University of Exeter

Doctorate in Clinical Psychology

Extensive Literature Review

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Title: Attachment Security-Priming and Emotional Dysregulation in PTSD

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Abstract: 197

Statement of academic probity and professional practice:

“I certify that all material in this assignment / assessment which is not my own work has been identified and properly attributed. I have conducted the work in line with the BPS DCP Professional Practice Guidelines. This research contributes to the overall DClinPsy degree.”

Signed:
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Research shows a strong association between an attentional bias to threatening stimuli and emotional regulation difficulties—specifically heightened activation of neural areas involved in emotional-processing and regulation, in individuals with PTSD. Theoretical and research evidence posits that the enhancing of felt-security through attachment security-priming may grant an individual access to effective emotion regulation strategies.

This review examines the literature pertaining to attentional bias toward threatening stimuli, and the research surrounding the neural mechanisms known to be implicated in the dysregulation of emotion, and which may be associated with attentional bias in PTSD patients. Attachment and emotional regulation theory, and security-priming literature is reviewed to assess the feasibility of applying security-priming to a trauma population.

Studies have successfully applied security-priming methods to healthy-control samples instigating favourable changes on a range of behavioural and clinical variables. However, there is a need for further research to determine the most effective security-priming methodology, and to determine efficacy in clinical samples. It is concluded that it is theoretically feasible that positive findings in security-priming could be extended to offer a new treatment approach to address emotion regulation difficulties, specifically the evidenced attentional bias to threat and neural activation abnormalities in PTSD sufferers.

Keywords: Attachment, trauma, PTSD, priming, attentional bias, amygdala, medial prefrontal cortex, mPFC, neural
Post-traumatic stress disorder (PTSD) is characterised by the persistent re-experiencing of a traumatic event, autonomic, affective and cognitive hyper-arousal, and symptoms of cognitive and behavioural avoidance of stimuli associated with the event (American Psychiatric Association, 2000).

Approximately 60% of people at some point in their lives will experience a serious trauma relating to combat, sexual assault, major accident or other real-life horror (Kessler et al., 1995). It is estimated between 8-30% of individuals will go onto develop symptoms of PTSD (Breslau et al., 1991; Jones & Barlow, 1990; McFarlane, 2000).

A number of models have been proposed to try and understand what causes and maintains PTSD (Brewin, 1989; Ehlers & Clark, 2000; Foa & Rothbaum, 1998; Jannoff-Bulman, 1992). A common assumption across theories is that the development of PTSD is a consequence of impaired emotional processing of a traumatic event, rather than exposure to the trauma itself.

PTSD is known to be associated with ineffective emotion regulation, specifically, the inability to learn and autonomously achieve feelings of safety, with sufferers often oscillating between experiences of hyper-arousal and emotional numbing (Lanius, Bluhm, & Frewen, 2011). Attentional bias (AB) to threat and abnormal activation in the emotional processing neural centres (Rougemont-Bucking et al., 2011), are evidenced to contribute to the emotional dysregulation found in symptomatic trauma-exposed individuals. Further research is required to provide behavioural and neural evidence of ways to help trauma-survivors learn safety.

This review will examine relevant literature pertaining to impaired cognitive and emotional processing in PTSD, and examine the viability of a novel approach to address these impairments based on secure attachment-priming methods research. This review will first outline the literature that has examined AB to threatening stimuli in trauma samples.
Research will then be reviewed surrounding the neural mechanisms which may be associated with AB in PTSD, specific regions of interest include the amygdala and medial prefrontal cortex (mPFC), known to be implicated in the dysregulation of emotion. Attachment resilience and security-priming literature will then be reviewed to assess the feasibility of extending security-priming to a trauma population. It is of interest to integrate these bodies of research to gain a greater understanding of the potential role of attachment security in improving emotion regulation in PTSD patients.

**Search Strategy**

PsychInfo and PubMed databases were searched for AB studies using the key words attention*, bias*, selective attention*, Stroop, dot-probe, probe detection or visual search, intersected with pts* (PTSD), post-trauma* and trauma. Search terms for the neural mechanisms of AB in PTSD were neural, fMRI, functional, imaging, neur*, amygdala, medial prefrontal cortex and mPFC, intersected with pts* (PTSD), post-trauma* and trauma. Search terms for attachment-priming literature were attach* (attachment), affect*, secur* intersected with prim* (priming). In addition, these databases were searched with the names of known researchers in the field, and references of obtained articles were searched for additional relevant studies. Papers not written in English were excluded.

**Cognitive Factors Maintain PTSD: The Role of Attentional Bias**

An AB refers to a phenomenon whereby a threatening stimulus acts to disrupt an individual’s cognitive activities due to an involuntary re-allocation of resource-limited attention to that stimulus, and hyper-vigilance towards threatening stimuli has been indicated in the maintenance of the symptoms of PTSD (Constans, 2005; El Khoury-Malhame et al., 2011a). Consistent with this, a plethora of studies report that individuals with PTSD demonstrate an AB toward threat-related stimuli on AB experimental paradigms. The
majority of these findings have been measured using the modified Stroop task (MST) which requires participants to colour name different trauma or threat-related words and neutral words, and it is found that PTSD patients are significantly slower to name the colour of trauma/threat-related words (Ashley et al., 2013; Beck, Freeman, Shiperd, Hamblen, & Lackner, 2001; Buckley, Blanchard, & Neill, 2000; Buckley, Blanchard, & Hickling, 2002; Constans, McCloskey, Vasterling, Brailey, & Mathews, 2004; Emilien, Penasse, Charles, Martin, Lasseaux, & Waltregny, 2000; McNally, Kaspi, Bradley, & Zeitlin, 1990; McNally, 1998; Moradi, Taghavi, Heshat, Doost, Yule, & Dalgleish, 1999). This bias is thought to occur because the accessibility of trauma-related thoughts is much greater and interferes with the colour-naming of threat-related words (Cohen, Dunbar, & McClelland, 1990).

Despite this wealth of evidence demonstrating an AB, use of the MST paradigm with traumatised populations has been criticised by AB researchers (Weierich, Treat, & Hollingworth, 2008). It is argued that the MST may tap into processes other than AB, specifically that the response interference on the task may occur as a result of the emotional arousal associated with the threatening stimuli presented rather than for reasons relating to attention allocation (McKenna & Sharma, 2004). Additionally, studies report not finding an AB using the MST with a PTSD patient sample (Devineni, Blanchard, Hickling, & Buckley, 2004; Freeman & Beck, 2000) or have not been able to consistently replicate this finding in samples with different types of trauma (Dubner & Motta, 1999). A recent review of the modified Stroop effect literature in PTSD questions whether the phenomenon has been subject to publication bias (Kimble, Frueh, & Marks, 2009), where studies with non-significant findings or findings which do not favour the current scientific discourse are not published (Rosenthal, 1979).

An alternative AB experimental paradigm is the dot-probe task (MacLeod, Mathews, & Tarta, 1986; Mogg & Bradley, 1999). In this design, a pair of stimuli made up of one
neutral and one emotionally-valenced word or picture is presented on a screen. Immediately following this, a probe (a dot) replaces the position of one of the stimuli and the participant is required to respond to indicate the position of the probe on the screen (top vs. bottom). Faster responses to probes that replace emotionally salient stimuli are taken to reflect ABs toward that stimuli (e.g. threatening), whereas faster responses to probes that follow neutral stimuli are thought to reflect biases away from emotionally-valenced stimuli.

Whilst this paradigm has reliably elicited findings of AB toward threat in other anxiety disorder populations (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007), the number of published studies reporting an AB towards threat in PTSD patient samples using the dot-probe paradigm are limited compared to the MST literature (Bryant & Harvey, 1997; El-Khoury-Malhame et al., 2011b; Elsesser, Sartory, & Tackenberg, 2004; Fani et al., 2012).

Other types of AB have been identified in PTSD samples, such as the ‘vigilance-avoidance’ hypothesis, where individuals also show a bias away from threat-stimuli on the dot-probe task (Dalgleish et al., 2003). However, this finding is not a robust one in comparison to literature showing bias toward threat-stimuli, and has been most strongly evidenced in a heterogeneous diagnostic sample made up of depression and trauma diagnoses, where bias away from threat was more strongly associated with depression-related stimuli, rather than trauma-related stimuli.

In addition to the MST and dot-probe task, AB has been recorded using several other different paradigms (Cisler & Kister, 2010), which suggests that the phenomenon is real and not a product of experimental artefact.

**Emotional Dysregulation in PTSD as a Mechanism for Attentional Bias**

It still remains unclear as to the precise mechanisms underlying the AB elicited by these paradigms and a variety of theoretical models have been proposed to explain the
phenomenon (reviewed by Cisler & Koster, 2010). In studies using individuals with anxiety disorders, consistent patterns of AB have been demonstrated. The underlying neural mediating mechanisms of this AB are thought to involve a hyper-active amygdala (Davis & Whalen, 2001), and a hypo-active mPFC (Bishop, Duncan, Brett, & Lawrence, 2004) responsible for attentional control\(^1\). Current neuroimaging research with a PTSD sample has also evidenced AB on the dot-probe task to positively correlate with activity in the amygdala (El-Khoury-Malhame et al., 2011b). Moreover, high attentional control has been shown to be a protective factor against difficulties disengaging from threat stimuli on a dot-probe paradigm in those with high post-traumatic stress symptoms (Bardeen & Orcutt, 2011).

A plethora of functional neuroimaging research has examined the mediating neural mechanisms of the symptoms of PTSD. These studies have primarily used symptom provocation (eliciting measurable post-traumatic symptoms in individuals) and cognitive activation designs (paradigms design to measure specific cognitive process(es)). Whilst the former is still the most widely used, cognitive activation studies allow for a more specific exploration of impairments in neuronal processing associated with PTSD by using a validated cognitive paradigm, such as the dot-probe task. Following meta-analysis (Etkin & Wager, 2007) and comprehensive reviews of this research (refer to McNally, 2006; Garfinkel & Liberzon, 2009; Shin, Rauch, & Pitman, 2006; Shin & Liberzon, 2010), pathophysiological explanations of PTSD have identified abnormalities in the neural structures involved in the processing of and emotional regulation associated with threatening stimuli, implicating a hyper-responsive amygdala and hypo-responsive pre-frontal cortical regions.

The amygdala is involved in the assessment of threat-related stimuli (Davis & Whalen, 2001). PTSD patients have been found to show an exaggerated amygdala response.

\(^1\) Attentional control refers to one’s ability to use higher level executive functioning to regulate automatic emotional responses (Eysenck, Derakshan, Santos, & Calvo, 2007).
to threat-related stimuli (Morey et al., 2009), and amygdala activation is also reported to positively correlate with PTSD symptom severity (Armony, Corbo, Clement, & Brunet, 2005). The mPFC, a higher order cortical structure, serves a regulatory purpose and acts to suppress or down-regulate the activation of limbic structures including the amygdala (Eippert et al., 2007; Miller & Cohen, 2001). A wide range of functional neuroimaging studies report diminished activity or failure to activate in the mPFC in PTSD patients in symptom provocation studies (Hou et al., 2007) and cognitive activation studies (Bremner et al., 2004). An inverse correlation is also found between mPFC activation and PTSD symptom severity (Dickie, Brunet, Akerib, & Armony, 2008). In addition, poor response to psychological therapy has been reported to be significantly associated with heightened amygdala activation at treatment baseline (Bryant et al., 2008).

The scientific evidence remains largely unclear as to whether AB and heightened amygdala activity act as a risk factor for post-traumatic stress, or the position that these phenomena are concomitant cognitive and neural manifestations that arise as a result of a post-traumatic stress response. A diminished AB has been found to be associated with amelioration of post-traumatic stress symptoms (El Khoury-Malhame et al., 2011a), and AB has been shown to be strongly positively correlated with amygdala activity (El Khoury-Malhame et al., 2011b). Furthermore, PTSD treatment studies have shown that symptom reduction in response to psychotherapy in PTSD patients is associated with decreased amygdala activation (Peres et al., 2007). This may provide preliminary evidence which lends support to the latter position.

Reviews of animal models and human neuroimaging studies suggest that the dysregulation to threat-stimuli shown by the hyper-responsive amygdala and hypo-responsive mPFC are strongly associated with the dys-regulation of negative affect (Hayes, Hayes, &
Mikedis, 2012; Liberzon & Sripada, 2008; Shin et al., 2005) which may act as an important mechanism which maintains the symptoms of PTSD such as hyper-vigilance or AB to threat.

A wealth of research exists showing consistently similar findings for a range of anxiety disorders (Bar-Haim et al., 2007), suggesting that a general deficit in emotion regulation may be common for a number of anxiety disorders. This would suggest that by focusing intervention on an individual’s emotion regulation, it may bring about favourable changes in symptoms for a variety of clinical anxiety disorders. These findings identify an individual’s emotional regulation centres as a treatment target for an attachment-based psychological intervention, which this research suggests may modulate AB in PTSD patients. Attachment theory and priming research which may offer this will now be reviewed.

**Attachment Theory**

An attachment relationship refers to the emotional bond between an individual and an attachment figure; usually a primary care-giver who attends to the individual’s basic physical and psychological needs and care (Bowlby, 1973, 1980, 1982). Attachment theory posits that during childhood, patterns of social interactions with attachment figures are internalised in the form of conscious and unconscious mental representations of self and relationship partners, referred to as a person’s internal working model (IWM). These social experiences with attachment figures act to shape and define the parameters of an individual’s IWM resulting in relatively stable individual differences in attachment styles and result in specific emotion regulation strategies (Main, Kaplan, & Cassidy, 1985).

Individuals with a consistently physically and emotionally available and responsive attachment figure would facilitate the efficient restoration of normal affect and feelings of security through enactment of what Main (1990) refers to as the primary attachment strategy,

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2 A pattern of generalised expectations, emotions, beliefs about the self, the world, others and relationships with significant others that arise from an individual’s attachment history (Cassidy & Shaver, 2008)
and are likely to go onto develop a positive IWM, that is, a secure global attachment style\(^3\). Conversely, individuals under the care of an attachment figure who is not consistently available at times of need are likely to internalise negative IWMs, an insecure global attachment style\(^4\).

The failure of the primary attachment strategies often results in compensatory strategies being recruited which involve the use of secondary attachment strategies, consisting of hyper-activation (up-regulation of attachment behaviours: e.g. hyper-vigilant to rejection, longing for close emotional bonds) or deactivation (down-regulation of attachment behaviours: e.g. suppress the need for close emotional bonds) of the attachment system (refer to Main, 1990; Mikulincer & Orbach, 1995; Vetere & Myers, 2002). In adult attachment studies, these secondary attachment strategies of hyper-activation and deactivation of the attachment system closely marry to the two dimensions used to conceptualise and measure an insecure attachment; attachment anxiety\(^5\) and attachment avoidance\(^6\), respectively (Brennan, Clark, & Shaver, 1998). Individuals who achieve low scores on both these dimensions can be said to possess a secure attachment style.

\(^3\) Positive expectations about themselves and others, and go on to successfully recruit the primary attachment strategy in their individual emotion regulation abilities to successfully be autonomous in restoring their internal world to a state of equanimity (Bowlby, 1973; Main, 1990).

\(^4\) Patterns of expectations that lack confidence in whether their proximity-seeking behaviours are able to attain security, in whether the world is a safe place, that trust can be placed in others to respond to their needs, and that the self is efficacious in restoring their emotional world to equanimity (Bowlby, 1973; Main, 1990).

\(^5\) High attachment anxiety is marked by fear of abandonment and rejection by a significant other, and low self-worth to other people and scores on this dimension reflect the degree to which a person relies on hyper-activating strategies.

\(^6\) High attachment avoidance is represented by discomfort with closeness to others and reluctance to depend on relationship partners and scores on this dimension reflect the degree to which a person relies on deactivating attachment strategies.
Early attachment relationships have been shown to have a significant impact on the development of emotional regulation neuronal structures (Schore, 1994; Gerhardt, 2004), and influence later development and adulthood life. The early attachment relationship is thought to provide the foundation for learning emotional self-regulation (Cassidy, 1994; Calkins, 2004; Sroufe, & Waters 1977), that is, the ability to modulate one’s own emotional experience and cope with arousal to maintain, functional but not debilitating levels of emotion (Cole, Martin, & Dennis, 2004).

**Attachment and Emotional Regulation**

The activation of the attachment system remains important across an individual’s entire life span impacting on how successfully an adult regulates negative affect (Coan, 2008; Coan, 2010; Thompson, 2008) and how effectively an individual implements the primary attachment strategy (Main, 1990).

Based on a comprehensive review of adult attachment studies, Mikulincer & Shaver (2003) have proposed a three-phase model of attachment-system dynamics in adulthood in relation to the regulation of negative affect, which elucidates how adults with different global attachment styles may engage in different ways of coping (refer to Appendix 1). This model proposes that the first component concerns monitoring of threat and when a potential or actual physical or psychological threat is detected by an individual, this activates the attachment system. The second phase involves the individual implicitly or explicitly deciding if an attachment figure is available and responsive to their needs. The answer to which determines the third phase and the individual’s use of primary or secondary attachment strategies, facilitating the application of affect-regulation strategies that are likely to be congruent with their dominant attachment style. If the individual appraises that attachment figures are available and responsive, the individual will successfully employ primary attachment strategies aimed to alleviate distress, maintain supportive relationships and bolster
the individual’s sense of love-worthiness and self-efficacy. Conversely, if the individual perceives an attachment figure to be unavailable or unresponsive to their needs, they go on to employ generally less effective secondary attachment hyper-activating or de-activating strategies.

This model is supported by robust empirical research linking attachment style and emotional regulation ability. Research shows that infants (Berlin & Cassidy, 2003), adolescents (Shapiro & Levendosky, 1999) and adults (Bonn-Miller, Vujanovic, Boden, & Gross, 2011; Mikulincer, 1998a) who possess secure attachment styles are found to be more successful in their use of strategies for coping with negative affect. Conversely, an insecure attachment style has been empirically linked with less effective emotion regulation in both infants (NICHD: Early Child Care Research Network, 2004) and adults (Mikulincer, 1998b; Troisi & D’Argenio, 2004; Mikulincer & Shaver, 2007a).

Concordant with the Mikulincer & Shaver model, neuroimaging research has demonstrated significant associations between insecure attachment style and exaggerated neural activation in emotional regulation centres in response to threat (Buchheim et al., 2006; Lemche et al., 2005; Vrtička, Andersson, Grandjean, Sander, & Vuilleumier, 2008; Vrtička, Bondolfi, Sander, & Vuilleumier, 2012).

Research demonstrates that possessing a secure attachment acts as a resilience factor in how well individuals manage post-traumatic stress, whereby more securely attached individuals are found to employ more successful emotion regulation strategies to restore their internal world to a state of equanimity (Lanius et al., 2011; Tull, Barrett, McMillan, & Roemer, 2007) and exhibit less severe trauma symptoms (Dekel, Soloman, Ginzburg, & Neira, 2004; Kanninen, Punamaki, & Qouta, 2003; Solomon, Ginzburg, Mikulincer, Naria, & Ohry, 1998).
The beneficial implications of a secure attachment on an individual’s emotion regulation abilities may address deficits in emotion regulation known to be strongly implicated in the maintenance of AB in PTSD. Several studies have successfully utilised the resource of a secure attachment by increasing individuals’ felt attachment security by using security-priming to bring about therapeutic gains.

**Primed a Secure Attachment**

It has been theorised and evidenced that attachment felt-security within an individual can be temporarily enhanced through cognitive methods involving conscious or unconscious exposure to attachment security-related stimuli through attachment ‘security-priming’ (SP).

SP involves making a secure attachment relationship or figure consciously (supraliminally) or unconsciously (subliminally) salient to an individual using an attachment security related priming stimulus. SP makes mental representations of attachment figures symbolically available –concentrated at the second phase of Mikulincer & Shaver’s three-phase model of adult attachment-system activation, and is believed to help facilitate the primary attachment strategy to augment a person’s sense of felt security and facilitate access to the primary attachment strategy to effectively emotionally regulate.

The exact mechanisms underlying SP are not well understood. However, cognitive models of spreading activation⁷ offer an explanation of the cognitive mechanisms that may underlie priming of IWMs. A person’s dominant attachment style is thought to be just the most accessible node in a complex hierarchical mental network of attachment-related thoughts, thus allowing the potential for different IWMs to be activated corresponding to

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⁷ The idea that mental representations are organised into large networks of cognitive nodes which excite or inhibit each other depending on if the representation is congruent or not with the presented stimuli. Associative networks have been hypothesised to underlie different attachment orientations, making different IWM self-maintaining (Collins & Loftus, 1975).
different kinds of attachment experiences (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996; Mikulincer & Shaver, 2003; Mikulincer & Shaver, 2007a). Therefore, SP is theorised to be effective for people who possess a dominant insecure attachment through the potential to activate secure IWMs that are incongruent with their dominant attachment disposition.

Secure attachment-related mental representations have been found to be successfully activated by retrieval of both actual or imagined past encounters with supportive significant others (Baldwin et al., 1996; Gillath, Selcuk, & Shaver, 2008). Different SP methods have been used in an attempt to activate security related mental representations. These include presenting participants with names of attachment figures (Mikulincer, Shaver, Gillath & Nitzberg, 2005), attachment-related words (Miterany, 2006 as cited in Mikulincer, Shaver, & Horesh, 2006), attachment-related pictures (Beckes et al., 2010; Mikulincer, Hirschberger, Nachmias & Gillath, 2001; Norman, Lawrence, Iles, Milad & Karl, submitted), by asking participants to recall a memory of an experience of a secure attachment (Gillath, Sesko, Shaver, & Chun, 2010), or write about a person who they feel they have a secure attachment with (Carnelley & Rowe, 2007).

Successful SP and the temporary activation of secure representations has been reported to influence a diverse range of participant variables including reducing cognitive body distortions in eating disordered patients (Admoni, 2006, as cited in Mikulincer & Shaver, 2007b); Reduced snack-food intake (Wilkinson, Rowe, & Heath, 2013); Increased mood (Mikulincer et al., 2001); Facilitate recovery following recall of a distressing memory (Selcuk et al., 2012); Reduced stressful intrusions after exposure to a traumatic film (Arikan et al., 2012); Reduced prejudicial negative attitudes towards members of an out-group (Mikulincer & Shaver, 2001); Enhanced expectations about significant relationships and more positive views of oneself (Carnelley & Rowe, 2007); Increased compassion for others’ distress (Mikulincer et al., 2005); Reduced cortisol levels, self-reported stress and increased
self-esteem (Dandeneau, Baldwin, Baccus, Sakellaropoulo, & Pruessner, 2007); Reduced dishonesty (Gillath et al., 2010); Decreased aggression (Mikulincer & Shaver, 2007b); A greater tolerance of pain (Rowe, Carnelley, & Harwood, 2012), and enhanced creative problem solving (Mikulincer, Shaver, & Rom, 2011).

Functional neuroimaging studies examining SP report a post-SP decrease in negative-affect related neural activations including in the amygdala, associated with social rejection (Karremans, Heslenfeld, van Dillen, & Van Lange, 2011), physical pain (Coan, Schaefer, & Davidson, 2006; Coan, Kasle, Jackson, Schaefer, & Davidson, 2013; Eisenberger et al. 2011), and threatening stimuli (Norman et al., submitted).

SP methods have been found to be successful when presented supraliminally and subliminally, with neither one overall being empirically proven to be more efficacious in increasing felt-security (Gillath et al., 2008; Mikulincer et al., 2005). However, a recent priming study that employed both methods reported that only supraliminal priming was subject to the moderating effects of attachment anxiety and attachment avoidance, whilst subliminal priming impacted on the target variable of creative problem solving regardless of attachment disposition (Mikulincer et al., 2011). This may suggest that subliminal priming is superior to supraliminal methods as it is outside of the participant’s awareness and less vulnerable to the disruptive influences of attachment insecurity and demand characteristics.

The susceptibility of individuals with dominant insecure attachment styles to secure primes has been explored. Some studies report SP to have beneficial effects on participants regardless of their attachment disposition where there is no interaction between attachment insecurity and security prime (Carnelley & Rowe, 2007; Mikulincer et al., 2001; Mikulincer et al., 2005; Norman et al., submitted; Shaver, Mikulincer, Lavy, & Cassidy, 2009), other studies have reported high scores on attachment insecurity dimensions are associated with
less response to SP (Gillath et al., 2006; Miterany 2004, as cited in Mikulincer et al., 2006; Mikulincer et al., 2011).

Attachment-related primes have been reported to be more effective and powerful in achieving changes in participants compared to neutral and emotionally positive but attachment unrelated stimuli (Mikulincer & Shaver, 2001; Mikulincer et al., 2001). This suggests that attachment SP is influencing something more than just changes in affect, and the successful application of SP to such a diverse range of samples suggests that this intervention is tapping into the global construct of attachment.

One study exists which has attempted to security-prime trauma-exposed individuals (Miterany, 2004, as cited in Mikulincer et al., 2006). Using the MST, it was found that AB was abolished in individuals who report post-traumatic stress symptoms following subliminal priming with an attachment-related word (e.g. love). The study concluded that the accessibility of trauma-related thoughts was reduced by priming individuals with an attachment-security stimulus, effectively activating a secure attachment IWM to counter AB processes.

The Miterany study’s findings extend those of priming studies reviewed to a PTSD sample; however the study does have several limitations. The methodologically flawed MST is used in the design, and future research should seek to replicate the study using a more methodologically sound cognitive activation paradigm. Secondly, this study employed a homogeneous trauma-type sample, namely wartime-related trauma, and research is required to investigate if the healing effects of a SP can be used with a wider range of trauma-types. The prognosis is promising given that the finding of impairment in cognitive and neural processing to threatening stimuli is a robust one and has been found in PTSD patients regardless of their index trauma.
Synopsis and Future Directions

The research reviewed demonstrates a strong association between AB and PTSD diagnosis. It is also widely reported in the research literature that abnormalities exist in the activity of areas known to be involved in emotional processing and regulation in PTSD patients, and that these patterns of abnormal activation correlate with PTSD symptoms and AB. Theoretical and research evidence reviewed shows that the manipulation and increasing of felt attachment security is able to bring about favourable changes on a wide range of behavioural and clinical variables, by potentially facilitating access to effective emotion regulation strategies.

A general weakness of the reviewed SP research is that most of the studies have employed analogue samples, and therefore generalisability of the findings to clinical samples remains limited. SP may offer a feasible novel way to address the cognitive and underlying neural impairments found in PTSD sufferers. Further research is required to elucidate the cognitive and neural substrates of SP, specifically to examine the impact of attachment SP on neural activation in the identified neural areas of deficit, to explore if this may result in enhanced activation and decreased AB to threat in a PTSD sample. Further work is also required to explore which is the most effective SP paradigm and methodology, and how individual differences in trait attachment security affect individuals’ susceptibility to SP interventions.
References


- Signs of threat?
  - YES
    - Activation of the attachment system
      - Seeking proximity to external or internalized attachment figure
        - Is an attachment figure available, attentive, responsive, etc?
          - YES
            - Attachment security; effective co-regulation
              - Engagement in Non-attachment activities (e.g., exploration, caregiving)
          - NO
            - Attachment insecurity (compounding of distress)
              - Is proximity seeking a viable option?
                - NO
                  - Deactivating strategies
                - YES
                  - Hyper-activating strategies
                    - Hyper-vigilance regarding threat and attachment-related cues
            - Distancing of threat and attachment-related cues
  - NO
    - Continue with ongoing activities
Appendix 2.  *Journal of Abnormal Psychology – Instructions to Authors*

**Submission**

Submit manuscripts electronically (in .rtf or .doc format) via the Manuscript Submission Portal.

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Editor, Journal of Abnormal Psychology  
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Emory University  
36 Eagle Row  
Atlanta, GA 30322

General correspondence may be directed to the Editor's Office.

In addition to postal addresses and telephone numbers, please supply electronic mail addresses and fax numbers, if available, for potential use by the editorial and production offices.

**Masked Reviews**

Masked reviews are optional and must be specifically requested in the cover letter accompanying the submission. For masked reviews, the manuscript must include a separate title page with the authors' names and affiliations, and these ought not to appear anywhere else in the manuscript.

Footnotes that identify the authors must be typed on a separate page.

Make every effort to see that the manuscript itself contains no clues to authors' identities.

**Types of Articles**

Most of the articles published in the Journal of Abnormal Psychology® are reports of original research, but other types of articles are acceptable.

- Short Reports of replications or of failures to replicate previously reported results are given serious consideration.
- Comments on articles published in the journal are also considered.
- Case Studies from either a clinical setting or a laboratory will be considered if they raise or illustrate important questions that go beyond the single case and have heuristic value.
- Manuscripts that present or discuss theoretical formulations of psychopathology, or that evaluate competing theoretical formulations on the basis of published data, may also be accepted.
The Journal of Abnormal Psychology publishes articles on basic research and theory in the broad field of abnormal behavior, its determinants, and its correlates.

The following general topics fall within its area of major focus:

- psychopathology - its etiology, development, symptomatology, and course
- normal processes in abnormal individuals
- pathological or atypical features of the behavior of normal persons
- experimental studies, with human or animal subjects, relating to disordered emotional behavior or pathology
- sociocultural effects on pathological processes, including the influence of gender and ethnicity
- tests of hypotheses from psychological theories that relate to abnormal behavior

Thus, studies of patient populations, analyses of abnormal behavior and motivation in terms of modern behavior theories, case histories, and theoretical papers of scholarly substance on deviant personality and emotional abnormality would all fall within the boundaries of the journal's interests.

Each article should represent a significant addition to knowledge and understanding of abnormal behavior in its etiology, development, or description.

In order to improve the use of journal resources, it has been agreed by the two Editors concerned that the Journal of Abnormal Psychology will not consider articles dealing with diagnosis or treatment of abnormal behavior. Journal and the of Consulting and Clinical Psychology will not consider articles dealing with the etiology or descriptive pathology of abnormal behavior.

Therefore, a study that focuses primarily on treatment efficacy should be submitted to the Journal of Consulting and Clinical Psychology. However, a longitudinal study focusing on developmental influences or origins of abnormal behavior should be submitted to the Journal of Abnormal Psychology.

Articles of five different types will be considered for publication in the Journal: Brief Reports, Regular Articles, Extended Articles, Case Studies, and Commentaries.

- Brief Reports must not exceed 5,000 words in overall length. This limit includes all aspects of the manuscript (title page, abstract, text, references, tables, author notes and footnotes, appendices, figure captions) except figures. Brief Reports also may include a maximum of two figures. For Brief Reports, the length limits are exact and must be strictly followed.
- Regular Articles typically should not exceed 9,000 words in overall length (excluding figures).
- Extended Articles are published within regular issues of the Journal (they are not free-standing) and are reserved for manuscripts that require extended exposition beyond
the normal length restrictions of a Regular Article. Typically, Extended Articles will report multiple experiments, multifaceted longitudinal studies, cross-disciplinary investigations, or studies that are extraordinarily complex in terms of methodology or analysis. Any submission that exceeds a total of 12,000 words in length automatically will be considered for publication as an Extended Article.

- Case Studies and Commentaries have the same length requirements as Brief Reports.

Cover Letters

All cover letters must contain the following:

- the full postal and e-mail address of the corresponding author;
- the complete telephone and fax numbers of the same;
- the proposed category under which the manuscript was submitted;
- a statement that the authors complied with APA ethical standards in the treatment of their participants and that the work was approved by the relevant Institutional Review Board(s);
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