Australian Centre for Posttraumatic Mental Health

Summary of the Traumatic Stress and Military Mental Health Literature: 2010

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This document is a summary of the recent literature in the field of military and posttraumatic mental health. It was written by the Australian Centre for Posttraumatic Mental Health with the support of the Australian Government, Department of Veterans' Affairs.

Disclaimer

The material in this report, including selection of articles, summaries, and interpretations is the responsibility of the consultants, the Australian Centre for Posttraumatic Mental Health, and does not necessarily reflect the views of the Australian Government.

The Australian Centre for Posttraumatic Mental Health

Level 1, 340 Albert St

East Melbourne

Victoria 3002, Australia

Phone: (+61 3) 9936 5100

Fax: (+61) 9936 5199

Email: acpmh-info@unimelb.edu.au

Web: www.acpmh.unimelb.edu.au

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Introduction

This annual summary of the traumatic stress and military mental health literature was produced by the Australian Centre for Posttraumatic Mental Health (ACPMH). The aim is to provide a brief summary of key literature pertaining to military mental health, as well as posttraumatic mental health more generally, published during the calendar year of 2010. The review is an informed review, not a critical review of the literature. This means that literature of relevance has been included although there has not been a systematic rating of the quality of published work. Thus we caution the reader against assuming that a single paper is sufficient to provide conclusive information. Where there are discrepancies with previous findings these will be discussed. We strongly recommend that readers source the original papers if they are interested in a particular finding.

Search Strategy and Content Overview

The literature was sourced using standard scientific databases, notably Medline, Web of Science and PsychInfo, with the following search descriptors: veteran* or defense or defence or military AND mental health or psych*. A broader search of PTSD and traumatic mental health was also conducted in journals including British Journal of Psychiatry, JAMA, Archives of Psychiatry, American Journal of Psychology, and Lancet. Most of the articles selected for inclusion in this annual summary appeared in relatively prestigious journals, although some are included from less established publications when appropriate.

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List of Abbreviations

ACPMH	Australian Centre for Posttraumatic Mental Health
ALPP	Assisted Living Pilot Project
BOND	Brief Neurobehavioural Detector
CALM	Co-ordinated Anxiety Learning and Management
CAPS	Clinical Assessment of PTSD Scale
CBT	Cognitive behavioural therapy
CPT	Cognitive processing therapy
CT	Cognitive therapy
DSM	Diagnostic and Statistical Manual of Mental Disorders
EMDR	Eye-movement desensitisation and reprocessing
ENP	Enhance Rehabilitation Protocol
GAD	Generalised anxiety disorder
MACE	Military acute concussion evaluation
mTBI	Mild traumatic brain injury
MMPI	Minnesota Multiphasic Personality Inventory-2
PTSD	Posttraumatic stress disorder
TRiM	Trauma Risk Management
OIF/OEF	Operation Iraqi Freedom/Operation Enduring Freedom
IRT	Imagery rehearsal therapy
OCD	Obsessive compulsive disorder
PD	Panic disorder
PE	Prolonged exposure
POV-DS	Partners of Veterans Distress Scale
SAD	Seasonal affective disorder
SIT	Stress inoculation therapy
SSRI	Selective serotonin re-uptake inhibitors
TBI	Traumatic brain injury
UK	United Kingdom
US	United States of America
VA	US Department of Veterans Affairs

Executive Summary

Diagnosis and factor structure

- The structure of Posttraumatic Stress Disorder (PTSD) within the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) has been criticised for the grouping of dysphoria-related symptoms together with fear-based symptoms in the C (avoidance and numbing) and D (hyperarousal) clusters. As a result people with high levels of worry or depression may be diagnosed with PTSD.
- Recent research and the proposed criteria for the new DSM-V forward that symptoms in categories C and D be re-categorised into an active avoidance criterion (more representative of a fear-based) and a negative alterations in cognition and mood criterion (a dysphoria-based factor).
- Overall, the research indicates that PTSD is best defined by four factors including re-experiencing symptoms, active avoidance, negative alterations in cognition and mood, and hyper-vigilance/startle symptoms.
- Preliminary research indicates this improved clustering of symptoms will potentially refine the diagnosis and hence improve diagnostic specificity. This may then facilitate improved tailoring of treatment.

Prevalence and course

- Similar to 2010, reviews were published discussing the variability in PTSD prevalence rates across studies in military samples. Consideration needs to be given to the type of methodology, random versus non-random sampling, use of impairment criterion, timing and latency of assessment, anonymity of screening, and level of combat exposure used when prevalence estimates are provided.
- Several studies indicated high percentages of internalising problems such as anxiety and depression.
- Studies also noted high rates of externalising problems such as heavy drinking (approx 21%), cigarette smoking (31.7%), illicit substance misuse (21.5%), aggressive behaviour (up to 50% in veterans with PTSD), and dangerous driving (2-10 times more likely than general population).
- In terms of the longitudinal course of disorders, one study reported that psychological disorders peaked in the first two years following war. Alcohol and anxiety disorders typically manifested first followed by mood related disorders.

Vulnerability and protective factors

- Several studies published data on risk factors for the development PTSD and mental health problems in military samples. In terms of risk factors, exposure to traumatic

events, pre-deployment exposure to violence, having fewer friends, attitudinal factors, being a junior enlisted recruit, and serving two or more deployments all increased the risk of developing PTSD. Deployment related stressors such as concerns back home and problems with command were also linked to PTSD following deployment.

- A UK study reported that younger age, female gender, weaker unit cohesion, poorer perceived leadership, and absence of a pre-deployment stress brief all increased risk of psychological distress. A perceived threat to life, poorer perceived leadership, and no stress brief were associated with higher levels of PTSD.
- One study reported that killing during combat increased the risk of developing PTSD, alcohol abuse, anger, and relationship issues. Future studies are required to understand the impact of types of killing (civilian versus enemy) and underlying mechanisms such as appraisals and guilt that may play a role.
- Several studies reported that psychological factors such as guilt, hyper-arousal, and emotion over- or under-regulation mediated and were linked to specific mental health symptoms.
- A number of studies this year examined factors that served as protective factors against the development of PTSD and depression. Protective factors that were significant in studies included unit support and high levels of unit cohesion, being a commissioned officer, having just completed rest and recuperation, and post-deployment social support. One study reporting fewer mental health problems in the Royal Marine commandos noted that training and selection processes may buffer against the development of psychological distress. Trauma Risk Management (TRiM), a peer support program, was associated with lower levels of psychological distress in a study that was looking at protective factors.
- The present findings add to existing knowledge of ways or areas where it is possible to mitigate the risks of developing PTSD and psychological distress. Strategies aimed at enhancing and strengthening social and peer supports appear to be important in decreasing the risk of developing mental health problems. In addition, practices which increase unit cohesion may also facilitate mental health.

Treatment

- 2010 saw a debate emerge regarding the efficacy of trauma-focussed, compared to non-trauma-focussed, therapies in the treatment of PTSD. The overall consensus is that trauma-focussed therapies relative to other interventions are the most effective at reducing PTSD. However, the counter-claim suggests that studies involving robust comparisons between trauma-focussed and non-trauma-focussed therapies have not established differences in effectiveness. Despite these claims, the weight of evidence at present supports the use of trauma-focussed therapy.
- A review study of prolonged exposure indicated this to be effective at reducing PTSD symptoms above and beyond control conditions in 86% of patients.

- Intensive delivery of cognitive therapy over the space of one week may be a viable way to produce rapid and effective reductions in PTSD symptomatology.
- Evidence is also starting to emerge for other types of therapies. One study found that cognitive processing therapy may be more efficacious at decreasing symptoms of PTSD in OIF/OEF veterans with less chronic PTSD than those with chronic PTSD.
- Some discrepant findings emerged regarding the use of Imagery Rehearsal Therapy (IRT) for the treatment of traumatic nightmares. Importantly, IRT when tested against a treatment control condition did not result in significant reductions in frequency. These studies indicated that delivering IRT in a group format may be less effective than when delivered in an individual format.
- Two group studies emerged indicating that attachment style and levels of disclosure may be important predictors of PTSD outcome. A pilot study (n=9) implementing group interpersonal therapy (which addresses attachment issues) also reported reductions in PTSD symptoms and depression.
- One review article and one treatment study provided support for the use of integrative programs to treat comorbid mental health problems particularly PTSD and substance misuse.
- Although smoking is a frequently occurring problem in veterans with PTSD it is often overlooked in treatment settings. One study reported that integrating smoking cessation into a PTSD treatment program resulted in greater levels of abstinence than a smoking program alone.
- Several studies reported on programs in the US which have demonstrated that it is possible to effectively deliver evidence-based PTSD therapies such as cognitive behavioural therapy (CBT), prolonged exposure, and cognitive processing therapy via primary care providers and US Department of Veterans Affairs (VA) facilities.

Utilisation and barriers to care

- Two studies reported that despite high levels of mental health problems in veterans, mental health services are under-utilised. A range of factors were cited as being barriers to intervention such as stigma, masculine roles, avoidance, treatment-discouraging beliefs, values that conflict with seeking treatment, knowledge barriers, physical barriers such as location, and an invalidating post-trauma environment can all act as barriers to intervention.
- These studies also noted a range of methods to overcome barriers to care. Where possible, resources should be allocated towards overcoming stigma and promoting positive attitudes towards service utilisation. There also needs to be a focus on helping veterans to recognise their mental health needs and to increasing veteran motivation to access treatment. Finally, treatments need to be made more acceptable

to veterans across age spans. Improving Access to Psychological Therapies is one program in the UK that is currently being piloted.

Technological advances

- A review article reported that video-conferencing is an effective method for delivering interventions for a range of mental health problems. One study reported that prolonged exposure therapy delivered via video-conference resulted in significant reductions in PTSD symptoms that were comparable to a group where prolonged exposure was delivered in person. Furthermore, another study found that cognitive behavioural therapy resulted in significant reductions in anger problems when delivered via video-conferencing. The literature in general indicated that video-conferencing is an acceptable and effective way to deliver treatments. However, there are some concerns regarding therapeutic alliance and managing high risk clients.

- Some preliminary evidence emerged supporting the use of virtual reality environments for the treatment of PTSD.

Traumatic brain injury and neurorehabilitation

- Patients with traumatic brain injury (TBI) frequently present with post-concussive symptoms and other comorbid psychiatric disorders. The overlap of these problems often makes it difficult to accurately diagnose, refer on for further assessment, and determine appropriate treatment. The main outcome studies in 2010 indicated that PTSD is more likely to occur in people with mild TBI as opposed to moderate or severe TBI. Loss of consciousness and amnesia in moderate to severe TBI may safeguard against the development of PTSD. In another study, self-reported cognitive functioning was not significantly related to neuropsychological test performance but was better accounted for by PTSD, anxiety, and depression. One study reported that the Brief Neurobehavioural Detector is one instrument that may assist during assessment. Overall, these results emphasise the need for a detailed clinical neuropsychological assessment which incorporates the use of psychometric tools.

- One study reported some small trends showing that blast versus non-blast TBI injuries were associated with higher levels of re-experiencing and overall PTSD symptoms.

- Three studies reviewed current approaches to best practice for veterans who sustain TBI. In terms of treatment one study reported on a range of empirically supported techniques that can assist in the rehabilitation of individuals with mild TBI. Such techniques included attention process training, working memory training, mnemonic techniques, external cuing, social communication skills training, and error management training.

Psychosocial rehabilitation

- One study reported that 25-56% of veterans who were receiving care reported a range of difficulties in social functioning, productivity, community involvement, and self-care.
- Another study reported that the Post-deployment Readjustment Inventory may be a useful way to detect psychosocial problems amongst returning soldiers. The authors found that this instrument had excellent internal consistency and strong convergent and predictive validity.
- One review article highlighted that with an ageing population of veterans, increased attention needs to be focussed on geriatric rehabilitation.

Suicide

- Suicide rates are increasing in the military. Several studies reported that those at increased risk are likely to have additional problems including PTSD, depression, and alcohol misuse. Increased stigma, barriers to care, and psychosocial difficulties alongside lowered resilience and psychosocial support place an individual at greater risk.
- One theoretical paper discussed Interpersonal Theory of Suicide and the factors within this model that are associated with increased risk of suicide. This article and another review discuss the need for interventions to target factors within this model.

Physical health, older veterans health, and mortality

- One study reported that PTSD was associated with an increased risk for central nervous system, musculoskeletal, ill-defined, circulatory, digestive, and hypertensive diseases. Another study also noted an association between PTSD and risk of developing dementia. However, there is no clear causal link between PTSD and the development of dementia. Finally, one survey reported that having a psychiatric diagnosis increased the risk of mortality in veterans. Alcohol and substance related disorders and schizophrenia increased the risk of mortality compared to other psychiatric diagnoses.

Gender

- Several studies reported on gender differences in psychological problems. Two studies noted that females experienced higher rates of depression and military sexual trauma while males typically presented with PTSD and alcohol related problems.
- One study documented that pregnancy in OEF/OIF veterans increased the risk of being diagnosed with a mental health problem.

Family relationships

- Overall, research is accumulating to show that family functioning is significantly impacted by veterans being deployed to a war zone. Furthermore, particular emphasis is being placed on problems that manifest when a veteran returns home with significant mental health problems. One review article outlined a number of models that help explain the link between PTSD and family functioning including secondary traumatisation, ambiguous loss, caregiver burden, couple adaptation to traumatic stress, and cognitive behavioural mechanisms.

- Increasing recognition is being given to the bi-directional influence of PTSD symptoms on marital functioning. One study reported that the presence of PTSD resulted in reduced marital satisfaction, decreased confidence in the relationship, reduced positive bonding, disrupted parenting alliance, and reduced dedication to the relationship, negative communication, and reduced satisfaction with making sacrifices for the relationship. Another study found that family functioning was shown to be predictive of avoidance and arousal symptoms. Where possible, veteran treatments for PTSD may benefit from incorporating couples therapy. Such therapies may assist veterans in identifying cycles of withdrawal/avoidance and in expressing primary emotions without overt aggression.

- Few studies have explored the impact of deployment on children. Despite this, a review article noted that there is a higher percentage of younger children (0-5 years) with parents who are deployed. Interventions such as Interaction Guidance, Minding the Baby, Child-parent Psychotherapy, Trauma-focussed CBT for pre-school children, and Parent-child Interaction Therapy have potential to be adapted, modified, and evaluated for military families within the US VA.

- One study reported that older children (11-17 years) are likely to present with a range of emotional and behavioural difficulties including school, peer, and family problems. Furthermore, this study reported that PTSD negatively impacts parenting.

Literature Review

Diagnosis and factor structure

As noted throughout this review, veterans and military personnel present with a unique constellation of mental and physical health problems. Improving our understanding of the nature and presentation of these problems will enable better detection, diagnosis, and subsequent treatment. As part of this, the 2010 literature reflected the upcoming revision of the current diagnostic criteria for PTSD. Specifically, the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV) will be revised to a fifth edition in 2013. The proposed new criteria for PTSD have been released and a number of studies have examined the implications of the new changes.

The current criteria and diagnostic algorithm for PTSD in DSM-IV has been criticised due to the lack of specificity and high level of overlap of symptoms with other mental health disorders such as depression. At present a diagnosis of PTSD requires exposure to a traumatic event (A), persistent re-experiencing (B), persistent avoidance and numbing symptoms (C), and persistent symptoms of increased arousal (D). Criticism has been centred on the grouping of dysphoric (low mood/distress) symptoms with fear or phobia type symptoms within Criteria C and D. The argument is that the grouping of these symptoms together results in spurious PTSD diagnoses in people with high levels of depression or worry. Thus for the DSM-V it has been proposed that Criteria C is separated into two criteria: persistent avoidance of stimuli associated with the traumatic event (active avoidance) (C) and negative alterations in cognition and mood that are associated with the traumatic event (passive avoidance and numbing) (D). Recent factor analytic studies have supported this separation of symptoms (Forbes et al., 2011; Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010). Such a structure resulted in fewer diagnoses of PTSD in people diagnosed with depression (Forbes, et al., 2011). The re-organisation of diagnostic criteria C and D may also enhance predictive validity. For example, Pietrzak and colleagues (Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010) found that the dysphoric factor was more closely associated with a wide range of psychosocial measures whereas the avoidance factor was only linked to psychosocial difficulties and perceived lack of post-deployment social support. Studies have demonstrated that re-experiencing symptoms (B1-B5), active avoidance (C1-C2), and hyper-vigilance/startle symptoms (D4-D5) are more specific to a fear factor whereas numbing symptoms (C3-C7) and hyper-arousal symptoms (D1-D3) are better defined by an anxious misery/distress factor (Forbes et al., 2010). This research provides some

support for the supposition that these groups of symptoms differ in their underlying nature and should be separated in the revised diagnostic criteria.

PTSD and Underlying Personality: PTSD is highly likely to be diagnosed alongside other mental health problems such as depression, anxiety disorders, and substance abuse. The varying co-morbid patterns between PTSD and other disorders has led to questions about the influence of temperamental or personality factors that may account for this. Forbes and colleagues (2010) using the Minnesota Multiphasic Personality Inventory-2 (MMPI) identified an externalising factor characterised by aggressiveness and disconstraint/ impulsivity, an internalising factor characterised by introversion and negative emotionality, a high internalising factor also associated with psychoticism, and a simple PTSD factor with MMPI scores in the normal range. Such research has also been corroborated by Rielage et al., (2010). In particular, they found that veterans (OEF/OIF) with an internalising temperament were more likely to be diagnosed with anxiety, depression, and PTSD. In contrast, veterans with an externalising personality style had higher rates of alcohol problems.

Overall, clarifying the factor structure of PTSD and personality structure of veterans may result in improved detection and diagnosis of PTSD. Understanding the personality structure may also enable improved delivery of treatment. For example, Forbes and colleagues (2010) noted that individuals with higher levels of internalising may benefit from trauma-focussed interventions whereas individuals with higher levels of externalising may benefit from approaches designed to immediately manage substance misuse or anger.

Prevalence and course

PTSD Prevalence: Several articles highlighted the variability in PTSD prevalence data across studies. In particular, a comprehensive review of combat-related PTSD prevalence rates was conducted on studies completed since the Vietnam War (Richardson, Frueh, & Acierno, 2010). Across wars the lifetime prevalence rate of PTSD in US veterans was between 6 and 31%. However, most notable were the different point prevalence rates between US military (4-17%) and UK military veterans (3-6%) from the Iraq war. Of relevance is a smaller range and lower ceiling in prevalence rates amongst veterans from non-US samples. A range of factors are cited as producing discrepancies in prevalence rates such as sampling, measurement technique, definition of PTSD, use of impairment criterion, timing and latency of measurement, and combat exposure (Richardson, et al., 2010). Illustrating two of these discrepancies, Thomas et al., (2010) noted that the prevalence of PTSD or depression with serious functional impairment

ranged from 8.5% to 14% in US soldiers. However, the rates of PTSD and depression typically increased (23.2% and 31.1%) when a more lenient diagnostic criteria requiring less functional impairment was used. Furthermore, rates of PTSD and depression post-deployment either remained the same or increased from 3 to 12 months.

Sundin and colleagues (2010) reviewed studies exploring the prevalence of PTSD in soldiers deployed to Iraq. Overall, they found a large range in prevalence rates (1.4% to 31%) across studies. Furthermore, PTSD prevalence rates were still high after controlling for study type and time of follow-up. Non-random surveys that typically targeted recruits exposed to the front-line, found the highest rates of PTSD (5.1%-31%). The authors noted that this was due to two studies which used 'on the record' surveys, different PTSD measures, and data from only one unit. Excluding these two studies increased consistency in prevalence rates (10.3%-17%). The overall range was increased by the inclusion of UK samples where the PTSD prevalence was between 2.1-6%. Studies using random sampling reported PTSD prevalence to be between 2.1% and 13.8%. Rates of PTSD immediately following deployment in population samples was lower (9.8%-12.1%), with rates amongst pre- and non-deployed recruits the lowest (2% to 5.6%). As mentioned above, studies that use 'on the record' surveys result in lower PTSD prevalence rates compared to anonymous screening 7.8% compared to 15.7% respectively.

Ramchand et al., (2010) also conducted a review of 29 studies exploring PTSD prevalence rates amongst soldiers deployed to Iraq and Afghanistan. Prevalence estimates ranged from 5-20% in recruits that were not seeking treatment. In contrast, prevalence rates in recruits who were seeking treatment were as high as 50%. The authors again emphasised the importance of considering PTSD criteria, methodology, and sample when comparing prevalence rates.

Indirect exposure to traumatic events is also likely to lead to increased mental health problems in deployed non-combatants. Peterson and colleagues (2010) conducted research into the prevalence of PTSD and mental health problems in US Air Force non-combatants deployed to Iraq and Qatar. The critical findings revealed that 20% of non-combatants were exposed to traumatic events. In particular, non-combatants in Iraq compared to Qatar (a safer region) had an increased likelihood of knowing someone who was wounded or killed (20.8% vs 6.3%) and feeling in danger of being killed (18.9% vs 3.5%). Furthermore, these non-combatants reported increased rates of PTSD (4.1 compared to 0.7%) and depressive symptoms (9.9% vs 5.4%).

PTSD and Internalising Problems: Internalising problems such as depression and anxiety are commonly observed in military recruits. Fear and colleagues (2010)

examined the prevalence of mental health problems in a sample of 9990 UK armed forces deployed to Iraq and Afghanistan. Probable PTSD was noted in 4%, common mental disorders in 19.7%, and alcohol misuse in 13% of deployed forces. Furthermore, depression and anxiety were highly likely to be comorbid with PTSD. In a study of 664 Lebanon War (1982) recruits 1, 2 and 20 years after participation it was revealed that PTSD, anxiety, and depression were more likely to be diagnosed together (26.7%-30.1%) than alone; PTSD (9.3%-11.1%), depression (1.2%-4.5%), anxiety (2.9%-4.5%; Ginzburg, Ein-Dor, & Solomon, 2010). Similarly, Ikin et al., (2010) explored rates of PTSD and depression in a sample of 5352 Australian Veterans 50 years after the Korean War. They found that 17% of veterans were diagnosed with both PTSD and depression while another 15% met criteria for PTSD without depression. These results indicate that over 50% of veterans that were diagnosed with PTSD also met criteria for a diagnosis of depression. The co-occurrence of these disorders was related to higher levels of impaired life satisfaction, decreased quality of life, and greater symptom severity relative to when a disorder occurred alone.

Externalising Problems: Externalising patterns of problems such as aggression, alcohol use, and antisocial behaviour are also frequently noted in military populations and are closely linked to PTSD. For instance, Thomas et al., (2010) found that approximately 50% of veterans diagnosed with either depression or PTSD reached criteria for alcohol abuse and aggressive behaviour. Furthermore, Bray et al., (2010) reported that in a sample of 28,546 US active duty personnel, 21% were heavy drinkers, 31.7% smoked cigarettes, and 21.5% engaged in other illicit drug use. Overall, the trends showed increases in the misuse of prescription medications, heavy alcohol consumption, stress, PTSD, and suicide attempts. Similarly Wilk et al., (2010) found that 25% of US combat infantry recently returned from Iraq screened positive for alcohol misuse. This is higher than the 13% rate noted above in UK deployed soldiers (Fear, et al., 2010). Blume and colleagues (2010) found that alcohol use was more prevalent in younger veterans, in males, and non-active duty members. Male veterans were also found to have higher rates of heavy drinking and alcohol related problems including drink-driving relative to female veterans (Brown, Bray, & Hartzell, 2010).

Aggressive and dangerous driving is another issue that may be more prominent in returning veterans. Kuhn et al., (2010) found that rates of unsafe driving were approximately 2-10 times greater in veterans than in the general public. This may be because deployed personnel are required to drive more aggressively and take greater risks in the combat zone, and that this style of driving is then maintained in civilian life. In a study of 1,543 soldiers who had been deployed to a combat zone it was found that about a quarter scored high on the antisocial behaviour scale (Booth-Kewley, Larson,

Highfill-McRoy, Garland, & Gaskin, 2010b). The scale included items such as, “I drove unsafely / I had trouble with the police / I had a disciplinary action taken against me”. PTSD, combat exposure, deployment related stressors, having an mTBI, younger age, and marital status (never married or divorced) were predictors of antisocial behaviour.

Longitudinal Course: The longitudinal course of psychiatric disorders is also likely to vary following exposure to stressors, deployment, or trauma. McKenzie et al., (2010) studied DSM-IV diagnoses in Australian Naval Gulf War (1990/1991) veterans post-war. Psychological disorders peaked in the first two years following the war with alcohol use disorders typically presenting first. Furthermore, in veterans with two or more diagnoses, alcohol and anxiety disorders typically preceded affective disorder diagnosis. Initial elevations in alcohol use may reflect a style of coping to deal with anxiety, PTSD, and adjustment post-deployment. The later development of affective disorders could reflect an increase in helplessness/hopelessness in response to ongoing anxiety/fear symptoms of PTSD.

Greater work is required to refine the definition and identification of PTSD in military populations. Furthermore, a special emphasis needs to be placed on the course of PTSD over time.

Vulnerability and protective factors

A host of factors are associated with either risk of, or resilience to, developing PTSD and other mental health problems. These factors may exist prior to (pre-), occur during (peri-), or be present after a particular stressor, traumatic event, or deployment (post-). As noted in the first section, personality style (externalising/internalising) of veterans may influence the comorbid presentation of PTSD.

Contextual Risk Factors: In terms of contextual risk factors, level and number of exposures to traumatic events has consistently been shown to be related to the development of mental health issues. In a sample of 706 Marines returning from OEF/OIF, Phillips and colleagues (2010) found that feelings of great danger or death, being shot or injured, seeing someone else wounded or killed, discharging a firearm, inspecting a destroyed military vehicle, and pre-recruitment exposure to violence increased the likelihood of developing PTSD. Having five or more close friends served as a protective factor, while having fewer friends (0-2), being a junior enlisted recruit, and serving two deployments increased the risk of developing PTSD. Kline and colleagues (Kline et al., 2010) noted that national guard soldiers previously deployed to OEF/OIF were three times more likely than non-deployed soldiers to screen positive for

PTSD or depression, and twice as likely to report chronic pain. In another sample of 1,569 US Marines deployed to Iraq and Afghanistan, 17.1% screened positive for PTSD (Booth-Kewley, Larson, Highfill-McRoy, Garland, & Gaskin, 2010a). Combat exposure, deployment related stressors (e.g., "concerns or problems back home", "problems with supervisor or chain of command", and "lack of time off"), and marital status (being divorced), and education (higher level) were the best predictors of post-deployment PTSD. Mulligan (2010) explored factors that increased risk of psychological distress and PTSD in 611 UK Navy, Army, and Royal Airforce recruits while on deployment in Iraq. It was determined that younger age, female gender, weaker unit cohesion, poorer perceived leadership, and absence of pre-deployment stress brief increased risk of psychological distress. A perceived threat to life, poorer perceived leadership, and no stress brief were associated with higher levels of PTSD.

One study investigated the impact of killing in Iraq war veterans. In a sample of 2,797 US soldiers returning from OIF It was found that up to 40% killed or were responsible for killing. Killing during combat put an individual at increased risk for developing symptoms of PTSD, alcohol abuse, anger, and relationship issues (Maguen et al., 2010).

Ferrier-Auerbach (2010) explored risk factors for emotional distress in 2677 National Guard Soldiers deployed for OIF in 2006-2007. They found rates of PTSD to be approximately 7% while rates of depression were 9%. Using factor analysis, five types of emotional distress were found including, negative affect/cognitions, trauma-specific re-experiencing and avoidance, vegetative symptoms, loss of interest/numbing, and arousal/irritability symptoms. Demographic characteristics (female gender, younger age), combat exposure, and attitudinal factors (e.g., "my role in this deployment does not closely match what I was trained for and expected to do") were related to the development of trauma specific distress and arousal symptoms, while female gender, recent prior deployment, and attitudinal factors were related to depression and generalised distress.

Psychological Risk Factors: In addition to contextual factors, consideration needs to be given to specific psychological factors. For example, guilt has been shown to mediate the relationship between combat-related abusive violence and the development of depression, and to a lesser extent, PTSD (Marx et al., 2010). Furthermore, PTSD symptoms of hyperarousal have been linked to aggressive impulses, difficulty managing anger, and perceived problems controlling anger (Elbogen et al., 2010; Sakusic et al., 2010). Furthermore, neurobiological data suggest that emotion over-regulation is linked to a dissociative type of PTSD while under-regulation is linked to re-experiencing and hyper-arousal symptoms (Lanius et al., 2010).

Protective Factors: In terms of protective factors, Pietrzak et al., (2010) found that unit support and post-deployment support resulted in reduced symptoms of PTSD and depression and increased resilience and psychosocial functioning. A recent study demonstrated that Royal Marine Commandos and Paratroopers reported fewer physical complaints and lower levels of fatigue compared to infantry (Sundin et al., 2010). In addition, Royal Marine Commandos had fewer mental health problems and lower post-traumatic-checklist scores. A possible explanation for these results is that the level of training and selection processes buffer against mental health problems and PTSD. Mulligan (2010) also noted that being a commissioned officer, high levels of unit cohesion, and having just completed rest and recuperation was related to better mental health.

Trauma Risk Management (TRiM) may also guard against the development of PTSD and mental health problems in the field. Frappell-Cooke and colleagues (2010) conducted a non-randomised study of the effects of TRiM on psychological distress in two groups of personnel (Royal Marines who were TRiM experienced and Cold-stream Guards who were TRiM naive). Questionnaires were administered screening for psychological distress before, during, and after deployment. The initial results demonstrated that the TRiM group had lower levels of psychological distress before and after deployment. Furthermore, there were higher levels of trauma-related distress pre-deployment in the Cold-stream Guards. Regardless of group, personnel who reported higher levels of distress perceived lower levels of support. Although there is some indication for the use of TRiM, this study was limited by the sample size and response rates to questionnaires after deployment. Furthermore, there may have been additional confounds between these two groups such as the screening process, training, and affiliation associated with being in the Royal Marines. Further studies are required which use greater sample sizes, involve diagnostic assessments, and increase control between groups.

The present research has a number of important implications for buffering against the onset of mental health problems. Critically, there are a number of contextual factors that may indicate who is at highest risk for developing mental health problems. Furthermore, specific emotional states, arousal, and methods of dealing with emotions should be considered in Veteran populations. Finally, training, programs, and support in field may buffer against the stressors of deployment.

Treatment outcome studies

Psychological Therapies: A range of treatment studies and reviews related to PTSD were published in 2010. The general consensus is that CBT trauma-focussed psychotherapies are the most effective at reducing PTSD symptoms (Cukor, Olden, Lee, & Difede, 2010). However, two reviews debated the controversial meta-analytic study published in 2008 which had concluded that all *bona fide* treatments (including non-trauma-focussed therapies) are equally effective at reducing PTSD symptoms (Benish, Imel, & Wampold, 2008). This review selected studies which included only bona fide treatments, that compared two or more direct treatments designed to be therapeutic, and that did not categorise treatment types. Ehlers (2010) pointed out there were biases in the selection and classification of treatments and studies deemed *bona fide* in their study. Furthermore, some of the treatments (e.g., hypnotherapy and psychodynamic therapy) deemed effective were only represented by one study and not compared to no-treatment conditions. Ehlers (2010) also point out that this meta-analysis neglected the significant number of studies and effect sizes produced by treatments that focus specifically on the trauma memory. Wampold and colleagues (2010) in response to Ehlers provide justification for the selection criteria used in the Benish study. Furthermore, the authors discuss other potential confounds in this research including therapist effects, allegiance, and alteration of legitimate protocols, and issues in conceptualising the 'trauma focus' of interventions. They then concluded that there is insufficient evidence to indicate that there is a particular treatment for PTSD that is superior to others. Despite these conclusions, there has only been limited research into the effectiveness of other types of therapies for PTSD. Therefore, trauma-focussed therapies remain the treatment of choice based on theoretical considerations and the empirical literature to date.

Prolonged Exposure (PE): A meta-analytic review of 13 studies determined that prolonged exposure is an effective treatment for PTSD (Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). Importantly, prolonged exposure compared to control conditions consistently resulted in greater PTSD symptom reduction. The authors noted that approximately 86% of patients receiving prolonged exposure had better outcomes than patients in control conditions. Furthermore, the authors reported that PE resulted in greater improvements on secondary measures such as anxiety and depression compared to control conditions. The effect sizes of prolonged exposure were maintained in studies of different quality, trauma type, dose, and time since trauma. In conjunction with these finding it was shown that cognitive processing therapy, eye-movement

desensitisation and reprocessing (EMDR), cognitive therapy (CT), and stress inoculation therapy (SIT) were comparable to prolonged exposure in terms of their effect sizes.

Cognitive Processing Therapy (CPT): A recent study provided results regarding differences in effects of CPT for veterans of OEF/OIF compared to veterans of the Vietnam War (Chard, Schumm, Owens, & Cottingham, 2010). Initial analyses did not show any differences in treatment effects between the two groups. However, using multivariate analysis and after controlling for number of sessions and pre-treatment CAPS scores, CPT treatment resulted in greater reductions in CAPS PTSD symptoms in veterans of OEF/OIF compared to the Vietnam War. Furthermore, the number of sessions delivered was greater for Vietnam veterans and for patients with higher PTSD scores. These results indicate that it may be more difficult to bring about reductions in chronic long-term PTSD with CPT.

EMDR: EMDR has been demonstrated to be a useful cognitive behavioural technique in managing PTSD symptoms in a range of populations. However, there is limited research currently supporting the use of EMDR in combat veterans (Albright & Thyer, 2010).

Intensive Therapy: There is also an indication that intensive cognitive therapy may be suitable for PTSD. In particular, Ehlers and Clark (2010) delivered 18 hours of therapy over 5-7 working days to 14 patients. This was followed by a session one week later. The authors found that implementing a more frequent course of cognitive therapy resulted in 71.4% of patients ceasing to be diagnosed with PTSD at three weeks. Furthermore, 85.7% of patients at three months and 92.9% of patients at nine months no longer met PTSD. Furthermore, symptoms of depression and anxiety also reduced following treatment. Finally, the authors found comparable outcomes to an earlier study that delivered weekly CPT. Ehlers and Clarke also noted that the intensive delivery method produced greater reductions in depression scores compared to the weekly method. Intensive therapy may have advantages in that changes are produced in a relatively short space of time. In addition, comorbid conditions such as depression and psychosocial difficulties may have less chance of developing if symptoms are effectively reduced. The intensive form of CT may also help to maintain treatment focus, build the therapeutic alliance quickly, and overcome longer term barriers to care such as maintaining weekly appointments. Although the initial results are promising, further randomised controlled studies are still required to determine the effectiveness of this intervention.

Pharmacological studies: In terms of pharmacotherapy, Selective serotonin re-uptake inhibitors (SSRIs) such as sertraline and paroxetine have been shown to be effective in treating PTSD (Cukor, et al., 2010). However, the results are typically smaller than the

effects of prolonged exposure and are only maintained while the medication is taken. There is some evidence that Topiramate (Andrus & Gilbert, 2010) and duloxetine (Villarreal, Canive, Calais, Toney, & Smith, 2010; Walderhaug et al., 2010) may also be effective in reducing PTSD symptoms. However, one trial using topiramate did not produce a significant reduction in PTSD scores compared to a control condition. Furthermore, there were significant adverse side effects associated with the use of this medication. In terms of duloxetine, Walderhaug and colleagues (2010) reported that this medication produced decreases in 21 combat veterans with treatment refractory PTSD and depression. Furthermore, duloxetine resulted in a reduction in nightmares. In terms of the Villareal study (2010), they found that nine out of 15 military veterans responded to duloxetine in terms of a 20% or greater reduction in PTSD CAPS scores. However, a number of side effects were noted including constipation, diarrhoea, and nausea. Three participants dropped out due to the side effects. These pilot studies suggest that further randomised placebo controlled studies are required.

Combined Psychological and Pharmacological Studies: At present there is limited research indicating that the combination of pharmacotherapy and psychotherapy is effective for the treatment of PTSD (Hetrick, Purcell, Garner, & Parslow, 2010).

Early Interventions: A systematic review of 15 psychological interventions indicated brief-trauma-focussed therapy was more effective than waiting list interventions at reducing acute-traumatic stress symptoms and the prevention of later PTSD (Roberts, Kitchiner, Kenardy, & Bisson, 2010). Although there is some indication that pharmacological early interventions, such as morphine administration following trauma, may reduce incidents of PTSD, further controlled studies are required before medications are considered a safe and preventative option for PTSD (Fletcher, Creamer, & Forbes, 2010; Holbrook, Galarneau, Dye, Quinn, & Dougherty, 2010).

Imagery Rehearsal Therapy (IRT) for Nightmares: A characteristic feature of combat exposure is the onset of re-experiencing symptoms including nightmares. Nappi and colleagues (2010) found that the implementation of a short IRT program led to significant decreases in nightmare intensity and frequency in a sample of 58 veterans from different eras. In addition, IRT resulted in reduced levels of insomnia and overall symptoms of PTSD. The authors noted that the probability of completing this treatment was greater if a veteran had completed a PTSD treatment program. Furthermore, the authors noted significantly reduced levels of insomnia when treatment was delivered in an individual compared to group format. Limitations of this study included a retrospective review of data not initially intended for research and there was no comparison condition. In addition, a number of veterans did not complete the course of IRT. In contrast to this finding and previous studies, Cook and colleagues (2010) found that six sessions of

imagery rehearsal (n=63) did not lead to a reduction in nightmare frequency compared to a treatment control condition (n= 63). For both groups there was an improvement in sleep quality and a reduction in CAPS scores. Possible explanations for the discrepancy with previous results may include the comparison with a treatment control condition, more severe presentations of PTSD and nightmares worked with, use of monthly retrospective versus nightly accounts of nightmares, use of a group format, and a lack of completed or concurrent treatment for trauma. Although being a more rigorous and controlled study, no immediate post-treatment assessment was completed. Furthermore, nightmare intensity and distress were not assessed in this study despite being a key criterion for psychopathology. Of these two studies the mode of delivery (group versus individual) and prior completion of a PTSD treatment program appear to be relevant in terms of treatment effectiveness.

Group Therapy and Attachment style: Recently, Forbes, Parslow, Fletcher, McHugh, & Creamer (2010) conducted a study to examine the impact of attachment (interpersonal) style on treatment outcome following group therapy. The results demonstrated that a preoccupied style of attachment (as opposed to a fearful, dismissive, or secure style) was associated with greater severity of PTSD symptoms at nine months post-treatment. Notably, the preoccupied attachment style is characterised by a preoccupation with approval and acceptance from other people. This style of interacting was hypothesised to interfere with optimal emotional processing of traumatic memories associated with treatment outcome. These findings have important implications for who is likely to benefit from group therapy. Furthermore, attachment style should also be considered as a moderating variable in future individual treatment outcome studies. Bowen, Shelley, Helmes, & Landman (2010) also found that in a group therapy format, military veterans who were high-disclosers had greater levels of dissociation at the start and end of the program. However, there was a greater decrease in levels of dissociation at the three month period. Ray & Webster (2010) implemented interpersonal psychotherapy in a group setting for nine Vietnam Veterans with PTSD as part of a pilot study. The authors found that this form of therapy resulted in improved interpersonal and global functioning as well as reduced symptoms of PTSD and depression. It was also noted that veterans reported a reduction in anger and stress levels.

Alcohol and Substance Use: Dass-Brailsford and Myrick (2010) reviewed the literature on integrating treatments for comorbid PTSD and substance abuse suggesting that integration should be adopted given the comorbidity and associated mechanisms of these disorders. Hien and colleagues (2010) recently explored the effects of a “Seeking Safety” treatment program (an integrated trauma-focussed/substance use CBT intervention) on PTSD symptoms and substance use 3, 6, and 12 months following

completion. Initial reductions in PTSD symptoms were associated with eventual reductions over time in substance use (global response). In contrast, initial decreases in substance use were not associated with later reductions in PTSD symptoms. The authors suggest that increased substance use likely reflects an attempt to self-medicate PTSD symptoms.

Smoking Cessation: Perhaps an overlooked comorbity of PTSD is cigarette smoking/addiction which is known to occur in approximately 45% of individuals. In particular, smoking is typically heavier, used to regulate negative emotional states, and more difficult to abstain from in individuals with PTSD. Furthermore, cigarette smoking is likely to lead to other physical health problems and is often ineffectively treated or untreated (McFall et al., 2010). Therefore, integrating smoking cessation into PTSD treatment programs may be an effective way to reduce cigarette consumption. In a very large study (n=943) published in the influential journal JAMA, McFall et al., (2010) found that smoking cessation that was integrated with other mental health care produced greater levels of abstinence at six and 18 month time points compared to Veteran Affairs Smoking Cessation Clinics alone.

In another approach, Dedert and colleagues (2010) developed a program that tested smoking cessation in veterans with PTSD. The program involved an initial invitational letter to 584 veteran smokers. Veterans who were interested received a follow-up phone call and were allocated to one of three treatment options including referral to the National Cancer Institute's Smoking Quitline, web-based counselling, or pharmacological treatment. The results indicated that 31.1% were interested and accessed information regarding quitting smoking. Of the sample that accessed intervention, 8.4% abstained from smoking. In total the authors noted that 2.6% of the initial group targeted reported abstinence.

Dissemination of Treatments and Effectiveness Studies: In efficacy studies treatments are typically delivered in a controlled format by trained therapists. This raises questions about what types and how effective interventions are when delivered by different health professionals in a less standardised way. A very large trial (n=1004) was conducted to gauge the effectiveness of Co-ordinated Anxiety Learning and Management (CALM) – a flexible treatment package for panic, generalised anxiety and seasonal affective disorders (PD,GAD, SAD) and PTSD, designed to be implemented by primary care clinicians – across 17 primary care clinics. CALM involves a computer based system to monitor outcomes and guide implementation of CBT/pharmacological intervention. In comparison to usual care CALM produced greater reductions in anxiety, depression, and functional disability, and greater quality of care over 18 months (Roy-Byrne et al., 2010).

This provides a useful model for the translation of evidence-based practices into routine clinical care by non-mental health workers.

The US VA has recently undertaken the dissemination of evidence-based interventions (Prolonged Exposure and Cognitive Processing Therapy) by training mental health staff in the VA health system (Karlin et al., 2010). After training, up to 96% of facilities were delivering either PE or CPT. Preliminary system data show that these programs are producing *on average* 30% decreases in PTSD checklist scores. The authors emphasised: ongoing training to promote mastery in providers, providing education to health professionals that recovery from PTSD is possible, incorporation of motivational techniques into therapy, utilising patient testimonials, formalisation of training requirements, alleviating provider fears about re-traumatising patients, overcoming time-constraints on a few practitioners by extending the training and knowledge base to others, and promoting changes in treatment culture (e.g., from symptom-based to recovery-based).

Utilisation and barriers to treatment

Despite high levels of mental health problems in veteran populations, health services are under-utilised. For example, Kim and colleagues (2010) found that approximately 45% of active duty soldiers and 33% of National Guard recruits reported the presence of a mental health problem three and 12 months post-deployment. Despite this, at 12 months only 27% of National Guard and only 13% off active duty veterans with a mental health problem accessed mental health services. Furthermore, active duty veterans reported higher levels of stigma compared to National Guard recruits. Iversen et al., (2010) reported that only 18.5%-54.3% (depending on type of problem) of UK recruits with perceived mental health problems accessed any form of medical assistance. Higher rates (54.3%) of medical professional help were sought when symptoms of PTSD were present compared to alcohol misuse (15.6%). Veterans also reported high rates of seeking help from chaplains, family members, and other non-medical professional services (social workers). Of the overall sample of help-seekers who were receiving professional medical assistance only 50.6% were receiving some form of counselling or psychotherapy. Rates of CBT being received were reported to be even lower at 6-12.9%. Improving Access to Psychological Therapies is one program that is aimed at making access to evidence-based treatments more timely and widespread in UK veterans (www.iapt.nhs.uk/special-interests/veterans). This is a conjoint program between the Ministry of Defence and Department of Health in the UK aimed at making services outside of the military more accessible and capable of catering to the needs of veterans. This program is currently piloting studies to identify vulnerable service leavers.

A study by Hawkins and colleagues (Hawkins, Lapham, Kivlahan, & Bradley, 2010) highlighted the discrepancy between alcohol misuse rates (21.8%) amongst OEF/OIF men and brief alcohol interventions received. In particular, only 32% of OEF/OIF screening positive for alcohol misuse received a brief intervention that included advice or feedback. Rates were even lower at 12% when more stringent criteria requiring both advice and feedback were used.

A range of factors are understood to either block or facilitate service use and treatment completion. In particular avoidance of trauma memories and feeling, values and priorities that conflict with seeking treatment, treatment discouraging beliefs, health care system concerns, knowledge barriers, access barriers, and an invalidating post-trauma socio-cultural environment can all factor into service usage. Gould et al (2010) noted that the general pattern of stigma and perceived barriers is consistent across US, UK, Australia, New Zealand, and Canadian armies. Cully and colleagues (2010) noted that veterans in rural areas are also less likely to receive psychotherapy.

Acceptance and adherence to treatment is another vital component that needs to be understood. Lindley et al., (2010) indicated that treatment acceptance was less likely when assessments were conducted by phone and by primary care physicians. Clinic location also impacted acceptance and adherence. Furthermore, veteran age (being older or retired) and/or being depressed reduced levels of acceptance and attendance. In terms of service utilisation, Kehle and colleagues (2010) noted that earlier treatment seeking, within six months after returning home from deployment to Iraq, was more likely for veterans who sustained injury, held positive attitudes regarding therapy, received therapy while in theatre, and had higher levels of PTSD and depressive symptoms.

Traditional masculine roles reinforced through culture and in the military environment may also hinder access to services (Lorber & Garcia, 2010). Such roles are typified by independence, competition and power, valuing of aggression and strength, use of ineffective coping methods such as drinking, and less acceptance of and skill at processing and expressing emotions.

Resources should be allocated to overcoming stigma and promoting positive attitudes towards service utilisation. Such programs may need to assist veterans to adopt alternative skill-sets to those necessitated by combat. Furthermore, particular emphasis should be placed on assisting recruits to recognise their mental health care needs. Peer to peer programs may be a useful method to facilitate such recognition, enhance treatment utilisation, adherence, and outcomes, and to reduce suicide (Greden et al., 2010).

Technological advances in treatment

Tele-interventions: Technological advances are one way that barriers such as stigma and distance to treatment facilities may be overcome. Importantly, tele-interventions are making therapy more accessible to a range of veterans. Olden and colleagues (2010) reviewed the literature noting that telemedicine technologies using a videoconferencing format have now been used to treat PTSD, depression, substance abuse, and conduct suicide risk assessments and interventions. Furthermore, videoconferencing interventions are also being used to provide support, education, and assistance for caregivers of patients with dementia, schizophrenia and TBI.

Recently, Tuerk et a., (2010) conducted a pilot study to explore the effectiveness of prolonged exposure, delivered using videoconferencing, at alleviating PTSD symptoms in combat veterans. The authors found that PE via videoconferencing produced large and significant reductions in PTSD symptoms that were comparable to a group where PE was delivered in person. Furthermore, they found that this type of intervention was accepted by participants, practical, and safe. There is also emerging evidence that telemedicine may be an effective means to conduct group therapy. For example Morland et al., (2010) reported that conducting group cognitive behavioural therapy via videoconferencing compared to treatment in person was just as effective at reducing anger symptoms related to PTSD in rural veterans. A later analysis indicated that satisfaction, number of sessions completed, homework completed, and attrition were similar between the two groups (Greene et al., 2010). There was however, a slightly stronger therapeutic alliance between participants and the group leader in the face-to-face versus videoteleconferencing method.

In a recent review of studies, Hill and colleagues (2010) note that telemedicine is effective for monitoring health, enhancing access to healthcare, enabling provider-patient interaction; and for facilitating treatment involving multiple providers. Despite initial results there are still some concerns regarding telemedicine approaches (Olden, et al., 2010). In particular, there are concerns regarding treatment effectiveness, therapeutic alliance, and managing high-risk clients. Limited skilled trauma therapists and lack of adherence to implementing evidence-based/manualised treatments is another concern. Hill et al., (2010) also noted barriers in terms of patient adherence and skill at using technology and problems with maintaining technology and skilled staff to operate these interventions. Future research may need to determine the effectiveness of different types of telemedicine interventions (telephone versus combined telephone and video). Based on the initial evidence,telemedicine approaches appear to be a practical and feasible method for delivering interventions and providing support.

Virtual Reality: The use of *Virtual Reality* is another technological advancement in the treatment of PTSD (Rothbaum, Rizzo, & Difede, 2010). In a recent review, Rothbaum (2010) noted that three scenarios related to Vietnam War, Iraq War, and World Trade Center have now been developed to assist people overcome PTSD. The virtual environment has now been designed to deliver information to all senses creating a sense of presence and immersion that can activate the fear/emotional structure associated with the traumatic memory. Initial evaluation of the Virtual Iraq/Afghanistan exposure system indicates that up to 83% of service members are neutral to willing to use such technology. Preliminary data show that this form of intervention resulted in significant and successful reductions in PTSD-Checklist-Military scores in 16 out of 20 soldiers who completed treatment (Rizzo et al., 2010). Furthermore, these reductions were maintained at three months follow up. However, no control or treatment condition was included. Despite these findings a number of participants did not complete the course of treatment. Furthermore, this type of technology may have greater ecological/face validity and be a more acceptable form of therapy for some recruits. However further studies are required.

Online Interventions: Stress Gym, an online internet program, uses CBT to reduce stress, and has also shown to be effective in enlisted sailors/officers (Williams, Hagerty, Brasington, Clem, & Williams, 2010). The program resulted in reductions in levels of stress. Furthermore, participants reported satisfaction with the program indicating that this method was feasible, engaging, and contained helpful content. Future studies are required using control conditions.

Traumatic brain injury and neurorehabilitation

Traumatic brain injury (TBI) is a frequent occurrence in war zones and can cause significant cognitive, physical, and psychological impairment. Although lower than other studies, MacGregor and colleagues (2010) reported rates of TBI amongst injured US military serving in Iraq to be approximately 15.8%. Furthermore, TBI is associated with a number of significant psychiatric sequelae. In a study of 932 seriously injured patients those with a mild TBI relative to those without, were significantly more likely to develop PTSD, agoraphobia, obsessive compulsive disorder (OCD), and any psychiatric disorder (Bryant et al., 2010). In a study of OIF/OEF veterans, those screened and confirmed as having a TBI were three times more likely to have PTSD, depression, or another anxiety disorder, and about 2.5 times more likely of having a substance related problem (Carlson et al., 2010). In total, up to 80% of veterans with initial positive screens for TBI were diagnosed with an additional psychiatric disorder. Finally, Bombardier and

colleagues (2010) reported that 53.1% of patients (non-veterans) with mild TBI experienced a Major Depressive Episode in the first year after injury.

TBI, PTSD, and Post-Concussive Syndrome: A characteristic feature of mTBI is post-concussive syndrome which requires three symptoms from the following: headache, dizziness, fatigue, balance problems, concentration, irritability, insomnia, intolerance of stress, emotion or alcohol, and memory problems. These features may also be associated with psychiatric presentations of PTSD and depression which are more likely to develop as a result of TBI. The complex relationship between mTBI, PTSD, and Post-concussive syndrome make it difficult to separate out the primary presenting issue, causal variables and ultimately the best treatment. Illustrating this, Brenner and colleagues (2010) found that post-deployment post-concussive symptoms were more likely in veterans with a diagnosis of both mild-TBI and PTSD compared to veterans with only a diagnosis of mild-TBI or PTSD. Recent literature suggests that post-concussive syndrome is more frequent in mild-TBI cases relative to patients with moderate to severe TBI (Belanger, Kretzmer, Vanderploeg, & French, 2010). However, when these authors controlled for variables including age, time since injury, mechanism of injury, and PTSD severity, the mild-TBI group no longer had significantly more post-concussive symptoms. One possible reason for this is that amnesia resulting from moderate to severe TBI may serve as a protective factor against the development of PTSD. Consistent with this, in a sample of 3047 severe injury patients, PTSD rates were elevated in the mild TBI group compared to the severe group (Zatzick et al., 2010). Furthermore, the authors noted that the presence of PTSD was associated with elevated health problems and impaired cognitive functioning. To further understand the diagnostic complications this triad of problems presents, a study was conducted to examine the relationship between self-reported cognitive functioning and objective neuropsychological indices of functioning in veterans with mTBI (Spencer, Drag, Walker, & Bieliauskas, 2010). The authors found that self-reports of cognitive functioning were not significantly related to objective neuropsychological test performance self-reports but were accounted for by PTSD, anxiety, and depression. Furthermore, there tended to be a large range in clinician estimates of objective test performance based on patients' self-report of cognitive functioning. This suggests that there is prone to be some error in clinical judgement of cognitive functioning and that this should be complemented with additional screening. Chapman and colleagues (2010) suggests that the Brief Neurobehavioural Detector (BOND) may be a useful screening device for individuals who sustain an mTBI. In particular, it was noted that BOND scores in such participants were not due to age, PTSD, other psychiatric diagnoses, substance-related problems or medical problems.

Blast-related Trauma and Physical Injuries: There has also been an increasing focus on blast versus non-blast incidents on the development of TBI, PTSD, and post-concussive. For example, higher levels of re-experiencing symptoms were reported in veterans who had experienced a blast-related TBI (Kennedy, Leal, Lewis, Cullen, & Amador, 2010). Similarly, Lippa, Pastorek, Benge, & Thornton, (2010) observed a small difference in PTSD in blast compared to non-blast patients with mTBI. However, post-concussive symptoms did not differ in relation to blast versus non-blast groups. The presence of a physical wound following blast-related mTBI may also safe-guard against the development of somatic and emotional symptoms such as anxiety (Kennedy, Cullen, Amador, Huey, & Leal, 2010). Having a visible physical injury may reduce ambiguity (within the patient and others) regarding symptoms, their cause, and predicted recovery.

Assessment, Intervention, and Future Directions: A comprehensive review of current methods for detecting, assessing, and treating TBI and comorbid conditions in military populations was published (Meyer, Marion, Coronel, & Jaffee, 2010). In particular the area of assessment is evolving towards assessing every soldier that undergoes a traumatic event using the military acute concussion evaluation (MACE). Positive screens result in a referral for further assessment and intervention. Severe TBI is usually diagnosed more rapidly through physical presentation and patients are referred on to specialised facilities. For patients with mTBI/concussion further assessment and monitoring is conducted using the Neurobehavioural symptom Inventory and preliminary education regarding concussion is provided. If symptoms persist, further assessment is conducted (see below Helmick, 2010). Soldiers' cognitive functioning may also need to be assessed to ensure safety and fitness for combat. The authors also discuss areas of developing and future investigations such as: cellular regrowth and interconnection therapies, developing evidence-based prevention and rehabilitation programs, 3-D modelling of blast waves and their impact on the brain, enhancing psychological and biological markers of psychological disorders such as PTSD and TBI, longitudinal studies of mTBI, and the use of blast sensors on helmets.

Helmick (2010) provided details regarding cognitive rehabilitation in military personnel with mTBI. Initially, the authors outlined an algorithmic process whereby a patient is screened for TBI, cognitive symptoms, and comorbid psychiatric problems. The presence of TBI and cognitive symptoms, after severe comorbid psychological disorders have been identified and 'controlled,' results in a referral for neurological assessment, then a cognitive assessment, and if necessary, referral on for cognitive rehabilitation. The authors then discuss specific types of interventions that have been shown to be empirically supported such as attention process training, working memory training,

mnemonic techniques, external cuing, social communication skills training, and error management training amongst them.

At present the Defence and Veterans Brain Injury Centre is implementing the Assisted Living Pilot Project (ALPP) (Hoffman, Shesko, & Harrison, 2010). ALPP is a program for veterans who have sustained a moderate to severe TBI and is designed to assist patients towards transitional and independent living. This program incorporates traditional rehabilitation services, environmental enrichment, and the Enhance Rehabilitation Protocol (ENP) that includes cutting edge technologies such as telemedicine for assessment. This program is also involved in researching therapies such as Tai Chi, aerobic training, and animal therapy.

Psychosocial rehabilitation

Psychosocial Rehabilitation: Veterans returning from military operations are likely to experience a range of difficulties in adjusting to civilian life. Sayer and colleagues (2010) noted that 25-56% of returning OIF/OEF veterans who were receiving some care experienced some to extreme difficulties in social functioning, productivity, community involvement, and self-care. Divorce, dangerous driving, substance use, and anger problems were reported in approximately one-third of participants. Despite this, 96% of veterans reported an interest in services designed to assist readjustment particularly through VA facilities, the internet, and mail.

Screening for readjustment using tools such as the Post-Deployment Readjustment Inventory (Katz, Cojucar, Davenport, Pedram, & Lindl, 2010) may be a useful way to pick up on problems experienced by returning recruits. This instrument gauges career challenges, social difficulties, intimate relationships, health concerns, concerns about deployment, and PTSD symptoms.

Geriatric Rehabilitation: A large and ageing veteran population poses additional challenges in terms of providing effective rehabilitation. Furthermore, rehabilitation can often be complicated by comorbid war-related medical and psychiatric problems. Despite this there is growing evidence that supports rehabilitative interventions in older adults (Cifu, 2010). In terms of intervention effectiveness there needs to be an emphasis on early and frequent use of rehabilitation that is integrated with other programs. Integration of rehabilitation into community living centres also increases the likelihood that patients can return home.

Suicide

Suicide is a leading cause of death in US veteran populations, passing mortality from combat in January 2009 (Bell, Harford, Amoroso, Hollander, & Kay, 2010). A number of factors increase the likelihood of suicidal ideation and suicide. Bell and colleagues (2010) reported that hospitalisation for a medical, psychiatric, or alcohol related problem was associated with an increased risk of suicide. Furthermore, suicide was more likely to occur soon after diagnosis of a mental health problem. Veterans who have higher levels of PTSD, depression, and alcohol use are also at increased risk of suicidal contemplation (Pietrzak, Goldstein, et al., 2010). In addition, this population was reported to have greater psychosocial difficulties, higher levels of stigma and barriers to care, and reduced levels of resilience and social support. In contrast, social support following deployment, sense of purpose, and sense of control were associated with less suicidal ideation. In another study, it was reported that men with a diagnosis of bipolar disorder and women with a substance use disorder were more likely to commit suicide (Ilgen et al., 2010).

Interpersonal Psychological Theory of Suicide details a set of circumstances that increases the likelihood of suicide (Selby et al., 2010). These factors include 'Desire for death', comprised of, 'thwarted belongingness' and 'perceived burdensomeness', and 'acquired capability for suicide'. For example, thwarted belongingness may come about from poor family adjustment, loss of friends in combat, feelings of isolation, disconnection from family, etc. Perceived burdensomeness may be associated with loss of purpose, failure to find work, or disability. Finally, Acquired Capability is linked to exposure to violence, witnessing death, combat training and experience of 'battle-mind', and habituation to fear. Screening needs to account for such factors. Treatments may also need to target thwarted belongingness and perceived burdensomeness.

In a commentary, Bryan and colleagues (Bryan, Kanzler, Durham, West, & Greene, 2010) discuss a number of factors particular to military service and deployment that may contribute to the elevated levels of suicide. First levels of exposure to trauma, violence, and combat may diminish a person's fear of death and increase tolerance of pain. Thus soldiers may develop an acquired capability for suicide. Second, difficulty in restricting access to firearms also increases the risk of suicide. Furthermore, attempts are often impulsive actions driven by high distress. Therefore, restriction to firearms may be one method to reduce suicide in high-risk individuals who are potentially planning and preparing suicide. Insomnia and nightmares are another factor associated with suicide. Therefore, CBT strategies to manage sleep problems may alleviate some of this risk. Agitation and hyper-arousal common reactions to combat zones may also be risk factors

for suicide risk. In particular, such problems are associated with impaired sleep and racing thoughts. Social support is another risk factor for suicidal ideation and action. Restricted communication with family and friends at home can hamper a sense of belonging. Despite this, military service and unit cohesion can confer a level of protection against suicide. There is also limited access to mental health services and risk-management plans in combat zones.

Physical health, older-veterans health, and mortality

Physical Health Problems: In a study of 4416 veterans from OEF/OIF it was found that PTSD was significantly associated with provider-diagnosed physical disease (Andersen, Wade, Possemato, & Ouimette, 2010). Notably, veterans with PTSD were almost twice as likely to develop nervous system, musculoskeletal, and ill-defined diseases. Furthermore, circulatory, digestive, and hypertensive diseases were also more likely to be diagnosed in veterans with PTSD.

Rheumatoid Arthritis: Boscarino, Forsberg, and Goldberg (2010) conducted a study of twins who served during the Vietnam War to examine the association between PTSD and rheumatoid arthritis. The results demonstrated that twins with the highest PTSD ratings were 3.8 times more likely to be diagnosed with rheumatoid arthritis.

Dementia: With the passage of time since war, veterans are presenting with problems associated with ageing that are likely to be exacerbated by PTSD and other mental health problems. For example, the rates of dementia were noted to be elevated in older veterans with PTSD relative to those without PTSD (Qureshi et al., 2010). Furthermore, Yaffe et al., (2010) found that the presence of PTSD increased the risk of developing dementia by two times. The authors suggest that PTSD and chronic stress associated with it might result in changes to the hippocampus and HPA-axis which are implicated in dementia. Despite these findings it is unclear whether there is a common risk factor to developing PTSD and dementia or whether PTSD leads to the onset of dementia via disruption of neuro-cognitive pathways.

Psychiatric Presentation and Mortality: Flood and colleagues (2010) examined the influence of internalising and externalising subtypes of PTSD on mortality. Overall, PTSD increased the likelihood of mortality compared to the non-pathology group. Both internalising and externalising subtypes were at increased risk of cardiovascular mortality, while the externalising sub-type had a higher rate of death due to substance-related causes. In a sample of 559,985 (1999 Large Health Survey of Veteran Enrollees) veterans it was found that all psychiatric diagnoses, including mood-related, PTSD,

schizophrenia, bipolar disorder, and alcohol and substance related disorders were associated with increased risk of mortality (Chwastiak, Rosenheck, Desai, & Kazis, 2010). After controlling for medical and psychiatric comorbidity, obesity, smoking, and exercise – alcohol and drug related disorders and schizophrenia placed an individual at increased risk of mortality.

Gender

Gender Differences: Due to the large number of female recruits now being deployed there is growing interest in gender-related differences and issues in military health. Maguen and colleagues (2010) conducted a study on gender differences in mental health problems for veterans of OEF/OIF. It was found that women had higher rates of depression while men had higher rates of PTSD and substance/alcohol use disorders. Similarly, (Haskell et al., 2010) reported higher rates of depression and military sexual trauma and lower rates of PTSD in females compared to males. The difference in rates of PTSD is likely to be due to the higher levels of combat exposure for males. In a sample of 125,729 OIF/OEF veterans receiving care, military sexual trauma rates were 15.1% for women and 0.7% in males (Kimerling et al., 2010). Furthermore, military sexual trauma was associated with increased likelihood of a mental health diagnosis.

Pregnancy: Mattocks and colleagues (2010) explored the relationship between pregnancy and mental health in veterans of OEF/OIF. The authors found that 32% of women who were pregnant compared to 22% who were not pregnant had one or more mental health diagnoses. Overall, women who were pregnant were two times more likely of having a mental health diagnosis including depression, PTSD, anxiety, bipolar disorder, and schizophrenia. Despite these findings little is known about the reasons for increased vulnerability to developing mental health problems in pregnant veterans. These findings highlight the need for further research and support for women who are pregnant following service.

Family and relationships

Deployment to a war zone, absenteeism, and post-deployment psychiatric and readjustment issues contribute to a number of difficulties in the family system and vice versa. In 2010 there were a number of research and review articles published in this important area. Dekel and Monson (2010) completed a review of relevant constructs that link PTSD to family functioning. These constructs/models include secondary/vicarious traumatisation, ambiguous loss, caregiver burden, couple adaptation to traumatic stress,

and cognitive behavioural mechanisms. The review then discusses the use of couple therapies to improve relationships. As of yet there is little data and research that has explored therapies to enhance the relationship between military parents with PTSD and their children. However, Paris and colleagues (2010) outline a number of treatments based in theory such as Interaction Guidance, Minding the Baby, Child-parent Psychotherapy, Trauma-focussed CBT for pre-school children, and Parent-child Interaction Therapy which have potential to be adapted, modified, and evaluated for military families with in the US VA.

Marital and Family Functioning: Allen, Rhoades, Stanley, & Markman (2010) found that PTSD symptoms in husbands returning home after deployment resulted in reduced marital satisfaction, decreased confidence in the relationship, reduced positive bonding, disrupted parenting alliance, and reduced dedication to the relationship, negative communication, and reduced satisfaction with making sacrifices for the relationship. Conversely, poor family functioning has also been shown to be associated with PTSD symptoms using structural equation modelling. Evans and colleagues (2010) found that poor family functioning (based on veterans' reports) at intake was associated with intrusion, hyper-arousal, and avoidance symptoms three months after intervention. Family functioning at three months then predicted arousal and avoidance symptoms at nine months. Poor family functioning as reported by both veterans and their partners predicted avoidance at three months, while poor family functioning at three months predicted intrusions and hyper-arousal at nine months. These results signify the importance of gauging family functioning and common relationship dynamics (demand-withdrawal) that may exacerbate arousal and avoidance symptoms of PTSD. These results also emphasise the need to incorporate family or couples therapy into PTSD treatments.

Gewirtz and colleagues (2010) using structural equation modelling found that PTSD symptoms one year after deployment was associated with poorer couple adjustment. Longer-term effects have also been observed in partners of Vietnam veterans. For example, combat and PTSD in veterans was significantly associated with the presence of depression in partners up to three decades later (O'Toole, Outram, Catts, & Pierse, 2010). Due to the significant strain placed on partners, the Partners of Veterans Distress Scale has been developed (POV-DS; MacDonell, Marsh, Hine, & Bhullar, 2010). Factor analysis of an initial set of questions answered by 665 female partners of Australian Veterans produced seven key factors made up of 45 of those questions. Those factors included sleep problems, hyper-vigilance, social isolation, financial problems, intimacy problems, exhaustion, and negative affect.

Child Wellbeing: Having a parent in the military is likely to impact the psychological wellbeing of children in a number of ways. Younger children of military families (0-5 years) are most likely to have a parent who has been deployed (Paris, et al., 2010). Presenting problems of children are likely to be mediated by developmental age, separation and loss during deployment, increased stress for the parent at home, and changes to the parent-child dynamic post-deployment. Chandra and colleagues (2010) explored the mental wellbeing of 11-17 year children with parents who had been deployed. The results indicated that these children have greater levels of emotional problems compared to national surveys. Furthermore, older children and girls of all ages had greater school, peer, and family problems. Finally, PTSD symptoms are associated with poorer parenting behaviours such as reduced positive parenting and parental involvement and elevated levels of inconsistent discipline and poor parenting (Gewirtz, et al., 2010).

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