

## COMBAT & OPERATIONAL STRESS

# Research Quarterly

## RECENT PUBLICATIONS

The *Combat & Operational Stress Research Quarterly* is a compilation of recent research on combat and operational stress, including relevant findings on the etiology, course, and treatment of Posttraumatic Stress Disorder (PTSD). The intent of this publication is to facilitate translational research by providing busy clinicians with up-to-date findings, with potential to guide and inform evidenced-based treatment.

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## ASSESSMENT AND TREATMENT

### *Multiple session early psychological interventions for the prevention of post-traumatic stress disorder*

**Sample:** Individuals exposed to a traumatic event

N= 941

**Variables:** PTSD symptoms, early psychological interventions

**Key findings:** There was no observable difference between treatment and control conditions on rates of PTSD after multiple-session early psychological intervention aimed at preventing PTSD. The results also showed a trend toward increased self-report of PTSD symptoms at three- to six-month follow-up in participants who received an intervention.

**Summary and implications:** Previous reviews have concluded that individual psychological debriefing is not an effective intervention for preventing PTSD among individuals who have experienced a traumatic event. As a result, other forms of intervention have been developed recently in an attempt to prevent PTSD. The aim of this review was to examine the efficacy of multiple-session early psychological interventions that were started within three months of the traumatic event. The review included randomized controlled trials of any multiple-session early psychological intervention or treatment designed to prevent symptoms of PTSD. The results from a meta-analysis of eight studies showed that there was no observable difference between treatment and control conditions on rates of PTSD after intervention. The results also showed an increased self-report of PTSD symptoms at three- to six-month follow-up in participants who received an intervention. The results suggest that psychological intervention should not be recommended following traumatic events for the prevention of PTSD if symptoms are not present, and that multiple- and single-session interventions may even be detrimental to some individuals. Further research is needed to evaluate the most effective ways of preventing PTSD in the early stages after the traumatic event.

Roberts, N.P., Kitchiner, N.J., Kenardy, J. & Bisson, J. (2009). Multiple session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews*, (3), CD006869.

### **Cognitive and affective predictors of treatment outcome in cognitive processing therapy and prolonged exposure for posttraumatic stress disorder**

**Sample:** Women with PTSD from a sexual assault  
N=145

**Variables:** Cognitive processing therapy, prolonged exposure, PTSD symptomatology, dropout rates, demographics, cognitive and affective traits

**Key findings:** Higher depression and guilt at pre-treatment were associated with greater improvement in PTSD symptomatology. Older women in prolonged exposure and younger women in cognitive processing therapy had the best overall outcomes.

**Summary and implications:** Cognitive-behavioral therapy (CBT) has been shown to be an effective treatment for PTSD in many studies. The majority of previous studies examining factors affecting treatment outcome primarily have focused on demographic factors or whether the treatment results in a reduction of PTSD symptoms. This study aimed to evaluate cognitive and affective predictors of treatment outcome and dropout rates for two types of CBT, cognitive processing therapy (CPT) and prolonged exposure (PE). Study participants were randomly assigned to one of the two treatments. The results showed that younger age, lower intelligence, and less education were associated with higher treatment dropout. However, higher depression and guilt at pre-treatment were associated with greater improvement in PTSD symptomatology. Dropout rates in PE were higher in women with greater anger at pre-treatment. The results also showed that older women in PE and younger women in CPT had the best overall outcomes. These findings could help reduce dropout rates in CBT and guide efforts to enhance treatment efficacy by matching patients to the appropriate therapy.

Rizvi, S.L., Vogt, D.S. & Resick, P.A. (2009). Cognitive and affective predictors of treatment outcome in cognitive processing therapy and prolonged exposure for posttraumatic stress disorder. *Behaviour Research and Therapy*, 47 (9), 737-743.

### **The impact of dissociation and depression on the efficacy of prolonged exposure treatment for PTSD**

**Sample:** Individuals diagnosed with PTSD  
N= 71 (60 completed)

**Variables:** PTSD symptoms, dissociative phenomena, depression symptoms, fear activation

**Key findings:** Neither dissociative phenomena nor depression in PTSD patients predicted poorer improvement after prolonged exposure treatment. Additionally, neither dissociation nor depression was associated with impeded fear activation during behavioral exposure.

**Summary and implications:** Although exposure-based treatments have been shown to be effective in reducing PTSD symptoms, some patients do not sufficiently benefit from exposure therapy. Past research has only been able to identify a few stable predictors of which patients will benefit from exposure therapy. This study aimed to investigate the impact of

several dissociative symptoms and depression on the effectiveness of prolonged exposure (PE) treatment in PTSD patients. The diagnoses, co-morbidity, pre-treatment depressive symptoms, PTSD symptom severity, and dissociative phenomena of 71 patients with PTSD were assessed at pre-treatment. Participants were also given a pre-treatment behavioral exposure test in which they were imaginably exposed to their trauma memory, during which subjective fear was assessed. After undergoing a standardized PE treatment program lasting eight to 12 weeks, PTSD, depressive and dissociative symptoms were again measured at post-treatment and at six-month follow-up in the 60 participants who completed the study. The results showed that dissociative phenomena and depression were not associated with poorer improvement after PE. Dissociation and depression were associated with enhanced, rather than impeded, fear activation during the behavioral exposure test. However, these effects disappeared after controlling for initial PTSD severity. The results imply that PTSD patients with severe dissociative or depressive symptoms may benefit from exposure therapy similarly to those with minimal dissociative or depressive symptoms.

Hagenaars, M.A., van Minnen, A. & Hoogduin, K.A.L. (in press). The impact of dissociation and depression on the efficacy of prolonged exposure treatment for PTSD. *Behaviour Research and Therapy*.

### **Delayed posttraumatic stress disorder: systematic review, meta-analysis, and meta-regression analysis of prospective studies**

**Sample:** Individuals exposed to potentially traumatic events

**Variables:** Delayed PTSD, demographics, event-related characteristics

**Key findings:** From a meta-analysis of PTSD literature, 25% of PTSD cases could be classified as delayed PTSD. The specific factors that were found to be particularly associated with delayed PTSD were military combat exposure, Western cultural background, and lower cumulative PTSD incidence.

**Summary and implications:** Prevalence estimates of delayed PTSD, defined as the onset of PTSD symptoms at least six months after the traumatic event, have varied extensively in the literature. The aim of this study was to use meta-analytic techniques to establish the prevalence of delayed PTSD in prospective studies and to evaluate associated factors. The 24 studies included in the meta-analysis were longitudinal, prospective studies of humans exposed to a potentially traumatic event. The analysis showed that the proportion of PTSD cases with delayed PTSD was 24.8%. The specific factors that were found to be associated with delayed PTSD were military combat exposure, Western cultural background, and lower cumulative PTSD incidence. The authors also found that participants with initial sub-threshold PTSD were at an increased risk of developing delayed PTSD, indicating that delayed PTSD can represent an exacerbation of prior symptoms.

Smid, G.E., Mooren, T.T., van der Mast, R.C., Gersons, B.P. & Kleber, R.J. (in press). Delayed posttraumatic stress disorder: systematic review, meta-analysis, and meta-regression analysis of prospective studies. *Journal of Clinical Psychiatry*.

## HEALTH AND FUNCTIONING

### *PTSD subclusters and functional impairment in Kosovo peacekeepers*

**Subjects:** Peacekeepers deployed to Kosovo

**N=** 203

**Variables:** PTSD symptom sub-clusters, functional impairment outcomes

**Key findings:** Specific functional impairment outcomes are associated with each of the four PTSD sub-clusters (as defined in this study). Re-experiencing symptoms predicted alcohol abuse; emotional numbing symptoms predicted violent behaviors; while avoidance and hyperarousal symptoms predicted functional impairments in a number of areas, including employment and family relationships.

**Summary and implications:** PTSD is associated with functional impairments in several sectors of life, including various aspects of social and occupational functioning. The aim of this study was to examine the relationship between PTSD symptom sub-clusters (re-experiencing, avoidance, emotional numbing and hyperarousal) and specific functional impairments in 203 peacekeepers deployed to Kosovo who were assessed both before and after the mission. The results showed that avoidance and hyperarousal symptoms uniquely predicted a set of functional impairment outcomes, including the areas of employment, family relationships, and social functioning. In addition, emotional numbing was the only significant predictor of violent behaviors. Finally, re-experiencing symptoms were the only significant predictor of alcohol abuse problems. The authors conclude that specific functional impairment outcomes are associated with each of the four PTSD symptom sub-clusters as defined in this study. (Note: The DSM-IV-TR combines avoidance and numbing into one sub-cluster.) These results have important implications for the evaluation and treatment of veterans returning from deployment.

Maguen, S., Stalaker, M., McCaslin, S. & Litz, B.T. (2009). PTSD subclusters and functional impairment in Kosovo peacekeepers. *Military Medicine*, 174 (8), 779-785.

### *Mild traumatic brain injury and posttraumatic stress disorder and their associations with health symptoms*

**Sample:** Male U.S. Army Vietnam-era veterans with and without brain injury

**N=** 4044

**Variables:** Mild traumatic brain injury, PTSD, physical, cognitive and emotional symptoms

**Key findings:** Mild traumatic brain injury (mTBI) was associated with headaches, memory problems, sleep problems, fainting and a current diagnosis of PTSD. mTBI was found to adversely affect long-term recovery from PTSD. PTSD was associated with physical, cognitive and emotional symptoms and had a larger effect on these symptoms than mTBI.

**Summary and implications:** Traumatic brain injury (TBI) is one of the most common diagnoses in service members

deployed to Iraq and Afghanistan. However, cases of mild TBI (mTBI) can go undiagnosed because it is sometimes overlooked when more visible physical injuries are also experienced. The aim of this study was to determine the association of various symptoms and psychiatric diagnoses with a history of mTBI and a current diagnosis of PTSD. This study consisted of three groups of male U.S. Army Vietnam-era veterans: 3218 healthy controls, 548 veterans who were injured in a motor vehicle collision but without a head injury, and 278 veterans with mTBI. The study measured prevalence of psychiatric diagnoses, physical, cognitive and emotional symptoms, and course of PTSD across time (assessment window lasted an average of 16 years) in all of the participants. The results showed that mTBI was associated with headaches, memory problems, sleep problems, fainting and a current diagnosis of PTSD. mTBI was found to adversely affect long-term recovery from PTSD. PTSD was associated with physical, cognitive and emotional symptoms and had a larger effect on these symptoms than mTBI. These findings reflect that both mTBI and PTSD are conditions that can negatively affect other aspects of health for years post-injury. The authors emphasize the need to intervene early after military deployment with emotional and social support to reduce residual symptoms associated with mTBI. In addition, PTSD treatment should also be prioritized to reduce symptoms and facilitate recovery.

Vanderploeg, R.D., Belanger, H.G. & Curtiss, G. (2009). Mild traumatic brain injury and posttraumatic stress disorder and their associations with health symptoms. *Archives of Physical Medicine and Rehabilitation*, 90 (7), 1084-1093.

### *Trauma exposure, branch of service, and physical injury in relation to mental health among U.S. veterans returning from Iraq and Afghanistan*

**Sample:** Operation Enduring Freedom (OEF)/Operation Iraqi Freedom (OIF) veterans and reservists who enrolled with the San Diego Department of Veterans Affairs (SDVA)

**N=** 339

**Variables:** Demographics, combat exposure, PTSD symptoms, depression, substance abuse

**Key findings:** The majority of veterans surveyed (64.3%) met criteria for PTSD, depression or substance abuse as defined in this study. PTSD was significantly more prevalent among Army or Marine veterans compared to Navy veterans, and injury during combat was a predictor of PTSD.

**Summary and implications:** Mental health problems are relatively common among troops after deployment to Iraq and Afghanistan. Previous studies of OEF/OIF veterans have reported various rates of mental health problems due to varying populations and methods of assessment. This study enrolled 339 OEF/OIF veterans from the Army, Marines, National Guard and Navy who were newly enrolled at the SDVA. Only 36% of the sample did not screen positive for mental health symptoms (PTSD, depression or substance abuse). Co-morbidity of PTSD with depression was more common than either condition alone, with 29% of the sample meeting criteria for co-morbid PTSD and depression, 8% having PTSD without depression and 15%



having depression without PTSD. Age, rank, race and gender were not associated with PTSD symptoms, but branch of service and injury during combat were significantly associated with PTSD. Symptoms of PTSD were found more often among Army and Marine veterans when compared to Navy veterans. In addition, Army and Marine veterans also scored significantly higher on the Combat Exposure Scale and had a higher prevalence of previous trauma than Navy veterans. Assessment of such factors as combat injury and branch of service upon presentation of veterans to the VA may help to identify those in need of mental health treatment.

Baker, D.G., Heppner, P., Afari, N., Nunnink, S., Kilmer, M., Simmons, A., et al. (2009). Trauma exposure, branch of service, and physical injury in relation to mental health among U.S. veterans returning from Iraq and Afghanistan. *Military Medicine*, 174 (8), 773-78.

### **Association of time since deployment, combat intensity, and posttraumatic stress symptoms with neuropsychological outcomes following Iraq war deployment**

**Sample:** Active-duty soldiers following return from Iraq deployment (one group assessed approximately one year after return and one group assessed more recently following return)  
N= 268

**Variables:** PTSD, depression, combat intensity, verbal learning, visual memory, attention, reaction time

**Key findings:** Greater PTSD symptoms were associated with poorer attention in soldiers tested at the one-year follow-up, but this association was not found in recently returned soldiers. Greater combat intensity was associated with better reaction time, regardless of time since deployment.

**Summary and implications:** Previous research in Iraq war veterans has suggested that deployment can lead to deficits in attention, learning and memory, and improvements in reaction time, but it remains unknown whether these deployment-related neuropsychological changes persist over time or are linked to stress-related factors. Two hundred sixty-eight active-duty Army soldiers were assessed after return from Iraq deployment; one group was assessed a median of 122 days after return, and the other group was assessed a median of 404 days after return. Increased PTSD symptom severity was associated with poorer attention among soldiers who had been back from Iraq for a year, but not among the more recently returned soldiers. However, when considered independently of PTSD, no neuropsychological changes were detected in the later-assessed group, indicating neuropsychological functioning appeared to remain stable for more than one year after return from deployment. The authors also found that higher levels of combat intensity were associated with more efficient reaction-time responses, regardless of time since deployment.

Marx, B.P., Brailey, K., Proctor, S.P., Macdonald, H.Z., Graefe, A.C., Amoroso, P., et al. (2009). Association of time since deployment, combat intensity, and posttraumatic stress symptoms with neuropsychological outcomes following Iraq war deployment. *Archives of General Psychiatry*, 66 (9), 996-1004.

### **The USS Cole bombing: analysis of pre-existing factors as predictors for development of post-traumatic stress or depressive disorders**

**Sample:** U.S. Navy service members aboard the USS Cole during the 2000 suicide bombing of the ship  
N= 191

**Variables:** Demographics, event-related characteristics, traumatic stress symptoms, depression symptoms

**Key findings:** Lower rank, female gender, younger age, having been injured or having a friend injured or killed were associated with the development of post-traumatic stress.

**Summary and implications:** Several studies have investigated factors that may predispose or protect against the development of PTSD, but few have been able to study a population that experienced the same traumatic event at the same time and soon after the event happened. The authors investigated which factors may be related to the development of PTSD or depression symptoms in a group of Navy sailors aboard the USS Cole during the 2000 suicide bombing of the ship. Using the Impact of Events Scale-Revised and the Zung Self-Rating Depression Scale, the factors identified as predisposing toward PTSD symptoms were lower rank, younger age, female gender, having been injured in the attack and having a friend injured or killed in the attack. Lower rank, having a best friend injured or killed, experiencing a difficult separation from their shipmates and previously experiencing significant traumatic life events were factors predisposing sailors toward depression. Identification and further investigation of these factors may contribute to the U.S. military's efforts to cultivate protective factors and develop therapeutic interventions tailored to specific groups.

Nasky, K.M., Hines, N.N. & Simmer, E. (2009). The USS Cole bombing: analysis of pre-existing factors as predictors for development of post-traumatic stress or depressive disorders. *Military Medicine*, 174 (7), 689-94.

### **Co-morbidity of posttraumatic stress disorder, anxiety and depression: a 20-year longitudinal study of war veterans**

**Sample:** Israeli male veterans of the Lebanon War  
N= 664

**Variables:** PTSD, anxiety, depression, psychosocial functioning

**Key findings:** Almost half of war veterans report a lifetime triple co-morbidity (PTSD, anxiety and depression), and those who do are more likely to have impaired functioning. PTSD predicted depression, anxiety and co-morbidity, but those conditions did not predict PTSD.

**Summary and implications:** It is well known that combat stress can cause long-term psychopathology, with PTSD being the condition most commonly associated with war trauma. A significant amount of people with PTSD also suffer from co-morbid depression or anxiety, and some suffer from a triple co-morbidity of anxiety, depression, and PTSD. This study followed up 664 Lebanon War veterans at one, two and 20 years after their participation in the war. The aim of this study was to determine the prevalence of co-morbidity of PTSD, anxiety, and depression; investigate the chronological relationship between

these disorders; and examine whether PTSD co-morbid with anxiety and depression leads to more impaired functioning than PTSD alone. The results showed that at all three points of assessment, rates of triple co-morbidity (26.7-30.1%) were higher than rates of PTSD alone (9.3-11.1%) or co-morbid with depression (1.2-4.5%) or anxiety (2.9-4.5%). PTSD predicted depression, anxiety and co-morbid disorders, but was not predicted by them. At the first and second assessments, triple co-morbidity was associated with more impaired functioning than PTSD alone. Also, at the second assessment, triple co-morbidity was associated with more impaired functioning than double co-morbidity. Overall, almost half of the war veterans report a lifetime triple co-morbidity, and those who do are likely to have high levels of impairment in functioning. These findings suggest that PTSD, although commonly co-occurring with depression or anxiety or both, is the core reaction to trauma, and the development of these co-morbid disorders is secondary to PTSD.

Ginzburg, K., Ein-Dor T. & Solomon, Z. (in press). Co-morbidity of posttraumatic stress disorder, anxiety and depression: a 20-year longitudinal study of war veterans. *Journal of Affective Disorders*.

### **Modeling associations between posttraumatic stress symptoms and substance use**

**Subjects:** Outpatients in substance use disorder (SUD) treatment

N= 35

**Variables:** Substance dependence symptoms, PTSD symptoms, substance use

**Key findings:** PTSD symptom fluctuations were concurrently associated with alcohol and cocaine dependence symptoms. The results support the concept of self-medication and suggest that PTSD fluctuations are associated with problematic substance behaviors, rather than just substance use itself.

**Summary and implications:** Past research has shown that co-morbid substance use and posttraumatic stress disorders (SUD-PTSD) predict poorer treatment outcomes. The explanation given for this co-morbidity is often self-medication to reduce PTSD symptoms; limited research, however, has been done to closely examine the co-occurrence of these symptoms. The aim of this study was to examine associations between PTSD and substance dependence (SD) symptoms using established methodologies on a fine-detail timeline. Thirty-five outpatients in SUD treatment completed retrospective reports of weekly PTSD and SD symptoms, and substance use over the previous six months. The results showed that weekly PTSD symptom fluctuations were concurrently associated with the presence of alcohol and cocaine dependence and were associated with the presence of opiate dependence in the following week. These results support the concept of self-medication, highlight the importance of detailed analysis of PTSD and SD symptoms, and suggest that PTSD fluctuations are associated with problematic substance behaviors, rather than just substance use.

Quimette, P., Read, J.P., Wade, M. & Tirone, V. (in press). Modeling associations between posttraumatic stress symptoms and substance use. *Addictive Behaviors*.

### **Physical and psychosocial functioning following motor vehicle trauma: Relationships with chronic pain, posttraumatic stress, and medication use**

**Sample:** Patients with chronic pain following motor vehicle injury

N= 234

**Variables:** Pain, PTSD, medication use, physical and psychosocial functioning

**Key findings:** Among subjects with chronic pain after experiencing motor vehicle injury trauma, higher severity pain was associated with greater physical and psychosocial impairment. Neither opioid nor SSRI use in PTSD-positive subjects had any impact on physical or psychosocial functioning compared to PTSD-positive subjects not taking the medications.

**Summary and implications:** PTSD is often co-morbid with chronic pain following a traumatic injury, but little is known about how the use of medications to manage pain or PTSD symptoms, such as opioids or SSRIs, affects functioning in these patients. Data were collected on 234 patients with chronic pain following motor vehicle injury, and the relationships of pain, PTSD and medication use across physical and psychosocial functioning were examined. As expected, higher severity pain was associated with greater physical and psychosocial impairment. Neither opioid nor SSRI use in PTSD-positive subjects had any impact on physical or psychosocial functioning compared to PTSD-positive subjects not taking the medications. However, opioid use was associated with greater physical and psychosocial impairment among subjects without PTSD. PTSD was also associated with greater psychosocial impairment among subjects not taking opioids or SSRIs. In addition, opioid use was associated with greater psychosocial impairment among subjects with high-severity pain, and high-severity pain was associated with greater impairment among opioid users. These findings suggest that PTSD may be important to consider in determining a treatment plan for patients with chronic pain after traumatic injury.

Clapp, J.D., Masci, J., Bennett, S.A. & Beck, J.G. (in press). Physical and psychosocial functioning following motor vehicle trauma: Relationships with chronic pain, posttraumatic stress, and medication use. *European Journal of Pain*.

### **Psychological resilience and postdeployment social support protect against traumatic stress and depressive symptoms in soldiers returning from Operations Enduring Freedom and Iraqi Freedom**

**Subjects:** Reserve/National Guard OEF/OIF veterans

N= 272

**Variables:** Traumatic stress symptoms, depressive symptoms, resilience, unit support, post-deployment social support

**Key findings:** Participants with PTSD scored significantly lower on measures of resilience, unit support, and post-deployment social support. Resilience and post-deployment

social support were negatively associated with traumatic stress and depressive symptoms.

**Summary and implications:** Substantial research has been done examining the prevalence and correlates of PTSD, depression, and related psychiatric conditions in Operations Enduring Freedom and Iraqi Freedom (OEF/OIF) veterans. However, no research has been done on whether such protective factors as psychological resilience and social support may guard against these psychiatric conditions in veterans. Two hundred and seventy-two reserve/National Guard OEF/OIF veterans completed a self-report assessing resilience, social support, and traumatic stress and depressive symptoms. The results showed that resilience scores in the overall sample were similar to those observed in civilian outpatient primary-care patients. However, participants with PTSD scored significantly lower on measures of resilience, unit support, and post-deployment social support. Resilience and post-deployment social support were negatively associated with traumatic stress and depressive symptoms. The findings suggest that interventions to promote psychological resilience and post-deployment social support may help reduce the severity of traumatic stress and depressive symptoms in OEF/OIF veterans.

Pietrzak, R.H., Johnson, D.C., Goldstein, M.B., Malley, J.C. & Southwick, S.M. (2009). Psychological resilience and postdeployment social support protect against traumatic stress and depressive symptoms in soldiers returning from Operations Enduring Freedom and Iraqi Freedom. *Depression and Anxiety*, 26 (8), 745-51.

## PSYCHO-BIO

### *Serotonin and sensitivity to trauma-related exposure in selective serotonin reuptake inhibitors-recovered posttraumatic stress disorder*

**Sample:** PTSD patients who improved significantly on SSRIs  
N= 10

**Variables:** PTSD, anxiety and mood symptoms; tryptophan administration, heart rate, blood pressure, tryptophan levels

**Key findings:** After giving patients an amino acid drink either with or without tryptophan (a technique shown to lower brain serotonin levels), a trauma-related exposure challenge induced anxiety in patients whether or not their drink contained tryptophan, but the effect was much greater when the drink did not contain tryptophan. These findings suggest that serotonin (5-hydroxytryptamine) plays a role in regulating stress responses, and PTSD symptoms can be restrained by SSRI-induced increases in serotonin function.

**Summary and implications:** Selective serotonin reuptake inhibitors (SSRIs) are first-line drug treatments for PTSD, although their method of action is not completely understood. Previous studies have produced the theory that SSRIs may decrease sensitivity to stressors by increasing synaptic levels of serotonin (5-hydroxytryptamine, or 5HT). To test this theory, the acute tryptophan depletion (ATD) technique was used to lower brain levels of 5HT transiently while exposing patients to

trauma-related stimuli. Ten patients, whose PTSD symptoms improved significantly on SSRI treatment, were exposed to trauma-related stimuli under ATD or sham tryptophan depletion conditions. Under both conditions, the trauma-related exposure challenge induced PTSD symptoms, but the responses were stronger under the ATD condition. These findings suggest that 5HT plays a general role in regulating stress responses, and PTSD symptoms can be reduced by SSRI-induced increases in serotonin function.

Corchs, F., Nutt, D.J., Hood, S. & Bernik, M. (2009). Serotonin and sensitivity to trauma-related exposure in selective serotonin reuptake inhibitors-recovered posttraumatic stress disorder. *Biological Psychiatry*, 66 (1), 17-24.

### *Low cerebrospinal fluid neuropeptide Y concentrations in posttraumatic stress disorder*

**Sample:** Males with combat-related PTSD and healthy controls  
N= 23

**Variables:** Neuropeptide Y concentrations, PTSD

**Key findings:** PTSD patients had significantly lower concentrations of neuropeptide Y in cerebral spinal fluid than healthy controls. Neuropeptide Y, which has been proposed as a stress-resilience factor, may be related to PTSD or to extreme stress exposure.

**Summary and implications:** Neuropeptide Y (NPY) is a peptide neurotransmitter that has been linked to the regulation of stress and anxiety and has been proposed as a stress-resilience factor. Few studies have investigated plasma levels of NPY in PTSD patients, and data on NPY in the central nervous system, which is likely a more reliable measure than plasma levels, are lacking. Ten male patients with chronic, combat-related PTSD and 13 healthy male controls were assayed for NPY concentrations in their cerebrospinal fluid. NPY levels in the cerebrospinal fluid were significantly lower in PTSD patients compared to healthy controls. NPY, a potential resilience hormone, could be a pathophysiological feature of PTSD or could be related to extreme trauma exposure. Future studies are needed to distinguish between these possibilities.

Sah, R., Ekhtator, N.N., Strawn, J.R., Sallee, F.R., Baker, D.G., Horn, P.S., et al. (2009). Low cerebrospinal fluid neuropeptide Y concentrations in posttraumatic stress disorder. *Biological Psychiatry*, 66 (7), 705-7.

## BRAIN AND COGNITION

### *Gender and PTSD: What can we learn from female police officers?*

**Sample:** Female police officers and civilians who had experienced a traumatic event

N= 281

**Variables:** Trauma exposure, peritraumatic emotional distress, somatization symptoms, PTSD symptoms



**Key findings:** Female civilians reported significantly more severe PTSD symptoms than female police officers, and this was explained by significantly more intense peritraumatic emotional distress among female civilians. Gender differences in PTSD may result from differences in peritraumatic emotionality.

**Summary and implications:** Many studies using civilian populations find that female gender is a risk factor for PTSD; however, studies in police and military populations often find no gender differences in PTSD. Female police officers were compared to female civilians on peritraumatic emotional distress, somatization and PTSD symptoms after exposure to trauma. Female civilians reported significantly more severe PTSD symptoms, even though the police officers had greater exposure to assaultive violence and greater total exposure to trauma. The elevated PTSD symptomatology in the civilian group was explained by more intense peritraumatic emotional distress among this group. In addition, somatization of symptoms was more strongly predicted by peritraumatic emotional distress for female officers than civilians. These findings are very significant because they suggest that apparent gender differences in PTSD may be the result of differences in peritraumatic emotionality, which can influence subsequent PTSD and somatization symptoms. Emotionality may be more important than gender in explaining susceptibility to PTSD.

Lilly, M.M., Pole, N., Best, S.R., Metzler, T. & Marmar, C.R. (2009). Gender and PTSD: What can we learn from female police officers? *Journal of Anxiety Disorders*, 23 (6), 767-74.

### **Attentional biases in PTSD: More evidence for interference**

**Sample:** Female sexual assault survivors with high- or low-severity PTSD

N= 46

**Variables:** PTSD symptom severity, visual search task reaction time, attentional facilitation, attentional interference

**Key findings:** High-severity PTSD participants showed increased interference (difficulty disengaging attention from threatening stimuli) to trauma-related words compared to low-severity PTSD participants. The increased attentional interference was specific to trauma-related stimuli. No evidence was found for facilitated detection of threatening stimuli in PTSD.

**Summary and implications:** Attentional biases to trauma-related stimuli have been found in individuals with PTSD; however, most previous research has not examined attentional facilitation as separate from attentional interference. Attentional facilitation is defined as enhanced detection of threatening stimuli, whereas attentional interference is defined as difficulty disengaging from threat-related stimuli that result in interference with a primary task. This study aimed to compare these two forms of attentional bias using a visual search task (VST) with a lexical decision component to differentiate between the two biases in female sexual assault survivors. Forty-six sexual assault survivors divided into high- or low-severity PTSD groups were given the VST with three types of stimuli: trauma-related, general threat-related and semantically-related neutral

words. The results showed that high-severity PTSD participants demonstrated increased interference to trauma-related words compared to low-severity PTSD participants. The increased attentional interference was specific to trauma-related stimuli. No evidence was found for attentional facilitation (enhanced detection) of threatening stimuli in PTSD. These findings have important implications to distinguish anxiety disorders that are characterized by rumination and intrusions, such as PTSD and Generalized Anxiety Disorder rather than those characterized by a fight or flight response, such as phobias.

Pineles, S.L., Shipherd, J.C., Mostoufi, S.M., Abramovitz, S.M. & Yovel, I. (in press). Attentional biases in PTSD: More evidence for interference. *Behaviour Research and Therapy*.

### **A functional magnetic resonance imaging study of deliberate emotion regulation in resilience and posttraumatic stress disorder**

**Sample:** Women with and without sexual trauma exposure  
N= 42

**Variables:** PTSD, trauma exposure, regulation of emotional response to negative pictures

**Key findings:** Successful down-regulation of emotional responses to negative stimuli appears to be impaired by trauma exposure; in contrast, the ability to up-regulate emotional responses to negative stimuli may be a protective factor.

**Summary and implications:** Thirteen to 26% of women in the U.S. report having been sexually assaulted, making sexual violence an important public health concern. About half of rape victims develop PTSD, while others develop no psychopathology. The aim of this study was to examine this individual variability in response to sexual violence, focusing on neural circuitry underlying the deliberate modification of emotional responses to negative stimuli. This was examined using functional magnetic resonance imaging (fMRI) blood oxygenation level-dependent (BOLD) response. Forty-two women participated in the study: 14 had PTSD after sexual trauma, 14 had no psychiatric diagnosis after sexual trauma, and 14 were non-traumatized control subjects. The results showed that non-traumatized healthy controls were more successful than either trauma-exposed group to down-regulate emotional responses to negative pictures, as measured by subjective rating and BOLD response in regions of the prefrontal cortex. After deliberate attempts to up-regulate emotional responses, however, trauma-exposed non-PTSD subjects were more successful in these attempts than healthy controls or participants with PTSD. The authors conclude that successful down-regulation of emotional responses to negative stimuli appears to be impaired by trauma exposure, and in contrast, the ability to up-regulate emotional responses to negative stimuli may be a protective factor.

New, A.S., Fan, J., Murrough, J.W., Liu, X., Liebman, R.E., Guise, K.G., et al. (2009). A functional magnetic resonance imaging study of deliberate emotion regulation in resilience and posttraumatic stress disorder. *Biological Psychiatry*, 66 (7), 656-664.

### **Neurobiological basis of failure to recall extinction memory in posttraumatic stress disorder**

**Sample:** Individuals diagnosed with PTSD and trauma-exposed control subjects without PTSD

**N=** 31

**Variables:** PTSD, acquisition and extinction of conditioned fear, extinction recall, skin conductance response, activation of the dorsal anterior cingulate cortex, activity of the amygdala, hippocampus, ventromedial prefrontal cortex and dorsal anterior cingulate cortex

**Key findings:** Individuals with PTSD showed impaired recall of extinction memory. PTSD subjects had greater activation of the amygdala during extinction learning, and during extinction recall this group had less activation in the hippocampus and ventromedial prefrontal cortex, and greater activation in the dorsal anterior cingulate cortex, which may underlie the impairment of extinction recall.

**Summary and implications:** Past research has shown activation irregularities in specific areas of the brain in individuals with PTSD, specifically the dorsal anterior cingulate cortex (dACC), the ventromedial prefrontal cortex (vmPFC), the amygdala and the hippocampus. However, research has not yet identified how malfunctions in these brain regions relate directly to fear extinction learning and its recall in PTSD. This study aimed to examine fear extinction learning and its recall relating to these regions of the brain. An experimental group comprised of 16 participants diagnosed with PTSD and a control group comprised of 15 trauma-exposed non-PTSD participants underwent a one day conditioning and extinction training, followed by a one-day extinction recall test. Both days' tests were conducted in a 3-T functional magnetic resonance imaging (fMRI) scanner. Skin conductance responses (SCR), which were used to measure conditioned responses, showed the PTSD participants exhibited impaired recall of extinction memory. The fMRI data showed the PTSD group had greater activation of the amygdala during extinction learning, and during extinction recall this group had less activation in the hippocampus and vmPFC and greater activation in dACC. These results support the hypothesis that fear extinction is impaired in PTSD and that dysfunctional activation in brain structures involved in fear extinction learning and its recall underlie this impairment.

Milad, M.R., Pitman, R.K., Ellis, C.B., Gold, A.L., Shin, L.M., Lasko, N.B., et al. (in press). Neurobiological basis of failure to recall extinction memory in posttraumatic stress disorder. *Biological Psychiatry*.

### **Pattern of cortical activation during processing of aversive stimuli in traumatized survivors of war and torture**

**Sample:** Survivors of war and torture with PTSD, trauma-exposed non-PTSD control subjects, control subjects with minimal trauma exposure

**N=** 77

**Variables:** PTSD, trauma exposure, visual processing of aversive stimuli, neocortical activity

**Key findings:** General trauma exposure in both the PTSD and non-PTSD groups was associated with a decreased visual processing of aversive stimuli, but the PTSD group also showed a hyperactivation of the superior parietal cortex in response to aversive stimuli.

**Summary and implications:** An attentional bias toward threat cues has been found in previous research on PTSD; however, neurophysiological studies have not confirmed whether this increased attention toward threat cues indicates preferential processing. The aim of this study was to examine the neocortical activity related to the processing of aversive stimuli in participants with PTSD. An experimental group of 36 survivors of war and torture with PTSD, a group of 21 trauma controls without PTSD, and a group of 20 controls who had not been exposed to trauma participated in this study. Each group was exposed to a visual evoked magnetic field using flickering pictures of varying affective valence as stimulus material. The results showed both of the trauma-exposed groups had reduced steady-state visual evoked field amplitudes over occipital areas in response to aversive pictures compared to unexposed controls. The PTSD group alone showed a hyperactivation of the superior parietal cortex selectively in response to aversive stimuli, which was related to dissociative symptoms and torture severity. The results point to a different pattern of cortical activation in response to aversive stimuli depending on the experience of multiple traumatic events and PTSD. General trauma exposure in both the PTSD and non-PTSD groups was associated with decreased visual processing of aversive stimuli, and the PTSD group's superior parietal activity might represent a specific process unique to the disorder.

Catani, C., Adenauer, H., Keil, J., Aichinger, H. & Neuner, F. (2009). Pattern of cortical activation during processing of aversive stimuli in traumatized survivors of war and torture. *European Archives of Psychiatry and Clinical Neuroscience*, 259 (6), 340-51.

