neutral mental set). Stimuli were matched for valence and intensity. After the practice trials, 5 blocks of test trials followed (85 trials each) with time to rest in between each block. The minimum rest period was 10 seconds. The participants no longer received feedback on their task performance.

There was equal probability of emotion- emotion (EE) repetition trials, neutral-neutral (NN) repetition trials, emotion-neutral (EN) switching trials, and neutral-emotion switching trials. There was equal probability of each of those occurring with each emotional expression (happy, angry, and neutral), so the probability of one of each of the 12 trial types equals 8.3%. The cue-to stimulus interval was randomized (CSI) and the cue remained on screen throughout the CSI. Valence was not random. It was repeated exactly 6 times and then switched to the next valence. A median RT was created for each trial type for each subject. So, it was not influenced by outliers.

Two switch cost scores, EN switch cost and NE switch cost, were calculated for each valence. These were the dependent variables of interest. Switch costs were calculated by computing two difference scores. The median response time (RT) for the NN repetition trials was subtracted from the median RT for the EN switching trials to obtain individual differences in EN switch cost. The median response time (RT) for the EE repetition trials was subtracted from the median RT for the NE switching trials to obtain individual differences in NE switch cost.

### **The Impact of Events Scale (IES)**

The IES (Horowitz, Wilner, & Alvarez, 1979) is a 15 item measure and was included to assess current emotional distress related to the specific stressful life event. The responses cover the past seven days. It consists of two subscales Intrusions (7 items) and avoidance (8 items). Participants are required to respond to each question on a four point scale, ranging from 'not at all' to 'often', with scoring by assigning the values 0,1,3,5, to each of the frequency categories. The maximum possible total score for the IES is 75, with the maximum for avoidance being 40 and for intrusion 35. Split half reliability of the total scale is high ( $r = 0.86$ ). Internal consistency of the subscales calculated using Cronbach's Alpha is high (Intrusions = 0.78, avoidance = 0.82).

### **The Detached Mindfulness Questionnaire (DMQ)**

The DMQ (Nassif, 2009) was included to assess self-report attentional flexibility. The DMQ is a 22 item measure that consists of five theoretically derived constructs of detached mindfulness: Attention flexibility, Meta-Awareness, Detachment/ Observing Self, Thought Control, and Cognitive De-centering. It assesses participants' different levels of awareness and how they respond to their thoughts and requires participants to rate each item on a scale of 1-5 (1 = Disagree; 2 = Disagree to some extent; 3 = neither agree nor disagree; 4 = Agree to some extent; 5 = agree). The overall reliability co-efficient of this new measure, including the reliability of the Attention Flexibility Subscale has been reported as acceptable (Nassif, 2009; unpublished thesis).

### **The Positive and Negative Affect Schedule (PANAS).**

The PANAS (Watson, Clark, & Tellegen, 1988) is a 20 item measure that comprises two mood scales, one measuring positive affect and the other measuring negative affect. Each item is rated on a 5-point scale ranging from 1 = *very slightly or not at all* to 5 = *extremely* to indicate the extent to which the participant has felt in the indicated time frame, for example "Right now". Watson et al. (1988) reported cronbach's alpha coefficients ranging from 0.86 to 0.80 for the Positive Affect Scale and 0.84 to 0.87 for the Negative Affect Scale. Test-retest correlations for an 8 week period ranged from 0.47 to 0.68 for the Positive Affect and 0.39 to 0.71 for negative affect. Validity of the

scale is reported: Measures of general distress and dysfunction, depression and state anxiety are more highly correlated with the negative affect scale (positive correlations) than the Positive Affect scale (Negative correlations).

### **Self-Attention Rating Scale**

A 7 point, Self-Attention Rating Scale (Wells, 2000), was used to measure level and change in attention. This measure assesses the main focus of attention at the present time. Participants are asked to indicate whether they consider their attention to be “entirely externally focused” with a rating of -3, or their attention to be “entirely self-focused” with a rating of +3, or somewhere in the middle “equal amounts” with a rating of zero. A successful ATT session is shown by a shift of at least two points from self-focused attention to externally focused attention.

### **Manipulation Check**

This was given to the experimental group only after ATT. This measure includes one question asking participants’ to rate on a scale ranging from 0% (not at all) to 100% (Completely) how much were they able to engage with the technique when instructed.

### ***Procedure***

After meeting inclusion criteria, participants were then given a sign-in code which allowed them to select two different experimental time slots (two or three days apart). Each participant was seen twice, with an average of 2.42 days (SD = 1.33) between the two sessions. The experimental group received two sessions of ATT and was asked to practice ATT twice for homework practice. The control group completed the attention filler task instead. The first experimental session lasted 90 minutes and the second 75 minutes.

### **Session 1**

All participants read the information sheet and gave their informed consent. They were randomly allocated via online software (<http://www.graphpad.com/quickcalcs/randomize1.cfm>) to either the experimental (ATT) or control (filler task) group. All participants completed the IES and DMQ at the beginning

of the session. They narrated their stressful event in accordance with Foa, Molnar and Cashman's instructions (1995), modified for the purpose of the experiment. They were asked to describe the event in the present tense, vividly, in as much detail as possible and to speak for a period of five minutes. They were also asked to describe their thoughts, feelings, behaviors, surroundings and other people's actions, during the event. The start of the trauma narrative was defined as the first expression of threat. The experimenter signaled to them when the time was up. Participants were then asked to listen back to three minutes of their taped narrative. Immediately after the end of the listening period they were asked to record the number of intrusions they experienced while listening to their narrative. They were asked to complete the PANAS and rate how they felt "right now". All participants were asked to complete the self-attention rating scale. Participants in the experimental group were briefly socialized to the MCT model of PTSD. The "healing metaphor" (Wells, 2009, p138) was used to explain persistence of symptoms and illustrate the role of the CAS (e.g. worrying and ruminating) in maintaining disorder. A rationale for ATT, specific to PTSD and instructions was also provided. Participants were then asked to complete three questions to check their understanding (e.g. *what can you do to help change these thinking patterns and let these thoughts take care of themselves?*). This was to ensure that they understood the rationale behind the technique and to increase motivation for homework compliance. They then completed the first session of ATT which lasted approximately 12 minutes, and the control group received a filler task of similar duration. Upon completion of their task, all participants re-rated their focus of attention. All participants completed the ACCE Task for the first time. Participants in the experimental group were given a CD of ATT and instructed to practice the technique at least twice for homework.

## **Session 2**

Participants were administered a Self-Attention Rating Scale at the beginning of the second session, before and after completion of their designated task. Participants in the experimental group completed another session of ATT and those in the control group completed another filler task. Prior to commencing the session, participants in the experimental group were asked to indicate the number of ATT rehearsals they had completed for homework. They were also asked to rate how much they were able to engage with the task. All participants were re-administered the IES and the DMQ. They were again asked to listen to three minutes of their narrative and to record the number of

intrusions they experienced while listening. They also completed the PANAS and rated how they felt 'right now' after listening to their narrative. Finally all participants were asked to complete the ACCE task again. All participants were debriefed and paid or awarded course credits. Information was provided to any participants who wished to seek further advice in relation to their traumatic experience.

### ***Overview of Data Analysis***

Analysis of Variance (ANOVA) is reasonably robust if group sizes are close to equal (Stevens, 1992). Analyses of covariance (ANCOVAS) were used in order to compare the effects of ATT on the variables specified by the hypotheses, while controlling for these variables at the start of the experiment. Mixed between-within subjects ANOVAS were also conducted to compare groups on the dependent variables. This analysis provided a test of whether there was a causal relationship between ATT and the intended outcomes. The results are summarized in Table 1. Finally Spearman's Rho correlations were used to examine significant associations between the observed change in intrusions, number of ATT sessions and change in attention flexibility.

## Results

### *Preliminary analyses*

The descriptive statistics in Table 1 summarize an initial screen of the key dependent variables assessed in the study. All variables were normally distributed except for number of intrusions at time 1 and time 2 and negative affect at time 2. These variables were positively skewed and yielded positive kolmogorov-Smirnov Statistics. They were transformed<sup>5</sup> accordingly using a logarithm to the base 10 statistic and subsequently the new variables were normally distributed. Overall there was only one missing value in the data. This was replaced with the group mean (Tabachnik & Fidell, 1996). The data was screened for outliers. For each analysis preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate.

For the intrusions and negative affect variables it was decided to retain the original values for the analyses, instead of the transformed scores. According to the Central Limit Theorem for group sizes of 30 or more, tests based on the normal distribution are still valid even when the data is not normally distributed (see Howell, 2002). A series of independent samples t-tests were conducted to ascertain whether there were any pre-existing differences between groups prior to experimental manipulation in order to highlight any variables that might need controlling as covariates. There were no significant differences found between groups at baseline except for two variables EN switch cost for 'happy faces' and for 'angry faces'. Switch cost is length of time (in milliseconds) spent disengaging from an emotional mental set and reconfiguring to a neutral set.

### **Insert Table 1 Here**

### *Impact of Stressful Event*

As part of initial screening the level of distress found to be associated with intrusive thoughts ranged from 30% to 100%. An independent samples t-test was conducted to compare the level of distress in the experimental and control group. There was no significant difference in scores for the experimental group ( $M = 65.35$ ,  $SD = 17.72$ ) and

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<sup>5</sup> The data was re-analyzed using the transformed variables. This made no difference to statistical significance.

control group ( $M = 57.10$ ,  $SD = 21.94$ ) ( $t(58) = 1.60$ ,  $p = 0.116$ , two-tailed). The magnitude of the differences in the means (mean difference = 8.25, 95% CI: -2.10 to 18.59) was small to moderate (eta squared = 0.04) (Cohen, 1988).

The average IES score at baseline for all participants was 30.27 ( $SD = 15.38$ , range = 5-71). A cut off point of 20 is generally used to indicate a moderate to severe impact of a traumatic event (Horowitz, Wilner & Alvarez, 1979). 66.7% of participants ( $n = 40$ ) were above this cut off and 33.3% ( $n = 20$ ) were below. A cut off score of 35 has been proposed for clinical diagnosis with an overall diagnostic efficiency of 88% relative to structured clinical interview (Neal, Busuttill, Rollins, Herepath, Strike, Turnbull. 1994). An independent samples t-test was conducted to compare initial scores between groups. There was no significant difference between the experimental group ( $M = 32.83$ ,  $SD = 18.17$ ) and the control group ( $M = 27.87$ ,  $SD = 12.04$ ) ( $t(58) = 1.24$ ,  $p = 0.22$ , two-tailed). The magnitude of the differences in the means (mean difference = 4.96, 95% CI: -3.10 to 13.01) was small to moderate (eta squared = 0.026) (Cohen, 1988).

### ***Attention rating and compliance with ATT***

Based on data obtained from the self-attention rating scale ATT was largely successful in its aim of shifting participants' focus of attention from self-focus to external focus. In the ATT group ( $N = 29$ ), all but three participants had a shift of at least two points toward external focus measured on the scale after they received the first session of ATT. Two of the remaining three participants indicated no change but they reported 60% and 70% compliance with the ATT session. The other participant reported a one point shift towards self-focused attention. This participant reported high compliance with the task with a rating of 70%. However further questioning revealed she had been focusing on what the experimenter thought of her during the technique. Compliance with the ATT in the experimental group ranged from 60 and 100 % in the first session ( $M = 75.17$ ,  $SD = 11.53$ ) and between 40 % and 100 % ( $M = 78.28$ ,  $SD = 14.65$ ) in the second session of ATT. On the second ATT session ( $N = 29$ ), 26 people rated their attention as shifting externally, three people stayed the same and no-one reported a shift towards self-focused attention. For the three people who stayed the same two of these reported 60% compliance and one of them reported 80% compliance.

In the control group (N = 31), the pattern of self-focused attention seemed random. 20 people indicated a shift towards external-focused attention, 4 reported no change and 7 reported a shift toward internal attention on the first session. On the second session, 17 people indicated a shift towards external-focused attention, four reported no change and 10 reported a shift toward internal attention. The exact cognitive mechanisms that could have been involved were not examined.

### ***Intrusions***

As hypothesized the number of intrusions decreased more in the group that received ATT, when compared to the control group (see Fig 1). There was a 51.27% reduction in intrusions reported by the ATT group and only a 2 % reduction in intrusions reported by the control group from time 1 to time 2. A one-way between groups ANCOVA revealed that after adjusting for Time 1 scores there was a significant difference between the two groups on number of intrusions reported at Time 2, with a significantly lower number of intrusions experienced by those in the ATT group,  $F(1, 57) = 13.46$   $p < 0.001$ . The effect size was large, partial eta squared = 0.19 (Cohen, 1988). There was a strong relationship between number of intrusions recorded at Time 1 and Time 2, as indicated by a partial eta squared value of 0.34. A mixed between-within subjects ANOVA was also conducted to test for differences between groups (ATT and filler task) on the number of intrusions participants' reported across two time periods (Time 1 and Time 2) and for interactions between the factors group and time (i.e. whether one group changed more than the other). A significant interaction effect between group and time was found (see table 1). The effect size was large (Cohen, 1988).

**Insert Figure 1 here**

### ***Negative Affect***

As hypothesized, negative affect decreased more in the group that received ATT when compared to the control group. A one way between groups ANCOVA revealed that after adjusting for Time 1 scores there was a significant difference between the two groups on negative affect reported at Time 2, with a significantly lower negative affect

experienced by those in the ATT group,  $F(1, 57) = 5.44, p < 0.05$ . The effect size was medium, partial eta squared = 0.09 (Cohen, 1988). There was a strong relationship between negative affect scores at Time 1 and Time 2, as indicated by a partial eta squared value of 0.22. A mixed between-within subjects ANOVA was also conducted (see Table 1). A significant interaction effect between group and time was reported. The effect size was large (Cohen, 1988).

### ***Attention Flexibility***

As hypothesized participants receiving ATT reported a greater change in Attention Flexibility (AF) measured by the DMQ when compared to a control group. A one way between groups ANCOVA revealed that after adjusting for Time 1 scores there was a significant difference between the two groups on Attention Flexibility reported at Time 2,  $F(1, 57) = 9.91, p = 0.05$ . The ATT group reported greater flexibility at time 2. The effect size was large, partial eta squared = 0.15 (Cohen, 1988). There was a strong relationship between AF scores at Time 1 and Time 2, as indicated by a partial eta squared value of 0.61. A mixed between-within subjects ANOVA was also conducted (see Table 1). There was a significant interaction effect between group and time. The effect size was large (Cohen, 1988).

### ***Emotional Attention Switch Cost***

Switch costs were calculated by computing two difference scores (Johnson, 2009). Analyses used median reaction times (RTs) because mean RTs are not robust against outliers. The RTs were for correct trials only. In addition, RTs for short cue to stimulus intervals were included, as the primary interest was in full switch cost, rather than residual switch cost.

**Insert Figure 2 here**

### **EN switch cost**

The median RT for neutral-neutral (NN) repetition trials was subtracted from the median RT for emotion-neutral (EN) switching trials to obtain individual differences in EN

switch cost. A 2 x 2 x 3 mixed design ANOVA was conducted on the EN switch cost data with one between group variable, Group (ATT, Control) and two within subject variables, Session (Time 1, Time 2) and Valence of stimuli (happy, angry and neutral). The Group x Time x Valence interaction effect was significant ( $F(2, 57) = 6.04, P < 0.004$ ).

To elucidate this three way interaction, three separate mixed-design ANOVAS (see Fig 2.) were conducted for each type of Valence (happy, angry, and neutral). The design of these analyses was 2(Group; ATT, Control) x 2(Session; Time 1, Time 2). There was a significant interaction between session and group for happy and angry faces (See Table 1). For happy faces the ATT group showed a significant reduction in switch cost score and the control group showed an increase. Perhaps due to an increase in attention flexibility individuals who received ATT did not try and focus on happy faces and instead were able to focus on the task at hand, illustrated by their faster response times. For angry faces both groups showed a reduction in EN switch cost. The control group showed a significantly greater reduction in switch cost score than the ATT group (see Table 1). This may suggest that individuals who received ATT did not employ cognitive avoidance in of negative emotional stimuli. For neutral faces the main effect comparing the two types of group was non-significant (see Table 1). Both groups showed a significant reduction in switch cost (see Fig 2).

### **NE switch cost**

The median RT for Emotion –Emotion (EE) repetition trials was subtracted from the median RT for NE switching trials to obtain individual differences in NE switch cost. A 2 x 2 x 3 mixed design ANOVA was conducted on the NE switch cost data with one between group variable, Group (ATT, Control) and two within subject variables, Session (Time 1, Time 2) and Valence of stimuli (happy, angry and neutral). The Group x Time x Valence interaction effect was non-significant ( $F(2, 57) = 0.92, P > 0.05$ ). Hence no further analyses were necessary.

### **Relationship between changes in intrusions, change in attention flexibility and number of ATT sessions performed**

Spearman's Rho correlations were run in the two conditions separately in order to explore the relationship between the change in number of intrusions reported, change in

self-rating of attention, change in attention flexibility and (only in the ATT group) the number of ATT sessions each participant received (including homework). This non-parametric test was chosen as the distribution of the variables was skewed for the newly computed change in intrusions variable and the change in self-rated attention variable, violating the assumptions of parametric testing. Change in the number of intrusions was computed by subtracting the number of intrusions reported at Time2 from those reported at Time 1. The same method was used to calculate the change in Attention Flexibility between the two sessions. Change in self-rated attention was calculated by subtracting the scores of participants given at the end of the training session, from the one obtained prior to manipulation. This was done for both sessions of training. The only significant association was between change in the number of intrusions and change in self-attention in the second session. There was a strong positive correlation ( $\rho = .542$ ,  $n = 29$ ,  $p < 0.01$ ) but only in the group that received ATT showing that as self-attention decreased the number of intrusions also decreased.

## Discussion

### *Key findings*

In support of hypothesis 1, the most striking feature of the data was the large reduction in intrusions reported by the group who received attention training in comparison to a control group. These findings are consistent with a previous study (Nassif & Wells, 2011). Also in agreement with Nassif and Wells (2011) a positive association between the change in number of intrusions and change in self-focused attention after the second session was found. There is general consensus that a heightened degree of self-focus is characteristic of emotional disorders (Ingram, 1990). ATT appeared to facilitate a shift in self-rated attention from internal focus to external focus.

In support of hypothesis 2, there was a significant reduction in negative affect reported by the attention training group in comparison with the control group. This is consistent with previous studies that have found that ATT resulted in a significant reduction in symptoms and an improvement in mood (e.g. Papageorgiou & Wells, 2000).

In support of hypothesis 3, attention flexibility increased significantly in the ATT group, in comparison to a control group as measured by the DMQ. These findings support the theoretical basis of ATT based on the S-REF model (Wells & Matthews, 1994).

Finally in support of hypothesis 4, there was a significant difference in EN switch cost between the groups for 'angry faces'. While both groups showed a reduction in EN switch cost for 'angry faces', this change was significantly greater in the control group. This may indicate a reduction in emotional avoidance, a maladaptive coping strategy and feature of the CAS, targeted by ATT. For 'happy faces', the ATT group showed a significant reduction in switch cost score and the control group showed an increase. No significant differences were found between groups in NE switch cost, which was included in analyses for exploratory purposes. So perhaps the control group maintained a strategy of focusing on positive stimuli (happy faces) and avoiding negative stimuli (angry faces) but the ATT group did not appear to show this emotional avoidance response because they may have been better able to process the trauma. Therefore they did not need to avoid negative emotional reminders of the event.

### *Theoretical Implications*

These findings support the theoretical basis of ATT. According to the S-REF model (Wells & Matthews, 1994) reduced attention flexibility and bias is a component of the CAS. ATT may work by making individuals' attention more flexible, which allows adaptive processing of the traumatic event (i.e. the RAP) and a reduction in symptoms. Individuals need attention flexibility for the regulation of extended thinking (e.g. worrying, rumination and switching out of threat mode of processing). Flexible control over thinking allows individuals to relate to their thoughts differently and this metacognitive flexibility 'frees up' their capacity to attend to other stimuli. Previous studies (e.g. Wells & Papageorgiou, 1995; Nolen-Hoeksema, 2000) found that worry and rumination can lead to a greater number of intrusive thoughts hence it seems likely that a technique that reduced these processes would lead to a reduction in intrusions and an overall improvement in affect. These findings provide further support for the metacognitive model of PTSD (Wells & Sambhi, 2004a).

In addition to an increase in self-reported attention flexibility, measured by the DMQ, ATT also appears to have demonstrated changes in attentional performance on an objective measure, the ACCE task (Johnson, 2009). Emotional to neutral switch cost in response to 'angry faces' was significantly faster in the control group who had not received ATT. Avoidance of negative material would be objectively indicated by a faster emotion to neutral switch cost for angry faces. Consistent with this finding evidence suggests that individuals high on anxiety may avoid attention to emotional imagery (e.g. Borkovec, Alcaine, & Behar, 2004). Studies have reported attentional bias away from threatening faces in highly anxious individuals (e.g. Mansell, Clark, Ehlers, & Chen, 1999; Mogg, Bradley, Miles & Dixon, 2004). However this is inconsistent with literature suggesting that individuals higher in anxiety selectively deploy attention toward negative emotional stimuli (e.g. Mathews & MacLeod, 2005; Fox, Russo, Bowles & Dutton, 2001). Observed effects may be dependent on the type of stimuli used and whether state or trait effects of emotion are tested (Wells & Matthews, 1994).

One possible explanation is that ATT reduced the degree to which participants tried to avoid negative material, to regulate their symptoms and mood. It seems plausible that attentional training may have reduced emotional avoidance of negative material, indicative

that participants had processed their negative emotion in a healthy manner, instead of repeatedly and intentionally avoiding it. Emotional avoidance is counterproductive, for example thought suppression leads to more intrusions and greater accessibility of negative material (S-Ref Model; Wells & Mathews, 1994; Wegner, 1994).

For ‘happy faces’, the control group was significantly slower to switch from an emotional to neutral judgment, than those who had been trained in flexible attentional control. Perhaps the control group, who experienced significantly more intrusions and greater negative affect, were attempting to regulate their emotion using an “avoidance” attentional deployment strategy (Gross & Thompson, 2007). Both groups improved equally on EN switch cost, for ‘neutral faces’ highlighting the importance of looking at valence-specific set-shifting. No significant results were evident for the NE switch cost scores, which was included as an exploratory analysis.

However these findings should be interpreted with caution as the ACCE task is a relatively new task and similar to other tasks of attentional performance, the mechanisms comprising and mediating the attentional biases demonstrated remain unclear. Future research, strongly driven by theory, is needed to further understand the attentional processes involved.

Possible neuropsychological mechanisms underpinning the effectiveness of ATT should also be investigated through methods such as fMRI and electroencephalography (EEG). One may expect participants who had received ATT to show changes in cortical activity, indicative of strategic and spatial processing of attention and metacognition (Wells, 2009).

### ***Limitations***

There are differences between the groups apart from the ATT which may be responsible for the results of the experiment. It is possible that expectancy effects, arising from the disorder specific treatment rationale administered as part of the ATT intervention, may be responsible for the reduction in symptoms. Future research could control for this by dismantling the treatment to see which components of intervention were most effective. Another difference was that the ATT group was asked to complete homework while the control group was not. This may have introduced practice effects impacting on the outcome variables. This could be controlled for by including conditions that include non-

specific factors (e.g. homework of a specific kind). It is also possible that demand characteristics may have impacted on outcome variables. Participants may have attempted to conform to the experimenters expectations.

The current sample involved a non-clinical sample; hence results cannot be generalized to a PTSD population. However, the inclusion of the IES indicated that over two thirds of participants were above the cutoff point of 20 which indicates a moderate to severe impact of a traumatic event (Horowitz et al., 1979).

A further limitation of this study was that no follow up data was collected. Data from other studies suggests that effects of ATT are maintained up to 12 months follow up (e.g. Wells, 1990; Wells et al. 1997) however this would need to be further investigated in the present context.

It is important to note the possibility of increased likelihood of type 1 error, due to the number of statistical analyses carried out. Perhaps the P-values should have been Bonferroni adjusted. However Perneger (1998) argues that such adjustments are unnecessary. Finally the switch cost scores at Time 1 also differed between groups for EN switch cost for 'happy' and 'angry' faces which may bias results and so analyses should be interpreted with caution. There may have been pre-experimental differences on the ACCE task that randomization did not eliminate. These differences may also have been due to order effects as the ACCE task was first administered after the first session of ATT. Future research should consider applying the ACCE task before the intervention as well as after.

### ***Clinical Implications***

Whilst recognizing that the current study involved a non-clinical sample it provides preliminary empirical support for the use of ATT, in the treatment of traumatic stress symptoms. It should be noted however, that ATT was not intended to be a stand-alone treatment technique.

It is unknown how long lasting effects of ATT are in trauma victims or how many sessions of ATT are required in order to see a clinically significant change in stress symptoms. Similar to the previous study (Nassif & Wells, 2011) three to four sessions

appeared sufficient in reducing traumatic stress symptoms. The duration of effects in trauma victims should be assessed in future studies.

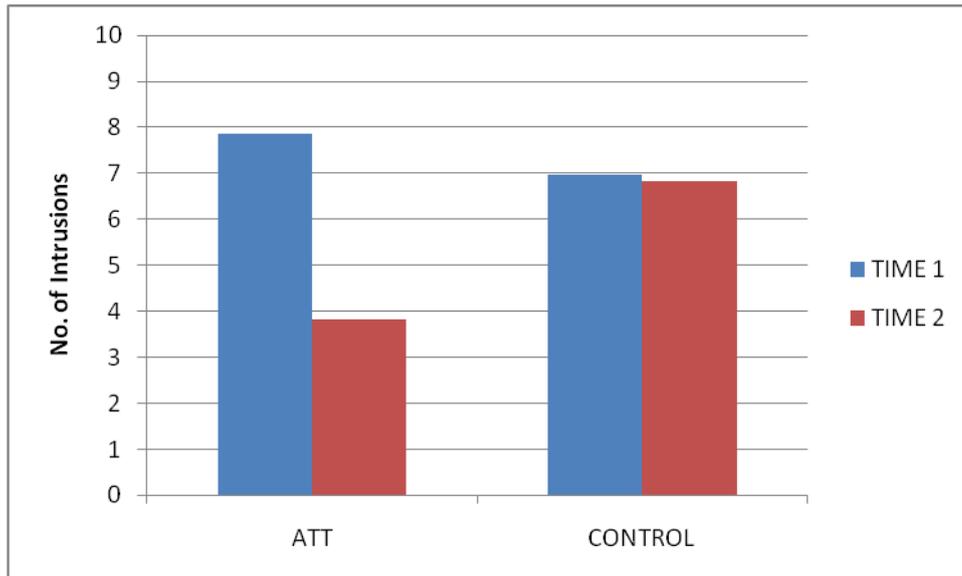
The findings of the present study are important in terms of contributing to the growing evidence base of the effectiveness of ATT and may be important in terms of the empirical evidence base for trauma related interventions. Future research should examine the impact of ATT on traumatic stress symptoms in a clinical population using standardized and objective measures of symptoms, attention and metacognition.

Table 1: Descriptive Statistics

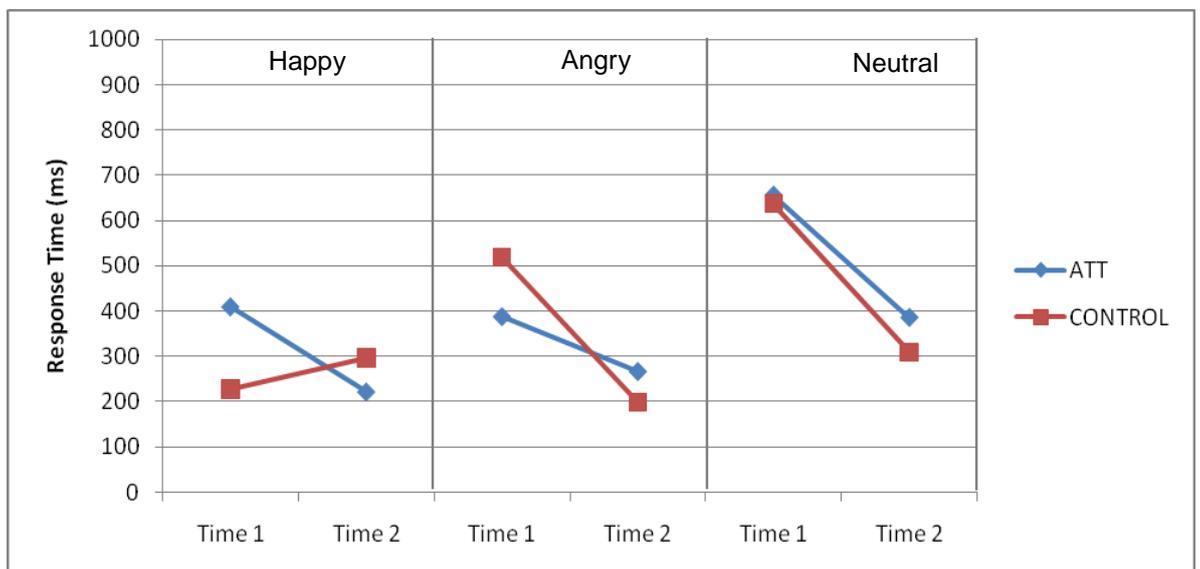
| Dependent Variables    |         | TIME 1 |        |         | TIME 2        |        |         | Group x Time Interaction |          |         |                  |      |
|------------------------|---------|--------|--------|---------|---------------|--------|---------|--------------------------|----------|---------|------------------|------|
|                        |         | Mean   | SD     | Range   | Mean          | SD     | Range   | WL                       | F (1,58) | P-Value | Partial $\eta^2$ |      |
| No. of intrusions      | A       | 7.86   | 5.55   | (1-25)  | 3.84          | 2.06   | (0-8)   | 0.85                     | 10.19    | 0.002** | 0.15             |      |
|                        | C       | 6.97   | 5.80   | (2-25)  | 6.84          | 5.75   | (1-25)  |                          |          |         |                  |      |
| Negative affect        | A       | 23.86  | 7.17   | (11-36) | 16.59         | 6.91   | (9-36)  | 0.90                     | 6.83     | 0.011*  | 0.11             |      |
|                        | C       | 21.76  | 7.20   | (12-39) | 19.35         | 6.35   | (12-37) |                          |          |         |                  |      |
| Attention flexibility  | A       | 13.80  | 4.02   | (6-21)  | 16.14         | 3.71   | (9-23)  | 0.91                     | 5.60     | 0.021*  | 0.09             |      |
|                        | C       | 13.09  | 4.88   | (5-25)  | 13.71         | 3.90   | (6-21)  |                          |          |         |                  |      |
| EN Switch Cost RT (ms) | Happy   | A      | 409.04 | 319.67  | (-215 -1030)  | 220.75 | 182.02  | (-47.80 – 657)           | 0.88     | 7.66    | 0.008**          | 0.12 |
|                        |         | C      | 227.52 | 352.45  | (-430 – 939)  | 296.69 | 268.64  | (5 -923)                 |          |         |                  |      |
| EN Switch Cost RT (ms) | Angry   | A      | 387.34 | 249.70  | (79 -809)     | 265.91 | 181.90  | (-7 – 676)               | 0.89     | 6.80    | 0.012*           | 0.11 |
|                        |         | C      | 517.98 | 217.80  | (60 – 952)    | 198.23 | 184.56  | (-46 –657)               |          |         |                  |      |
| EN Switch Cost RT (ms) | Neutral | A      | 656.09 | 314.07  | (57 – 1516)   | 385.68 | 258.01  | (-87 -1075)              | 0.99     | 0.35    | 0.559            | 0.01 |
|                        |         | C      | 637.00 | 398.30  | (-65 – 1540)  | 309.51 | 225.89  | (32-820)                 |          |         |                  |      |
| NE Switch Cost RT (ms) | Happy   | A      | 509.00 | 198.83  | (-67 – 897)   | 538.78 | 176.95  | (102-728)                | -        | -       | -                | -    |
|                        |         | C      | 631.67 | 282.21  | (107-1282)    | 227.52 | 352.45  | (-74 – 1068)             |          |         |                  |      |
| NE Switch Cost RT (ms) | Angry   | A      | 538.78 | 176.95  | (107 – 1179)  | 342.76 | 234.05  | (-262 – 879)             | -        | -       | -                | -    |
|                        |         | C      | 467.73 | 343.18  | (-396 – 1136) | 662.60 | 348.40  | (133 – 723)              |          |         |                  |      |
| NE Switch Cost RT (ms) | Neutral | A      | 629.43 | 405.09  | (-444 – 1815) | 440.84 | 199.98  | (-9.50 – 828)            | -        | -       | -                | -    |
|                        |         | C      | 342.93 | 210.80  | (69 – 1723)   | 591.32 | 399.59  | (15 – 1641)              |          |         |                  |      |

Note: RT (ms) = median response time in milliseconds, A = ATT group, C = Control group, WL = Wilks Lambda, Partial  $\eta^2$  = Partial Eta Squared, \*p < .05; \*\* p < .01,

**Figure 1. Change in mean number of intrusions within and across the two groups.**



**Figure 2. Change in Emotion - Neutral (EN) switch cost between groups**



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## **Part 3: Critical Appraisal**

**Word Count = 4, 268** (Excluding References)

## ***Overview***

This section will highlight methodological and clinical issues, which merit recognition and discussion in the context of the present research. The first section will reflect on methodological and ethical issues raised throughout the research process. The second section will focus on theoretical and clinical considerations related to this study. Finally the limitations of this research study and suggestions for future research shall be discussed.

## ***Methodological & Ethical Considerations***

### **Design**

A mixed between-within subjects design was employed. The advantage of such a design is that it allows for comparison between treatment groups and within groups over time. This type of analysis can test whether there is a causal relationship between the independent variable, random assignment to groups (attention training or filler task), and the intended outcomes (a reduction in intrusions and negative affect, change in objective attention performance).

### **Recruitment**

It was decided to recruit an analogue sample from the University of Manchester for a number of reasons. The impact of the Attentional Training Technique (ATT) on traumatic stress symptoms has only been evaluated in one previous study (Nassif & Wells, 2011). It is considered good practice to establish treatment efficacy in an analogue sample before attempting replication with a clinical population (Chambless & Hollon, 1998). Relevant literature (e.g. Breslau, Davis, Andreski, & Peterson, 1991) indicates that high numbers of students have been exposed to a stressful life event making them an appropriate sample in the current research context. Furthermore, stress symptoms are commonly occurring events and there may be few differences in the nature of acute stress symptoms and those found in PTSD.

The researcher was reasonably confident about accessing a large enough sample for the study that satisfied the inclusion criteria. A previous study (Nassif & Wells, 2011) employed similar inclusion criteria and reported no difficulties with recruitment. Breslau, et al. (1991) studied a random sample of adults between the ages of 21 – 30 years and reported that 39% had been exposed to at least one event that would fit the DSM-III-R criteria (American Psychological Association, 1987) for PTSD. Vrana and Lauterbach (1994) also studied a healthy college population and found that 84% of respondents reported at least one event of sufficient intensity potentially to elicit PTSD.

Psychology students at the university are required to earn a certain amount of course credits through a voluntary participation scheme operated by the University which provides an incentive to take part. Another advantage of using students is that they generally have more free time than a working population. Time was a consideration as the study involved meeting with participants twice, for up to an hour and a half, within two to three days. Recruitment slowed as expected around exam time, however overall no significant difficulties were encountered. All participants completed both parts of the study.

### **Sample size**

A sample size of 60 was considered sufficient to conduct parametric analyses. Power calculations were based on change scores between two groups (ATT & control) derived from a previous study (Nassif & Wells, 2011). For number of intrusions, it was estimated that 17 participants would be required per group (34 in total) to yield 80% power at  $p = 0.05$  (based on a simple t-test of the changes with estimated SD of change of 1.8). For attention flexibility it was estimated that 19 participants (38 in total) would be required per group to yield 80% power at  $p = 0.05$  (based on a simple t-test of the changes with estimated SD of change of 2.5). It was decided to include a larger sample because of the more exploratory nature of one dimension of the study as data was unavailable for estimates of change scores for negative affect and emotional to neutral switch cost.

## Measures

All the measures used in the study are available for viewing (Appendix C). They were administered to each participant in the same order to ensure they underwent the same procedure. The principal hypothesis related to the number of intrusions experienced by participants after listening to their stressful narrative. The length of narrative was controlled for by imposing a time limit of three minutes. However it is difficult to ascertain how long individual intrusions may have lasted. It would have been interesting to ask participants what percentage of listening time had been occupied by intrusions.

The Impact of Events Scale (IES) (Horowitz, Wilner, & Alvarez, 1979) was administered as a descriptive measure to describe the impact of the traumatic event on the participants. The IES was not intended for use in the primary analyses, as it is predominantly used with clinical populations. This measure has however been found to be sensitive to PTSD symptoms in student populations (Roussis & Wells, 2006). It was selected instead of the IES-R (Weiss, & Marmar, 1996) as little has been published on the psychometric properties and construct validity of this scale (Creamer, Bell, & Failla, 2003). Also for comparison purposes, the IES is a more widely used measure (Joseph, 2000). However, the utility of the IES has been questioned as it is not based on DSM-IV criteria and does not assess symptoms of hyperarousal (Joseph, 2000).

Both scales of the The Positive and Negative Affect Schedule (PANAS, Watson, Clark, & Tellegen, 1988) were administered even though only scores obtained from the Negative Affect Scale were included in the analyses. Although not included in the initial hypotheses there appears to have been an increase in positive affect in the group that received attention training as evident from the descriptive statistics (Appendix D).

Scores were also obtained for all five subscales of the Detached Mindfulness Questionnaire (DMQ) (Nassif, 2009) even though Attention Flexibility was the only subscale included in the analyses. Descriptive statistics of the other subscales: Detachment, Meta-awareness, Thought Control and Cognitive Decentring are available (Appendix D). The DMQ is a relatively new measure and although it has demonstrated 'acceptable fit' for

repeated administrations it would be beneficial to establish an optimal time period. The current study averaged 2 – 3 days, which seemed to be adequate for detecting change in attention performance.

The inclusion of an objective measure of attention performance was a considerable strength of the study that was not included in the pilot study (Nassif & Wells, 2011). Originally the researcher considered investigating the impact of ATT using the attentional subscales of a computerised Neurocognitive test called CNS Vital Signs. These included a Stroop Task, a Shifting Attention Task (SAT) and a Continuous Performance Task (CPT). As little is known about the impact of ATT on neurocognitive status this hypothesis would also have been exploratory in nature. However it was decided to use the Attentional Control Capacity for Emotions Task (Johnson, 2009). This emotional attention set shifting paradigm was considered more sensitive to detect change, due to the specific nature of the task and the relatively brief intervention (3 – 4 sessions of ATT).

The researcher considered the possibility of applying for a small imaging grant with the view of scanning a subset of participants, to investigate whether any neuropsychological changes could be detected in the ATT group. The university ethics committee advised against the imaging procedure due to time and financial constraints.

## **Procedure**

The procedure was designed so that each participant underwent the same protocol within each group. Overall the procedure was adhered to. Length of time between sessions was generally two to three days. On a few occasions the experimenter had to reschedule the second part of the experiment due to unforeseen events on behalf of the participant (e.g. illness). Some participants struggled to speak in the present tense and slipped into the past when narrating their stressful narrative. Participants appeared to engage well with the ATT task and understood the rationale behind it, as evident from ‘the socialization to the model check’ that was included in the study (Appendix E). Although the researcher checked homework compliance at the start of session 2, there is no further guarantee that participants practiced the technique as instructed.

## **Analyses**

Parametric tests were used to examine the data pertaining to the main hypotheses. These were considered appropriate due to the number of participants and nature of the data. Analyses utilizing Emotional to Neutral switch cost scores should be interpreted with caution as scores at Time 1 differed significantly between groups, which could bias results.

## **Ethical Issues**

This study was approved by the University of Manchester, Division of Clinical Psychology (Appendix F). Ethical approval was also received from the School of Psychological Sciences Ethics Committee. Due to the nature of the study, concern was raised at one of the committee meetings, about participants' emotional well-being as the study involved speaking about a stressful life event. It was agreed that if a participant became upset during testing, the experimenter would handle the situation sensitively and suggest contacting their GP or the university counselling services if appropriate. The university counselling service had approved this arrangement prior to testing. It is worth mentioning that several research projects at Manchester University had used Foa, Molnar and Cashman's (1995) method of recording a stressful narrative and the distress it could cause was considered fleeting.

All participants were given detailed information about the study before they took part (Appendix G) and signed a consent form (Appendix H). They were fully debriefed at the end of the study. They were reminded that they were free to withdraw their participation at any time. The researcher considered offering ATT to participants in the control group. However this would have been too difficult to implement within the time constraints of the study and competing demands of clinical training. All participants completed the study and while further information was provided on a number of occasions no-one became unduly distressed or withdrew from the study.

## **Dual Role**

A further consideration was the researcher's ethical position as a trainee clinical psychologist. Clinical researchers are encouraged to adhere to ethical guidelines including autonomy, beneficence and justice (Kitchener, 2000). The researcher felt confident that these were adhered to throughout the entire research process. The study involved listening to participants describe their stressful events that ranged in severity, from exam stress to sexual assault. The discomfort associated with these events was an essential requirement of the study in order to assess the impact of ATT on traumatic stress symptoms. However at times it felt mildly uncomfortable, as the researcher's clinical role on placement involved working therapeutically with clients to alleviate their symptoms. It would have been inappropriate to slip from the role of 'researcher' into the role of 'therapist' and this would have potentially confounded results. It was important to follow the research protocol to ensure the reliability and validity of results. Clinical supervision was a useful outlet to discuss and reflect on such experiences.

## ***Theoretical Implications***

Present findings are consistent with predictions based on the metacognitive model of PTSD (Wells, 2000). According to this model, metacognitive treatment techniques such as ATT interrupt and reduce the CAS (i.e. unhelpful responding to intrusive thoughts) which results in a reduction in symptoms. Other theoretical models of PTSD, such as the Emotional Processing Theory (EPT; Foa, & Riggs, 1993) might struggle to explain how ATT could produce such a significant reduction in intrusive thoughts and negative affect, in such a short time frame (2-3 days). They maintain that prolonged exposure is necessary to activate the fear networks and allow distress to subside via habituation. Cognitive theories (e.g. Ehlers & Clarke, 2000; Brewin, Dalgeish, & Joseph, 1996) indicate that more time would be necessary to integrate the trauma memory in order to significantly reduce intrusive thoughts and negative affect.

According to the S-REF Model (Wells & Matthews, 1994) ATT works by making individuals' attention become more flexible, this permits healthy emotional processing of the traumatic event and a reduction in symptoms. Attention flexibility increased

significantly in the ATT group which supports the theoretical basis of ATT. According to the S-REF model lack of attention flexibility is a marker of the CAS. Patients need to strengthen attentional flexibility for the regulation of extended thinking (e.g. worrying) and a reduction in maladaptive coping strategies such as emotional avoidance (e.g. thought suppression).

ATT appears to be effective by reducing self-focused attention, as measured by the self-attention rating scale, restoring flexible control over thinking and detachment from thoughts. This would also account for the significant decrease in negative affect reported by those in the ATT group. These results make sense in terms of the S-REF model which maintains that engaging in prolonged preservative thinking and threat monitoring i.e. The CAS has a negative impact on mood and prolongs symptoms. The positive association between change in number of intrusions and change in self-focused attention after session two may indicate that practice is necessary to implement the technique effectively.

### ***Clinical Implications***

The need for briefer more effective treatments for PTSD has been identified (Kilic, 2001). To date cognitive behavioral therapy (CBT) including exposure therapy (ET) and cognitive restructuring (CR) is the most widely studied treatment for PTSD in the literature (Rothbaum, Meadows, Resick & Foy, 2000). Although dropout rates vary in the research literature they have been estimated to be as high as 43% (Power, McGoldrick, Brown, Buchanan, Sharp, et al., 2002). Some researchers have suggested that ET can lead to symptom exacerbation and contribute to high dropout rates (Pitman Altman, Greenweald, Longpie, Macklin, et al., 1991; TARRIER, Pilgrim, Sommerfield, Faragher, Reynolds, et al. 1999). However, Feeny, Hembree and Zoellber (2003) argue that drop rates are no higher for ET than for other forms of CBT. Becker, Zayfert, and Anderson (2004) surveyed a sample of 207 psychologists and reported only 17% used imaginal ET in the treatment of PTSD. This indicates that perhaps its acceptability is questionable for many therapists. Similarly high dropout rates have been reported for treatments other than CBT such as group psychotherapy (Fisher, Winne, & Ley, 1993) and a combination of medication and supportive psychotherapy (Burstein, 1986).

Metacognitive therapy for PTSD has shown impressive results over a relatively short period of time (e.g. Wells, Welford, Fraser, King, Mendel, et al., 2008). Metacognitive techniques such as ATT appear to target metacognitive beliefs and negative affect associated with intrusions without treating emotion directly. Such techniques may be important for individuals who cannot tolerate the initial distress and increase in symptoms associated with techniques such as exposure and drop out of therapy.

Whilst recognizing that the current study involved an analogue sample it provides preliminary empirical support for the use of ATT, as a stand-alone technique in the treatment of traumatic stress symptoms. As little as three to four sessions showed a significant between groups difference, consistent with previous findings (Nassif & Wells, 2011).

Socialization to the Model of PTSD and a rationale for ATT treatment, tailored specifically to PTSD, were important for enhancing motivation and compliance. Without these essential components of the ATT package, treatment may not have been as effective. It is unknown how long lasting effects of ATT are in trauma victims or how many sessions of ATT are required in order to see a clinically meaningful change in stress symptoms. Similar to the previous study (Nassif & Wells, 2011) three to four sessions appeared sufficient at reducing traumatic stress symptoms. Other studies have reported lasting effects; with symptom reduction maintained at 18 months follow up (Cavanagh & Franklin, 2000) in hypochondriac patients.

The finding that number of intrusions increased for two participants indicates that for some people ATT may exacerbate symptoms. An increase in intrusions may be accounted for by unhealthy emotionally processing or a RAP that is currently active (Nassif, 2009). It was not possible to establish whether either of these two processes was responsible for this effect. It is possible that some participants did not engage fully with the technique due to fatigue, which may impact on motivation. This was reported by one participant who had celebrated her birthday the previous night.

### ***Limitations of the study***

A number of limitations have been identified within the study such as the nature of the stressful event, sample accessed, the design and the materials which restrict the interpretations and implications of the findings.

### **Stressful event**

The type of stressor varied greatly among participants (Appendix I). The current study drew upon life events that people had already experienced, as opposed to attempting to induce stress symptoms in an artificial setting, improving the validity of findings. Length of time passed since the event also varied amongst participants with some events occurring years ago and others just a couple of months. Some of the events involved direct threat to self while others involved witnessing others. Such variability means we cannot draw firm conclusions about the types of stressor that may respond best or worst to ATT.

### **Sample**

This study utilized an analogue sample and therefore results should be interpreted with caution and may not be generalized to a clinical population. However inclusion of the IES showed that two thirds of the sample ( $n = 40$ ) scored at or above the cut-off of 20 (Horowitz, et al., 1979) which indicates that they were moderately to severely impacted by their traumatic event. This suggests that ATT may also show beneficial results if used in the treatment of patients with PTSD.

The sample consisted of undergraduate and postgraduate students from a restricted age range and from a middle class background. Results should be interpreted in this context as they may not necessarily provide a true representation of the general population with regard to age and IQ. The sample was largely females ( $n = 48$ ). Previous literature suggests that rates of PTSD are higher in females than males (Kessler et al., 1995). Gender differences may exist in the extent to which ATT moderates the relationship between attention flexibility and traumatic stress symptoms.

It was assumed due to the nature of the population that they were free from any major psychiatric illness. Perhaps participants should have been screened in advance as it is likely that the presence of emotional disorders such as obsessive compulsive disorder or

generalised anxiety disorder may have influenced the number of intrusions and negative affect levels reported.

Another limitation worthy of comment is that these participants were recruited via self-selection sampling, in response to adverts on the university volunteer website or posters displayed around the university (Appendix J). They were selected from their responses obtained online. They were also offered an incentive in the form of 10 pounds or 12 course credits for taking part. This may bias selection and introduce demand characteristics (e.g. social desirability effects) that could potentially influence outcome.

### **Methodological issues**

It is important to consider alternative explanations for the results obtained. There are differences between the groups apart from the ATT intervention. Significant between groups' differences may have been influenced by expectancy effects. The experimental group was socialized to the metacognitive model of PTSD and received a disorder specific rationale explaining how ATT could lead to a reduction in symptoms. The control group received no socialization to the metacognitive model or rationale. It is possible that this part of the ATT package may have contributed to the reduction in symptoms seen in the experimental group, as the ATT group expected to receive an effective treatment intervention. However, the aim of the present study was first to establish whether the complete ATT package impacted on traumatic stress symptoms. Future research could subsequently investigate which components of the ATT package are most effective. In addition to expectancy effects there may have been demand characteristics, the participants may have given the answers they thought the experimenter wanted. Other non-specific factors such as asking participants in the ATT group to complete homework may have impacted on the outcome variables. The control group was not instructed to complete the attention filler task for homework. It is possible that practice effects may have impacted on between group differences. Future research could control for this by instructing the control group to practice the attention filler task for homework.

### **Measures**

A number of potential predisposing and maintaining factors relevant to traumatic stress symptoms were not measured such as previous trauma and history of mental health

problems (Ozner, Best, Lipsey, & Weiss 2003). Pre-trauma measures of intelligence (IQ) have also been identified as a predictor of PTSD (Buckley, Blanchard, & Neill, 2000) It is currently unclear to what extent intellectual functioning might moderate the impact of ATT on traumatic stress symptoms. Evidence also suggests that PTSD symptoms and depression scores are positively related to the number of events the person has experienced, particularly in women (Vrana & Lauterbach, 1994). These potentially confounding variables may have impacted on the variables of interest, such as number of intrusions experienced while listening to the narrative.

Most of the measures included in the study were based solely on self-report, with the exception of attention flexibility. These measures may be subject to response bias. The inclusion of psychophysiological measures such as cardiovascular reactivity, cortisol levels, or skin conductance would have been an addition to the study.

The DMQ is a new measure and its sensitivity to change is not well known. However it has been found to show consistently strong negative relationships with measures of pathology including the Penn State Worry questionnaire and the STAI Self Evaluation Questionnaire (Nassif, 2009).

### **The ACCE Task**

The ACCE task was first administered at the end of session one after the first session of ATT or attention filler task had been administered and again at the end of session two. Due to the sequencing of tasks a true baseline measure of attentional performance, measured by the ACCE task, may not have been obtained. This may account for the between groups differences between groups at time 1, which limits the interpretation of these results. The reason it was not administered at baseline, before the ATT or attention filler task in session one, was that it also involves attentional processes, and may have led to order effects, confounding results of the primary hypotheses. Future research should consider applying the ACCE task at baseline, before the intervention, as well as after. There may also have been pre experimental differences that randomization did not eliminate.

Participants should have been screened for visual impairment as this could have influenced performance on the task (Johnson, 2009). Only those with normal or corrected-to-normal vision should have been included.

### **The ATT CD**

The standardized audio version of the ATT task was included in this study. This may exert different effects than the “live” version which is designed to increase sounds and spatial locations and to consistently load attention. However this standardized version ensured that participants had the same intervention and reduced the risk of possible confounding variables. The standardized version was used in an earlier study (Nassif & Wells, 2011).

### ***Implications for Future Research***

Data from this study and the pilot study (Nassif & Wells, 2011) suggest that ATT has beneficial effects on traumatic stress symptoms. The next step is to investigate the impact of ATT as a stand-alone treatment with a clinical sample. To verify the validity of the findings and their relevance to the study of PTSD the current study should be replicated in a clinical sample that have experienced a range of traumatic events using a randomised controlled design or an established case methodology. The duration of effects in trauma victims should be assessed in future studies, by re-assessing participants at follow up sessions.

To the author’s knowledge it is the first time that ATT has shown a change in an objective attention set shifting task. The ACCE task is a relatively new task and hence findings should be interpreted with caution. Future research is necessary to understand the attentional processes involved. This finding should be replicated in future studies. Perhaps an adapted form of the ACCE task, specifically designed for a PTSD population should be developed.

Now that ATT has shown an improvement on an objective measure, possible neuropsychological mechanisms underpinning the effectiveness of ATT should also be investigated through methods such as functional magnetic resonance imaging (fMRI) and

electroencephalography (EEG). One may expect participants who had received ATT to show changes in pre-frontal cortex or spatial processing regions, indicative of strategic processing of attention (Wells, 2009).

The findings of the present study are important in terms of contributing to the growing evidence base of the effectiveness of ATT and maybe important in terms of the empirical evidence base for trauma related interventions. Future research should examine the impact of ATT in patients diagnosed with PTSD using a standardized measure of intrusions.

As two participants reported an increase in intrusive thoughts future investigation into the differential effects of ATT would be an appropriate avenue for future work. ATT may also be useful as a preventative technique in terms of strengthening attentional control in individuals vulnerable to psychopathology e.g. soldiers going to combat. This may be tested using a between subjects longitudinal design.

### *Summary*

The first part of this section comprised an overview of the methodological and ethical considerations encountered during the research process. Overall the researcher is confident that the study is a credible piece of quantitative research that may have important implications for the theory and treatment of traumatic stress symptoms. A series of important theoretical and clinical implications were discussed that have emerged as a result of this research study. Limitations of the study have been reflected upon and suggestions made for the future indicating that there is much scope for future research in the area. To conclude whilst it is acknowledged that the present study is preliminary in nature it is believed that it can provide useful insights into the role of attentional processes in the development and treatment of traumatic stress symptoms and provide a basis for studies in the future.

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## **Appendices Section**

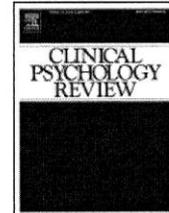
## **Appendix A: Author Information Pack for Clinical Psychology Review**

## **Appendix A: Author Information Pack for Clinical Psychology Review**



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ISSN: 0272-7358

## DESCRIPTION

*Clinical Psychology Review* publishes substantive reviews of topics germane to clinical psychology. Its purpose is to help clinical psychologists keep up-to-date on relevant issues outside of their immediate areas of expertise by publishing scholarly but readable reviews. Papers cover diverse issues including: psychopathology, psychotherapy, behavior therapy, behavioral medicine, community mental health, assessment, and child development.

Reviews on other topics, such as psychophysiology, learning therapy, and social psychology, often appear if they have a clear relationship to research or practice in clinical psychology. Integrative literature reviews and summary reports of innovative ongoing clinical research programs are also sometimes published. Reports on individual research studies are not appropriate.

## AUDIENCE

Psychologists and Clinicians in Psychopathy

## IMPACT FACTOR

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## **Appendix B: Author Information Pack for Behaviour Research and Therapy**



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ISSN: 0005-7967

## DESCRIPTION

*Behaviour Research and Therapy* encompasses all of what is commonly referred to as cognitive behaviour therapy (CBT). The focus is on the following: theoretical and experimental analyses of psychopathological processes with direct implications for prevention and treatment; the development and evaluation of empirically-supported interventions; predictors, moderators and mechanisms of behaviour change; and dissemination and implementation of evidence-based treatments to general clinical practice. In addition to traditional clinical disorders, the scope of the journal also includes behavioural medicine. The journal will not consider manuscripts dealing primarily with measurement, psychometric analyses, and personality assessment.

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## AUDIENCE

For clinical psychologists, psychiatrists, psychotherapists, psychoanalysts, social workers, counsellors, medical psychologists, and other mental health workers.

## IMPACT FACTOR

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## ABSTRACTING AND INDEXING

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## **Appendix C: Measures & Scales**

The Impact of Events Scale (IES)

The Detached Mindfulness Questionnaire (DMQ) and Scoring Key

The Positive and Negative Affect Schedule (PANAS)

Intrusions Record

Self-Attention Rating Scale

Manipulation Check

Attention Filler Task

## **The Impact of Events Scale (IES)**

Horowitz M, Wilner N, Alvarez W. (1979). Impact of Event Scale: a measure of subjective stress. *Psychosomatic Medicine*. 41(3):209-18.

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**DMQ**  
(Nassif 2009)

*People have different levels of awareness and reaction to their own thoughts. Below is a list of items examining how you view your thoughts and how you react to them. Please indicate the number that best reflects how much you agree or disagree. There are no right or wrong answers.*

|  | Disagree | Disagree<br>to some<br>extent | Neither<br>agree nor<br>disagree | Agree to<br>some<br>extent | Agree |
|--|----------|-------------------------------|----------------------------------|----------------------------|-------|
| <b>1. I am aware that many of my thoughts are simply opinions rather than facts</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>2. I have no problem shifting attention away from my feelings</b>   | 1        | 2                             | 3                                | 4                          | 5     |
| <b>3. I usually know what I'm thinking about if someone asks me</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>4. I am able to have a negative thought without worrying about it</b>   | 1        | 2                             | 3                                | 4                          | 5     |
| <b>5. I can usually let go of my thoughts even if I'm worried</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>6. I can step back from my thoughts and see them as separate from me</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>7. I am able to understand that what I worry about is not necessarily going to happen</b>   | 1        | 2                             | 3                                | 4                          | 5     |
| <b>8. I usually know when my thoughts don't mean anything</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>9. I can have a sense of myself which is distinct from my thoughts and feelings</b>   | 1        | 2                             | 3                                | 4                          | 5     |
| <b>10. I am able to see my thoughts as separate from who I am</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>11. I can readily take a step back from my thoughts and observe them</b>  | 1        | 2                             | 3                                | 4                          | 5     |
| <b>12. I have no difficulty realizing that thoughts are simply passing events in my mind that do not necessarily reflect reality</b> | 1        | 2                             | 3                                | 4                          | 5     |

|  | Disagree | Disagree to some extent | Neither agree nor disagree | Agree to some extent | Agree    |
|--|----------|-------------------------|----------------------------|----------------------|----------|
| <b>13. I am usually aware of my thoughts</b>   | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>14. I find it easy to shift my attention from one thing to another</b>            | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>15. I am often aware of the way my mind works</b>                                 | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>16. I usually try to control or stop my thoughts even when they are upsetting</b> | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>17. I can be aware of my mind as separate from the thoughts that it has</b>       | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>18. I am often aware of how events around me influence my thinking</b>            | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>19. I often let my thoughts roam freely</b>                                       | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>20. I try and control my thoughts most of the time</b>                            | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>21. I am not usually preoccupied with controlling my thoughts</b>                 | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |
| <b>22. I can concentrate on my work even if I'm worried about something</b>          | <b>1</b> | <b>2</b>                | <b>3</b>                   | <b>4</b>             | <b>5</b> |

Reproduced with permission from:

Nassif, Y. (2009). *Test of metacognitive therapy and technique in posttraumatic disorder (PTSD)*. University of Manchester: Unpublished Doctoral Thesis.

## Scoring key

**Detachment/ Observing self: 6, 9, 10, 11 and 17**

**Meta-awareness: 3, 13, and 15**

**Thought Control: 16, 19\*, 20, 21\***

**Attention flexibility & suspension of conceptual processing: 2, 4, 5, 14, and 22**

**Cognitive de-centering: 1, 7, 8, 12, and 18**

**\*reverse score**

Reproduced with permission from:

Nassif, Y. (2009). *Test of metacognitive therapy and technique in posttraumatic disorder (PTSD)*. University of Manchester: Unpublished Doctoral Thesis.

### **The Positive and Negative Affect Schedule (PANAS)**

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.

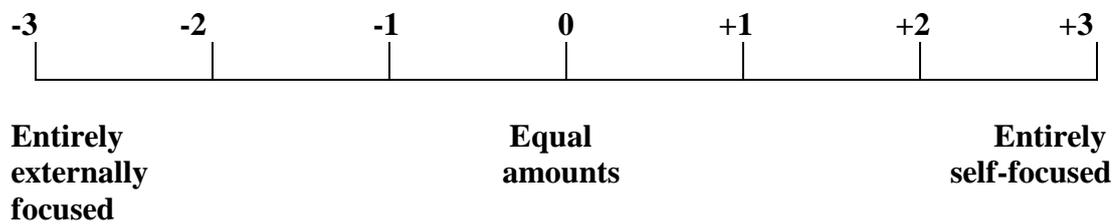
In order to protect copyright this measure has not been electronically included in the thesis. A loose copy is available with the hardbound version of the thesis.

## Intrusions Record

**Please indicate how many mental intrusions (thoughts or memories about your event) you have experienced while listening to your narrative? (Please record a number)**

---

### Self-attention Rating (Wells, 2000)



Wells, A. (2009). *Metacognitive Therapy for Anxiety and Depression*. New York: Guilford Press.

## MANIPULATION CHECK

**Please indicate how well you were able to engage with the technique?**

**Not at all**

**Very much**

**0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%**

**How many times did you practice the technique for homework?**

---

Attention Filler Task

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H | A | K | H | B | F | D | E | R | U | Y | P | O | S | Q | L | K | J | I | J |
| N | S | Q | E | T | H | J | N | B | V | M | O | I | S | A | Q | L | K | I | P |
| D | Z | X | H | G | R | T | Y | H | B | A | K | J | C | X | M | L | I | T | Y |
| W | D | F | R | H | Y | S | D | J | Z | G | E | K | I | M | N | F | T | G | Q |
| Y | A | D | F | H | Y | U | I | J | N | D | C | S | Q | O | L | J | B | D | Q |
| I | E | F | Q | T | Y | K | M | N | V | A | S | Q | E | R | U | Y | I | O | K |
| B | H | J | H | E | R | T | G | S | A | H | J | K | L | I | U | B | F | A | Q |
| W | K | H | G | T | E | F | S | N | D | O | R | G | S | Q | K | V | N | Z | I |
| A | M | H | F | E | R | T | S | D | A | L | K | V | B | F | Q | R | I | U | X |
| Q | G | H | U | D | E | B | M | B | A | Q | O | E | E | F | G | O | C | D | P |
| H | E | V | U | V | Y | I | R | K | X | D | F | X | J | Z | T | B | M | G | Z |
| L | H | L | G | D | H | O | F | H | I | U | D | D | N | S | G | G | G | F | D |
| O | F | U | D | E | G | E | G | N | N | Z | O | E | G | W | F | E | F | C | R |
| T | G | Y | E | I | E | D | H | G | G | X | E | R | T | O | D | F | R | V | I |
| I | E | Y | R | U | F | C | B | D | F | M | I | F | V | U | K | R | Y | B | M |
| G | X | T | M | J | R | F | N | V | D | H | N | T | C | H | I | U | U | N | N |
| E | Q | V | C | G | B | N | J | F | C | T | H | G | D | G | M | J | N | Y | G |
| T | J | B | Q | L | N | H | X | R | E | E | Y | Y | S | R | N | M | G | Q | F |
| R | D | N | O | P | M | U | C | G | R | C | U | B | K | E | B | X | Z | S | Q |
| H | U | G | K | O | I | J | S | H | U | G | C | H | U | D | S | A | W | D | O |
| U | M | D | H | A | J | K | E | E | J | U | D | J | J | C | Z | L | F | F | K |
| J | O | A | E | Z | Z | I | D | U | I | O | B | U | T | V | I | O | H | O | R |
| D | S | Z | V | X | A | L | F | J | O | K | E | K | G | F | Y | P | Q | K | F |
| S | I | I | S | F | S | K | W | N | P | M | E | I | H | M | R | V | O | J | I |
| F | N | O | K | R | D | J | P | I | L | G | F | L | G | J | E | X | L | Y | L |
| V | F | K | G | E | F | A | L | A | O | Q | P | O | D | L | K | W | M | N | S |
| P | Z | T | T | C | E | R | F | V | B | H | Z | Q | M | O | K | J | K | G | V |
| L | E | E | H | B | S | Q | U | H | G | R | B | V | I | N | M | A | I | R | G |
| K | A | C | A | L | J | H | G | R | F | V | S | W | U | I | K | Q | X | E | Y |
| J | K | D | M | S | X | A | J | R | Q | A | S | U | J | G | F | O | M | Y | J |
| H | W | N | L | S | D | Q | J | Y | U | K | N | F | T | Y | U | K | F | J | G |
| A | N | B | H | G | C | E | T | N | J | U | G | S | L | Y | N | F | Q | X | R |
| G | I | H | S | E | G | T | O | P | M | H | B | Q | C | F | E | R | T | S | L |
| H | S | F | T | E | N | J | U | I | S | C | V | B | G | B | T | R | U | K | X |
| U | K | D | R | B | G | Q | U | J | F | B | C | E | O | U | Z | A | P | Q | G |
| Y | E | G | F | D | T | Y | U | K | L | O | B | C | A | Q | E | W | T | U | P |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 5 | 4 | 5 | 2 | 6 | 8 | 9 | 2 | 0 | 1 | 4 | 5 | 7 | 8 | 5 | 1 | 5 | 1 |
| 0 | 6 | 9 | 5 | 0 | 7 | 0 | 6 | 4 | 2 | 3 | 0 | 1 | 8 | 5 | 2 | 1 | 4 | 6 |
| 2 | 9 | 4 | 8 | 5 | 0 | 2 | 9 | 3 | 0 | 5 | 6 | 0 | 5 | 8 | 9 | 9 | 0 | 9 |
| 4 | 0 | 5 | 2 | 9 | 8 | 6 | 8 | 7 | 0 | 4 | 5 | 7 | 1 | 3 | 4 | 6 | 9 | 7 |
| 6 | 2 | 8 | 0 | 6 | 9 | 8 | 5 | 7 | 4 | 5 | 0 | 2 | 3 | 6 | 4 | 5 | 4 | 5 |
| 0 | 1 | 9 | 5 | 9 | 8 | 5 | 2 | 0 | 1 | 2 | 0 | 3 | 6 | 0 | 6 | 8 | 2 | 2 |
| 3 | 4 | 0 | 6 | 6 | 5 | 3 | 4 | 7 | 8 | 2 | 6 | 4 | 1 | 1 | 8 | 2 | 3 | 5 |
| 2 | 7 | 4 | 0 | 9 | 0 | 5 | 8 | 7 | 1 | 2 | 6 | 4 | 3 | 4 | 9 | 5 | 6 | 8 |
| 5 | 5 | 6 | 3 | 5 | 0 | 4 | 6 | 0 | 2 | 3 | 1 | 8 | 9 | 5 | 2 | 6 | 5 | 1 |
| 7 | 6 | 0 | 2 | 2 | 5 | 6 | 8 | 4 | 0 | 2 | 3 | 5 | 9 | 9 | 1 | 9 | 8 | 0 |
| 0 | 3 | 2 | 8 | 1 | 7 | 5 | 1 | 6 | 9 | 2 | 0 | 2 | 0 | 6 | 0 | 7 | 2 | 2 |
| 3 | 0 | 3 | 5 | 6 | 0 | 7 | 8 | 5 | 0 | 2 | 3 | 6 | 9 | 2 | 3 | 1 | 0 | 5 |
| 6 | 2 | 0 | 4 | 3 | 6 | 0 | 3 | 2 | 4 | 4 | 6 | 0 | 0 | 3 | 5 | 0 | 7 | 4 |
| 4 | 5 | 6 | 6 | 0 | 5 | 5 | 5 | 0 | 5 | 5 | 3 | 4 | 8 | 0 | 4 | 3 | 4 | 7 |
| 9 | 8 | 9 | 0 | 2 | 6 | 8 | 6 | 8 | 2 | 2 | 0 | 6 | 7 | 7 | 7 | 0 | 5 | 6 |
| 5 | 5 | 6 | 2 | 5 | 2 | 9 | 9 | 9 | 1 | 6 | 2 | 9 | 5 | 5 | 9 | 4 | 3 | 0 |
| 0 | 4 | 7 | 1 | 8 | 4 | 6 | 8 | 5 | 0 | 0 | 5 | 2 | 6 | 6 | 3 | 8 | 0 | 3 |
| 6 | 1 | 5 | 3 | 9 | 8 | 0 | 7 | 0 | 2 | 2 | 8 | 1 | 2 | 3 | 2 | 0 | 9 | 2 |
| 5 | 0 | 4 | 2 | 2 | 0 | 2 | 6 | 6 | 5 | 4 | 1 | 0 | 0 | 2 | 0 | 5 | 0 | 4 |
| 2 | 3 | 1 | 9 | 3 | 3 | 4 | 0 | 9 | 9 | 6 | 7 | 2 | 1 | 4 | 5 | 9 | 5 | 8 |
| 6 | 6 | 2 | 5 | 0 | 6 | 8 | 2 | 8 | 0 | 2 | 5 | 3 | 4 | 5 | 4 | 7 | 1 | 7 |
| 4 | 9 | 3 | 0 | 1 | 9 | 7 | 5 | 0 | 7 | 5 | 2 | 9 | 2 | 0 | 6 | 6 | 4 | 5 |
| 9 | 0 | 0 | 8 | 5 | 7 | 5 | 2 | 7 | 6 | 4 | 0 | 8 | 3 | 1 | 1 | 0 | 8 | 2 |
| 0 | 2 | 6 | 0 | 4 | 5 | 3 | 4 | 0 | 2 | 0 | 3 | 5 | 6 | 2 | 7 | 5 | 5 | 0 |
| 2 | 1 | 5 | 7 | 7 | 4 | 0 | 8 | 6 | 4 | 7 | 4 | 7 | 4 | 0 | 3 | 6 | 7 | 4 |
| 5 | 4 | 9 | 2 | 3 | 0 | 2 | 9 | 5 | 3 | 6 | 0 | 5 | 9 | 2 | 5 | 1 | 4 | 6 |
| 7 | 5 | 8 | 6 | 5 | 4 | 6 | 2 | 8 | 9 | 0 | 1 | 2 | 6 | 9 | 9 | 0 | 6 | 9 |
| 0 | 2 | 2 | 4 | 0 | 3 | 2 | 6 | 0 | 5 | 8 | 9 | 7 | 0 | 6 | 0 | 8 | 3 | 0 |
| 1 | 3 | 3 | 5 | 6 | 5 | 8 | 9 | 2 | 4 | 0 | 2 | 5 | 6 | 4 | 4 | 0 | 0 | 8 |
| 3 | 6 | 0 | 1 | 7 | 5 | 6 | 2 | 6 | 5 | 7 | 0 | 3 | 8 | 7 | 1 | 0 | 5 | 4 |
| 2 | 9 | 4 | 5 | 8 | 0 | 4 | 9 | 0 | 6 | 2 | 3 | 7 | 1 | 9 | 0 | 5 | 8 | 6 |
| 0 | 7 | 1 | 7 | 8 | 2 | 0 | 3 | 6 | 0 | 9 | 0 | 5 | 1 | 2 | 8 | 4 | 7 | 5 |
| 2 | 5 | 3 | 8 | 5 | 0 | 6 | 8 | 1 | 9 | 0 | 8 | 4 | 7 | 0 | 6 | 4 | 6 | 8 |
| 6 | 0 | 8 | 7 | 5 | 0 | 2 | 3 | 6 | 0 | 9 | 4 | 0 | 2 | 5 | 7 | 5 | 7 | 2 |
| 9 | 1 | 3 | 6 | 5 | 8 | 9 | 7 | 5 | 2 | 1 | 0 | 2 | 0 | 7 | 7 | 9 | 6 | 5 |
| 2 | 9 | 0 | 1 | 7 | 5 | 3 | 7 | 8 | 6 | 2 | 4 | 0 | 1 | 5 | 6 | 2 | 3 | 1 |

## **Appendix D: Descriptive Statistics for Other Variables**

Descriptive Statistics by Group for the other variables

| <b>Group</b>                     | <b>Variable</b>                  | <b>Mean</b>            | <b>SD</b> | <b>Range</b> |
|----------------------------------|----------------------------------|------------------------|-----------|--------------|
| ATT<br>group<br>N=29             | IES total score Time 1           | 32.83                  | 18.17     | 7-71         |
|                                  | IES total score time 2           | 25.10                  | 15.16     | 3-59         |
|                                  | Intrusions subscale (IES) Time 1 | 14.48                  | 10.19     | 1-35         |
|                                  | Intrusions subscale (IES) Time 2 | 10.41                  | 7.85      | 2-33         |
|                                  | Avoidance subscale (IES) Time 1  | 18.21                  | 10.08     | 3-36         |
|                                  | Avoidance subscale (IES) Time 2  | 14.79                  | 9.82      | 1-36         |
|                                  | Positive Affect (PANAS) Time 1   | 21.79                  | 6.99      | 12-39        |
|                                  | Positive Affect (PANAS) Time 1   | 26.65                  | 7.99      | 13-43        |
|                                  | DMQ Total score Time 1           | 71.83                  | 9.33      | 45-88        |
|                                  | DMQ Total score Time 2           | 76.48                  | 7.14      | 62-91        |
|                                  | DMQ Detachment Time 1            | 15.76                  | 4.53      | 7-24         |
|                                  | DMQ Detachment Time 2            | 17.72                  | 3.56      | 9=25         |
|                                  | DMQ Meta-awareness Time 1        | 12.03                  | 2.20      | 5-15         |
|                                  | DMQ Meta-awareness Time 1        | 12.10                  | 2.04      | 7-17         |
|                                  | DMQ Thought Control Time 1       | 11.17                  | 3.06      | 5-17         |
|                                  | DMQ Thought Control Time 2       | 10.34                  | 2.98      | 5-16         |
|                                  | DMQ Cognitive Decentering Time 1 | 19.07                  | 3.16      | 11-24        |
|                                  | DMQ Cognitive Decentering Time 1 | 21.17                  | 2.27      | 15-24        |
|                                  | Control<br>group<br>N=31         | IES total score Time 1 | 25.10     | 15.16        |
| IES total score time 2           |                                  | 25.71                  | 10.66     | 7-47         |
| Intrusions subscale (IES) Time 1 |                                  | 13.10                  | 6.77      | 1-24         |
| Intrusions subscale (IES) Time 2 |                                  | 11.97                  | 5.96      | 3-25         |
| Avoidance subscale (IES) Time 1  |                                  | 14.77                  | 8.38      | 2-33         |
| Avoidance subscale (IES) Time 2  |                                  | 13.74                  | 7.36      | 0-31         |
| Positive Affect (PANAS) Time 1   |                                  | 20.48                  | 7.66      | 10-40        |
| Positive Affect (PANAS) Time 1   |                                  | 19.90                  | 7.63      | 10-40        |
| DMQ Total score Time 1           |                                  | 69.23                  | 11.65     | 48-107       |
| DMQ Total score Time 2           |                                  | 69.84                  | 9.97      | 50-98        |
| DMQ Detachment Time 1            |                                  | 13.39                  | 4.20      | 5-25         |
| DMQ Detachment Time 2            |                                  | 14.03                  | 4.10      | 5-24         |
| DMQ Meta-awareness Time 1        |                                  | 12.58                  | 1.59      | 8-15         |
| DMQ Meta-awareness Time 1        |                                  | 12.13                  | 2.19      | 6-15         |
| DMQ Thought Control Time 1       |                                  | 11.74                  | 2.68      | 5-18         |
| DMQ Thought Control Time 2       |                                  | 11.84                  | 2.49      | 6-16         |
| DMQ Cognitive Decentering Time 1 |                                  | 18.45                  | 3.35      | 9-25         |
| DMQ Cognitive Decentering Time 1 |                                  | 18.13                  | 2.96      | 10-23        |

## **Appendix E: Rationale for ATT & Socialization to the Model**

Adapted from: Wells, A. (2009). *Metacognitive Therapy for Anxiety and Depression*. New York: Guilford Press.

**PTSD symptoms are a normal part of adaptation to a traumatic experience.**

Intrusive thoughts, arousal responses, flash backs, nightmares and startle responses are normal and necessary after trauma. They are a sign that you are attempting to process the trauma and adjust to the event in a way that enhances future coping. However some coping strategies and thinking styles have an effect of preventing this process from reaching completion because they maintain a sense of threat. Specifically worrying about danger in the future, repeatedly going back over the trauma in your mind and trying to suppress thoughts and avoid them.

**Healing metaphor – recovery does not require the excessive use of current strategies.**

Overcoming a psychological injury caused by trauma is very much like overcoming a physical injury such as a cut to the skin. If you think of a physical injury the body has its own way of healing an injury over time. But what would happen if you tried to make the injury heal, say by picking at the scar and repeatedly cleaning the wound? How quickly would it heal?

Trauma symptoms are like this. Overtime the mind can heal itself and this often occurs. However, just like a flesh wound, if you interfere with the healing process it can take longer and symptoms can persist. You are interfering in the healing process by engaging in worry and rumination, by avoiding thoughts, and by keeping attention focused on threat. These processes can be difficult to stop initially. ATT will help you to develop a new relationship with thoughts and develop flexibility in your thinking that will enable the healing process to resume.

**Attention Training:**

Attention training technique is a metacognitive treatment technique which aims to stop self-focused attention, can make it easier to break free of old and unhelpful thinking patterns and facilitate healthy processing of the trauma. ATT works by increasing your level of mental flexibility. It strengthens and restores internal mental control mechanisms and to understand this it can be likened to mental fitness training. We all know that being physically fit helps build resistance to disease and helps fight infection. If we are flexible in the way that we think this level of mental fitness helps recovery from psychological distress.

The aim of the technique is not to distract you from upsetting thoughts or feelings. In fact these are likely to occur as you practice. You must not try to stop them. If you have negative thoughts or feelings treat them as inner – noises. The aim is to continue to follow the procedure whilst allowing these inner experiences to take care of themselves. You can simply think of these experiences as passing events in your mind and body.

I would like to practice this technique twice, once in the morning and in the evening. If possible ban rumination (going over the trauma), worry, and threat monitoring. These are all examples of picking the scar.

1. Are PTSD symptoms normal?

2. What does recovery from PTSD require you to do?

3. What can you do to help change these thinking patterns and let these thoughts take care of themselves?

## **Appendix F: Letter of Ethical Approval**

Sheila Callinan  
305, 15 The Hacienda  
Whitworth Street West  
Manchester  
M1 5DE

12 October 2009

Dear Shelia

**Re: Feedback from Research Sub-Committee - 12<sup>th</sup> October 2009**

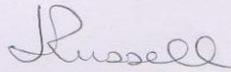
Thank you for your revised research proposal which was considered by the Research Sub-Committee Meeting on 12<sup>th</sup> October 2009. The committee were satisfied that the revisions made were appropriate and in accordance with the feedback from the meeting of 14<sup>th</sup> September and you may now proceed with the research project as set out in your revised proposal. We would, however, recommend that you consider the following suggestions.

- Consider using an alternative measure to the CNS Vital Signs (see paper recommended by Richard Brown). Using an alternative measure may enable you to give a larger reward in the prize draw.
- You advised distressed participants to contact their GP, the counselling service or self-help organisations and you do not agree to meet with them again. It would be a good idea to contact the counselling service and inform them about your plans to advise participants to contact them.
- Your screening question related to Criterion A for PTSD and you omitted the term 'traumatic'.

For the purposes of ethical scrutiny by relevant NHS and/or University bodies, this letter may be taken as confirmation that your research proposal has been independently reviewed and that it is considered to meet necessary scientific and methodological standards.

On behalf of the Research Subcommittee, we wish you good luck with your research work.

Yours sincerely

A handwritten signature in cursive script, appearing to read "K Berry".

**Dr Katherine Berry**  
**Clinical Lecturer**  
**Panel Chair, Research Sub-Committee**

cc *Professor Adrian Wells*

## **Appendix G: Participant Information Sheet**

## School of Psychological Sciences

### Participant Information Sheet

**Title of project:** A study of the effects of attentional training technique (ATT) on intrusive thoughts and emotions following a stressful life event.

**Introduction:** People usually experience distressing events (e.g. being a victim of crime) over the course of their life time. Intrusive thoughts after these events are common and are considered to be part of a normal emotional process. These thoughts can become problematic when people respond to them by changing their pattern of attention or thinking. The present study sets out to look at whether practicing specific attention exercises will help to alleviate intrusive thoughts and discomfort.

**What will I be asked to do if I take part?** The first part of this study involves responding via email to the questions: "Has a stressful event happened to you, such as a crime or car accident or a threat to your personal safety? Do you get intrusive thoughts about it that you find uncomfortable?" You will be asked to rate your level of discomfort and if considered eligible for the study invited to take part in the experiment. This study involves two sessions which will take place on two separate days. Each which will be arranged by the researcher. You will be asked to complete three short questionnaires. You will be asked questions that will assess: your emotions (e.g. fear), the impact of the distressing event (e.g. I tried not to think about it), the level of awareness that you have of your own thoughts (e.g. I can let go of my thoughts even if I am worried) and your ability not to engage with them when you are stressed (e.g. I can let go of my thoughts even if I am worried). Here, and only if you agree, you will be asked to report an unpleasant experience that happened to you. This will be recorded on a tape and will be destroyed at the end of the experiment. You will be randomly allocated to one of two groups. Depending on the group, you will be given an attention task to complete. This may involve listening to a cd, or completing letter and number finding tasks. You will also be asked to complete a computer task. You may also be given a short home-work task to complete. On the second session you will repeat the task as in the first session, and then you will listen to your narrative that was recorded in the previous session. You will be asked to complete the same questionnaires and ratings scales as in the first session. You will also be asked to complete the computer task again. You will receive course credits (if eligible) or £10 as compensation for your time.

**Will my data be confidential?** All information collected as part of this study will be treated in the strictest of confidence. Personal details and responses will be kept on a separate database. Only the researcher and supervisor will have access to it. The results of the study will be published in articles in psychology journals so that other psychologists can read about the research. It will not be possible to identify who you are from any results.

**Do I have to take part?** Your participation in the study is completely voluntary. If you decide to take part and then later change your mind, either before you start the study, during it or afterwards, you can withdraw without giving reasons, and if you wish your data will be destroyed.

**Where can I obtain further information if I need it?**

If you have any questions about the study please contact Sheila Callinan by email at [sheila.callinan@postgrad.manchester.ac.uk](mailto:sheila.callinan@postgrad.manchester.ac.uk) or the study supervisor Professor Adrian Wells at [Adrian.Wells@manchester.ac.uk](mailto:Adrian.Wells@manchester.ac.uk)

**This project has been approved by the  
School of Psychological Sciences Research Ethics Committee**

## **Appendix H: Consent Form**

School of Psychological Sciences

**Consent form**

**Title of Project:** A study of the effects of attentional training technique (ATT) on intrusive thoughts and emotions following a stressful life event.

The participant should complete the following part of this sheet him/herself

|   |                                 |
|---|---------------------------------|
| 1. Have you read the Participant Information Sheet?   | <b>YES/NO</b><br>Initials:..... |
| 2. Have you received enough information about the study?  | <b>YES/NO</b><br>Initials:..... |
| 3. Do you consent to be audio taped as detailed in the Participant Information Sheet?   | <b>YES/NO</b><br>Initials:..... |
| 4. Do you understand that you do not need to take part in the study and if you do enter you are free to withdraw:-<br>* at any time<br>* without having to give a reason for withdrawing<br>* and without detriment to you? | <b>YES/NO</b><br>Initials:..... |
| 5. Do you agree to take part in this study?   | <b>YES/NO</b><br>Initials:..... |

**Name of participant:** ..... **Signed:** ..... **Date:** .....

**Name of researcher: Sheila Callinan** ..... **Signed:** ..... **Date:** .....

|  |                                 |
|--|---------------------------------|
| Do you consent for the audio tapes to be retained and used for future studies? | <b>YES/NO</b><br>Initials:..... |
|--|---------------------------------|

**Name of participant:** ..... **Signed:** ..... **Date:** .....

**Name of researcher: Sheila Callinan** ..... **Signed:** ..... **Date:** .....

**This project has been approved by the  
School of Psychological Sciences Research Ethics Committee**

## **Appendix I: Type of Stressor**

### Stressful life events reported (N = 60)

| Type of Stressor  | Reported Stressors  | N  |
|---|---|----|
| Death of close family member or friend                              | Death of father from cancer, death of mother from substance misuse, death of grandmother from natural causes, death of close friend from suicide, death of best friend's mother, death of friend from illness | 6  |
| Sexual Assault  | Sexual assault by stranger, sexual assault by family friend, rape   | 5  |
| Physical Assault  | Domestic violence, physical assault by gang, physical assault at home, being mugged, being stalked and threatened, held at knife point and mugged   | 12 |
| Motor Accident  | Car accident while driving or as a passenger  | 12 |
| Initial shock of discovering illness to self or loved one           | Diagnosis and treatment of cancer, burst own ear drum with cotton bud, blood sugars dangerously high (diabetic), back operation, mother nearly died from illness on holiday                                   | 5  |
| Survived accident/incident to self or other                         | Surf accident, witnessed stabbing, witnessed violence at a house party, mother's stalker attempted to break into house, attempted break in by gang of youths, witnessing loved pet cat dying, exam failure    | 11 |
| Stressful period in past (which ended) that brought extreme changes | Family conflict, father sent to prison, relationship breakdown, emotionally abusive father, finding out identity of sister's father, parents' divorce, sister ran away  | 9  |

## **Appendix J: Poster for Recruitment**

# Volunteers Needed for an Attention Training Study

Participants can earn up to 12 credits (if  
eligible) or £10

Following a brief initial screening, participants are needed for an attention training experiment. This will take place on two separate days. The first session will take 1 hour and the second session will also take 1 hour. Both sessions are essential for the experiment.

You may be asked to practice a short exercise twice for homework.

**Incentive:** You will be paid £10 for doing both sessions or receive 12 course credits (6 per session).

**Interested in taking part?** Please contact Sheila at [sheila.callinan@postgrad.manchester.ac.uk](mailto:sheila.callinan@postgrad.manchester.ac.uk)

This study is being carried out by Sheila Callinan as part of her ClinPsyD research, under the supervision of Professor Adrian Wells, from the School of Psychological Sciences.

**THIS PROJECT HAS BEEN APPROVED BY THE  
SCHOOL OF PSYCHOLOGICAL SCIENCES RESEARCH ETHICS COMMITTEE**