

Summary of the Military and Veteran Mental Health and Traumatic Stress Literature: 2012

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This document presents an annual literature summary for the year 2012 in the field of military and veteran posttraumatic mental health. It was produced for the Australian Government, Department of Veterans' Affairs (DVA), by the Australian Centre for Posttraumatic Mental Health (ACPMH).

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Glossary of terms

Alternative therapies	Alternative therapies refers to a group of health care systems, practices, and treatments that are not considered to be a part of conventional medicine, that are used as an alternative to conventional care
CAPS	Clinician-administered PTSD scale: a 30-item structured interview that corresponds to the DSM-IV criteria for PTSD
Comorbidity	Comorbidity is the presence of one or more disorders (or diseases) in addition to a primary disease or disorder
Complementary therapies	Complementary therapies refers to a group of health care systems, practices, and treatments that are not considered to be a part of conventional medicine, that are used as an adjunct to conventional care
CPTSD	Complex posttraumatic stress disorder
DSM-IV-TR	The Diagnostic and Statistical Manual of Mental Disorders (DSM) 4th edition, produced by the American Psychiatric Association (APA).
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders (DSM) 5th edition, produced by the American Psychiatric Association (APA) - released May 2013.
National Guard	The military reserve units controlled by each state of the United States
NHMRC	National Health and Medical Research Council
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PTSD	Posttraumatic stress disorder
SUD	Substance use disorder
TBI	Traumatic brain injury
UK	United Kingdom
US	United States
VA	Veterans Affairs - The US Department of Veterans Affairs
Virtual reality exposure therapy (VRET)	Exposure therapy administered in a computer-generated virtual environment



Executive summary

This annual summary of the military and veteran mental health and traumatic stress literature for the year 2012 was produced by the Australian Centre for Posttraumatic Mental Health (ACPMH) for the Australian Government, Department of Veterans' Affairs (DVA). This executive summary provides an overview of the literature summary for each topic of review chosen in consultation with DVA.

DSM-5 changes to PTSD diagnostic criteria (pages 8-12)

- The Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) was released by the American Psychiatric Association in May 2013. DSM-5 has substantially changed the diagnostic criteria for Posttraumatic Stress Disorder. Literature in 2012 set out to investigate the impacts these changes had had on prevalence rates of PTSD and debated the ways in which trauma experiences are understood in the psychiatric field.
- Studies showed slight increases or decreases in prevalence rates of PTSD as a result of the changes made by DSM-5. In 2012 one single study which utilised a veteran sample found a slight decrease in prevalence rates using DSM-5 criteria relative to DSM-IV criteria. Research also continues to challenge the current understanding of trauma and its mental health consequences.

Mild traumatic brain injury (pages 13-16)

- Considered the signature injury for the OEF/OIF conflicts, in 2012 numerous studies investigated the prevalence rates of traumatic brain injury (TBI), its relationships with other psychiatric disorders, and conceptual definitions of traumatic brain injury in veterans, with emphasis on mild TBI.
- In 2012, research found that 4.4-13.9% of OEF/OIF veterans have experienced a TBI, and confirmed the similarity between TBI-related problems (including postconcussive syndrome (PCS)) and other psychiatric disorders such as PTSD. This has led researchers to question the current approach for how veterans are diagnosed and treated post-TBI.

Substance use (non-alcohol) and veterans (pages 17-20)

- Substance use in veteran populations is a uniquely challenging area for research to investigate. Regardless, several studies in 2012 set out to address prevalence rates and the effects of substance use on veterans.



- Prevalence rates for substance use disorders varied between 3% and 12% and trends appeared to be increasing steadily since the start of the OEF/OIF conflicts. The studies confirmed that substance use disorders result in negative outcomes for veterans generally, such as increased complexity in the presence of mental health problems, increased likelihood of non-injury (e.g., disease and other health problems) and injury related mortality (e.g., accidents, suicide). Importantly, there is increasing evidence of prescription drug abuse and synthetic drug use.

Anger and aggression in veterans (pages 21-24)

- Multiple studies in 2012 investigated experiences of anger and aggression in veterans, and how they are influenced by disorders such as PTSD, veteran-specific factors such as personality, age or gender, and military-specific factors such as combat exposure and intensity.
- The literature revealed that rates of acting aggressively or having problematic levels of anger are often elevated post-deployment (typically, measured at 3-12 months post-deployment and up to decades after Vietnam theatre deployment) and they have become significant issues facing OEF/OIF veterans and their loved ones. Unfortunately, the literature also highlighted that anger and aggression are influenced by a complex web of factors such as mental health problems, or combat exposure and that much remains unknown.

Suicide and veterans (pages 25-29)

- Military factors have previously been thought to buffer against suicide risk in the military, however, the 2012 literature reported that suicide rates in the US military have surpassed civilian rates. The risk factors reported this year echo findings of previous years, where being younger, OEF/OIF deployment, having a mental illness (e.g., PTSD, mood disorder, substance use disorder) conferred greater risk. Military specific events such as combat exposure, killing in combat and more than one deployment (in active duty personnel) were further confirmed as risk factors in 2012. One study found a greater risk for suicide attempt where childhood trauma and mood disorder were present. Despite multiple deployment being a risk in active military personnel, one study showed up to 30% of suicides in military personnel, were amongst those never deployed.
- One stand out finding in 2012 was that sleep disturbances were identified as being strongly related to suicidal behaviour in veterans, and more strongly associated with risk of suicide behaviour than depression and substance use disorders. In one of the



few Australian studies cited in the literature, 90% of Vietnam veterans reported significant sleep disturbances.

- Protective factors such as reporting suicidal ideation to providers, social support and being married continued to be identified in the literature. For serving personnel, unit cohesion was also identified as particularly protective.

E-Health interventions (pages 30-34)

- E-health interventions offer veteran and military populations unique access to mental health services, reducing barriers to care. The 2012 literature showed that the acceptance and utilisation of e-health interventions is influenced by a range of factors, such as stigma, distance, mobility, general preference, and whether soldiers are actively seeking help for mental health issues or not. Despite these influencing factors, soldiers who are educated about telemental health methods may be more inclined to use them.
- Generally the 2012 literature supported the efficacy of e-health modalities for the screening, assessment and treatment of mental health difficulties. In treatment, reduced hospitalisation rates for veterans unable or unwilling to access in-person care were observed using a telephone CBT modality, and reductions in PTSD symptoms were also observed in telephone delivered mindfulness. A review study of controlled studies of Virtual Reality Exposure Therapy (VRET) also concluded that VRET was efficacious in reducing anxiety and PTSD in veterans, though it also stated that no differences were observed between VRET and traditional exposure therapy. Despite the promising findings in VRET, dropout rates remain high and older veterans demonstrate less engagement in VRET.
- The literature in 2012 indicated the importance of some face to face interaction within e-health treatment modalities. This literature also demonstrated that while good effects are found using e-health modes of treatment, they are generally not more effective than what is seen in in-person delivery modes.

Alternative therapies for PTSD (pages 35-38)

- As with previous years, there was very little published on alternative therapies for PTSD in 2012. Of those published studies many lacked rigour in research design and analysis, prompting caution around their interpretation.
- The literature reported on the potential efficacy of third wave cognitive behavioural therapies for PTSD such as mindfulness and meditation. Mantrams (repeated words or phrases), a form of mindfulness, and biofield therapy alongside guided imagery, also gained some support as complementary therapies that aided the reduction of



hyperarousal in people with PTSD. Although music therapy was found to be enjoyable, the 2012 literature produced some evidence against recommending its use in treating PTSD. Despite the lack of scientific rigour associated with studies of alternative and complementary therapies, observational studies in 2012 reported increases in the prevalence of alternative therapies in veteran populations.

Utilisation and barriers to care (pages 39-42)

- In 2012 a number of papers reported on attempts to reduce barriers to care. The use of digital technologies such as videoconferencing to deliver treatment were commonly studied and found to be as effective as in-person modalities. Interestingly, assumptions regarding age and cultural background were refuted in the 2012 literature, with some studies suggesting digital technologies are well received and utilised by older veterans. Veterans with greater mental health difficulties however tended to prefer in-person modalities. Like the studies described in the e-health and alternative therapies sections, studies regarding digital technologies were often methodologically limited.
- One successful initiative in the USA included increasing the rebate for travel to health services for eligible veterans.



Introduction

This annual summary of the military and veteran mental health and traumatic stress literature was produced by the Australian Centre for Posttraumatic Mental Health (ACPMH), for the Australian Government, Department of Veterans' Affairs (DVA). The aim is to provide a summary of the literature pertaining to key issues identified by DVA in conjunction with ACPMH. The review is an informed, rather than critical, review of the literature. The literature included in this summary has met the broad inclusion criteria based on regular standards of academic review, but a systematic evaluation of all published research during this time period has not been made. Where there are discrepancies in the literature, these will be discussed, but we caution the reader against assuming that a single paper is sufficient to provide conclusive information. We recommend the reader source the original papers if they are interested in particular findings.

Background

In preparation for the 2012 annual literature summary, ACPMH consulted with DVA to identify the key topics on which to focus the review. These eight topics were identified as: (1) DSM-5 changes to posttraumatic stress disorder (PTSD) diagnostic criteria; (2) Mild traumatic brain injury; (3) Substance use (non-alcohol) and veterans; (4) Anger and aggression in veterans; (5) Suicide and veterans; (6) E-health interventions; (7) Alternative therapies for PTSD; and (8) Utilisation and barriers to care.

Methodology

The methodology used in this 2012 literature summary included having a defined literature search strategy and an *a priori* inclusion/exclusion criteria.



Literature search strategy

Topic area	Search terms
DSM-5 changes to PTSD criteria	DSM* OR PTSD diagnostic criteria AND veteran* OR combat OR military OR defence* or defense*
Mild traumatic brain injury	TBI OR traumatic brain injury OR mTBI OR postconcussive symptom* OR postconcussive syndrome AND veteran* OR combat OR military OR defence* or defense*
Substance use (non-alcohol) and veterans	substance use disorder* OR substance abuse OR drug* OR opiate* OR opioid* OR cannabis AND veteran* OR combat OR military OR defence* or defense*
Anger and aggression in veterans	anger OR aggression OR hostility OR violence AND veteran* OR combat OR military OR defence* or defense*
Suicide and veterans	suicide OR suicidal ideation OR veteran* OR combat OR military OR defence* or defense*
E-health interventions	e-health OR telehealth OR telemental OR virtual reality OR technology OR tele* AND veteran* OR combat OR military OR defence* or defense*
Alternative therapies for PTSD	complementary OR alternative OR mindful* OR meditat* OR mantram OR animal OR equine OR canine OR pet OR herb* OR aromatherapy OR massage OR music OR energy OR acupressure OR yoga OR dance OR art therapy OR virtual OR biofeedback OR tai chi OR sensorimotor AND veteran OR defense OR defence OR military OR combat OR PTSD OR posttraumatic stress
Utilisation and barriers to care	utilisation OR barriers to care AND veteran* OR combat OR military OR defence* or defense*

Inclusion and exclusion criteria for papers

Papers included in the literature summary were selected according to inclusion and exclusion criteria. These are presented in Table 1. Two assessors provided quality assurance checks for the selection of papers. Papers which could not be agreed upon for inclusion were assessed by a third independent assessor, who also checked the final list of abstracts to be included in the summary. The total number of abstracts derived from the literature search contrasted with the number of papers selected for inclusion is seen in Table 2. The literature search strategy included a prioritisation of review papers in line with NHMRC guidelines for evidence review. That is, systematic reviews and



meta-analyses were prioritised over general literature reviews. Priority was given to papers which were published in impactful and prominent journals such as British Journal of Psychiatry, Journal of the American Medical Association, Archives of General Psychiatry (now called JAMA Psychiatry), American Journal of Psychology, and Lancet. It is noted that online first articles that were available from 2012, published, or to be published in hard copy in 2013, were included. This is to ensure the most up to date literature is included in the 2012 review.

Table 1. Inclusion and exclusion criteria for selected papers in the annual summary

Inclusion criteria	Exclusion criteria
Literature published in 2012	Qualitative studies without empirical data ⁺
Studies reporting empirical data and findings	Single case studies
Studies published in high quality, impactful journals	Grey literature (e.g., reports, newsletters, conference proceedings)
Relevant review papers (e.g., systematic reviews, meta-analyses)	Studies with no relevance to veteran and military populations
Exceptional commentary pieces	
Papers drawn from other populations where findings are relevant to a veteran/military population	

⁺ Except in the substance use section and utilisation and barriers to care section

Table 2. Number of abstracts yielded from search and papers selected for annual summary

Topic	Abstracts yielded	Papers included
DSM-5 changes to PTSD diagnostic criteria	44	13
Mild traumatic brain injury	69	19
Substance use (non-alcohol) and veterans	75	14
Anger and aggression in veterans	43	20
Suicide and veterans	73	25
E-health interventions for veterans	46	11
Alternative therapies for PTSD	85	11
Utilisation and barriers to care	40	17
Total^a	475	130



Literature summary

DSM-5 changes to PTSD diagnostic criteria

Overview of changes to PTSD diagnosis

The Diagnostic and Statistical Manual of Mental Disorders (DSM) 5th edition, was released in May, 2013. A number of psychiatric disorders, including PTSD, have undergone major revisions. PTSD was moved from “Anxiety Disorders” into a new class of “Trauma and Stressor Related Disorders” and the original 17 diagnostic symptoms were increased to 20. The definition of what constitutes a traumatic event, referred to as criterion A, was also substantially changed to tighten the definition of a trauma experience. In addition, the previous three clusters of symptoms (B: *re-experiencing*, C: *avoidance and emotional numbing*, and D: *hyperarousal*) were expanded to four clusters of symptoms (B: *re-experiencing*, C: *active avoidance*, D: *negative alterations in cognitions and mood*, and E: *arousal and reactivity*).

A number of studies published in the 2012 literature investigated three broad areas of potential impact arising from the PTSD diagnostic change. These included: (i) the effect on prevalence rates, (ii) the relationship between new symptoms and PTSD, and (iii) a dialogue around extending different types of PTSD.

Changes to the definition of a traumatic experience (Criterion A) and the impact on PTSD prevalence

There were a number of studies published in 2012 that investigated the effects of diagnostic changes on the rates of PTSD²⁻⁶. This research largely focussed on the changes to criterion A, which defines what constitutes a traumatic event. Criterion A has changed in two ways. First, the experience of the traumatic event has been explicitly defined as trauma experienced *directly* by an individual or *indirectly*, through a traumatic event experienced by a loved one, friend, or through constant vicarious exposure that may be associated with an individual's employment (e.g., journalist witnessing traumatic events constantly). This change now explicitly excludes learning about a traumatic event through electronic media such as television, video games, movies, or pictures, unless exposure to such material is through employment. Furthermore, the previous DSM-IV-TR contained an A2 criterion which stipulated that the individual must have experienced an emotional response of intense fear, helplessness or horror during the traumatic event. In the revised DSM-5, A2 has been removed, due to evidence showing that an endorsement of A2 was not predictive of PTSD symptoms and that PTSD can occur despite these emotional experiences not occurring during the trauma⁷. Despite these



changes being reviewed in a previous ACPMH summary, only 2012 produced research that specifically investigated these changes on PTSD rates in veterans¹.

In 2012, one study comprising 24% veterans (N=185), found that the changes to the definition of the traumatic event reduced diagnostic rates of PTSD by six per cent². However, the population affected by these reduction rates were those who reported traumatic events relating to learning about the death (non-violent or non-accidental) or illness of a loved one. Elhai and colleagues³ found a similar reduction of eight per cent in a non-veteran sample of undergraduate students (N=216). The reduction in PTSD rates was attributed to the number of individuals who were excluded because they reported experiencing a trauma event exclusively through electronic media. Based on these two studies, there is evidence that the restriction of trauma may reduce PTSD rates. However, these changes are unlikely to have a significant impact on rates of PTSD in military populations due to the nature of war-related trauma as a directly experienced traumatic event.

In addition to potential changes in prevalence rates due to the changes to criterion A, the removal of the A2 criterion stipulation that an individual must have an emotional experience of intense fear, helplessness or horror during the trauma may also affect prevalence rates. One study found a small but significant increase of PTSD rates among undergraduates with the removal of A2, from 4.3-4.8%³. In another study also using a large civilian sample (N=1033), excluding the A2 criterion did not change the estimated PTSD prevalence significantly⁴. Moreover, the findings indicated that A2 was a poor screen for PTSD.

The removal of the A2 criterion is likely to be more relevant to rates of PTSD in military populations than changes to the definition of the traumatic event. In a small sample with nearly one-quarter of respondents being veterans, the removal of A2 had no impact on PTSD prevalence rates². In another sample of 908 combat and non-combat veterans, there was no association found between endorsement of A2 and PTSD diagnosis, providing additional support for the removal of the A2 criterion in the DSM-5⁵. However, while multiple studies now show that A2 has no validity for PTSD diagnosis^{2,8}, one study showed in a sample of veterans that those who endorsed A2 reported significantly higher PTSD severity, indicating that experiencing an intense emotional response of fear, helplessness or horror during the traumatic experience is predictive of developing more intense PTSD symptomatology⁵. Thus, despite A2 not being relevant for the PTSD diagnosis, it still plays an important role in the course of PTSD.

¹ Refer to the ACPMH integrated literature review 2002-2012 for discussion of the previous proposed DSM-5 changes to PTSD:
http://www.acpmh.unimelb.edu.au/resources/lit_summary.html



Changes to other DSM-5 PTSD symptoms and their impact on prevalence rates

The majority of the new and revised symptoms for PTSD fall in the DSM-5 criteria D (negative cognition and mood) and E (arousal and reactivity) clusters. These clusters include new symptoms that reflect reckless or self-destructive behaviour and irritable or aggressive behaviour, in addition to the current DSM-IV-TR symptoms of negative effects to concentration, sleep and startle response. Additionally, the criteria D cluster features new items relating to dysphoric mood such as persistent distorted self-blame or of others and pervasive negative emotional state. Original DSM-5 proposals required three symptoms being endorsed from both D and E criteria for diagnosis of PTSD, but revised proposals have reduced the number to two symptoms in the D criterion and two in the E criterion. The revised and new symptoms in the proposed DSM-5 have led to recent studies assessing how these new symptoms relate to PTSD^{3,9}.

In one study, effects of the new criteria on PTSD rates was measured in 345 veterans where the majority of the sample (75%) had served in the OIF/OEF and 15% had served in the Vietnam War.⁹ Results indicated that DSM-IV-TR rates of PTSD in the sample were 39.9%, but when three items from cluster D and three items from cluster E were used as diagnostic criteria, as proposed by the DSM-5 originally, rates dropped to 30.3%. Revised estimates using two items from cluster D and two items from cluster E resulted in PTSD rates of 38.7%, comparable to DSM-IV-TR rates⁹. In comparison, including all proposed changes to the DSM-5 criteria, in a sample of 585 undergraduate students, overall rates of PTSD increased by 0.4-1.8 percentage points³. This is contrasted with two earlier studies which showed a 1-2% decrease overall using civilian populations^{10,11}. Thus, with the few studies so far investigating PTSD diagnostic changes in the DSM-5, there is evidence for either slight decreases or increases in prevalence rates, and the study⁹ that used a military population showed a decrease.

Changes to DSM-5 PTSD symptoms and other disorders

A pervasive issue facing psychological diagnosis is managing highly comorbid disorders and overlapping symptoms. Therefore, in addition to studies investigating changes to prevalence rates in PTSD, there have been investigations into how the new criteria clusters and symptoms relate to diagnoses of comorbid disorders, such as depression and substance use disorders. A longitudinal study with OEF/OIF personnel investigated how the DSM-5 criteria D and E subsumed in three factors of anger, aggressive behaviour and negative expectations related to PTSD and other disorders⁶. Importantly, the aggressive behaviour and anger items were found to represent distinct dimensions. Aggressive behaviour items represent symptoms such as impulsive and injurious



behaviour towards others and objects, whereas the anger factor represented a mood state, but not behaviours. Results showed that while all three factors related to PTSD, there was variation in the strength of these relationships. The items that tapped into anger showed the strongest correlations with PTSD, with the anger rates showing a significant increase from pre-deployment to post-deployment in those diagnosed with PTSD. In comparison, the aggressive behaviour and negative expectation symptoms were less specifically related to PTSD. Aggressive behaviour was equally related to PTSD, depression and alcohol use, whereas negative expectations were more strongly related to depression rather than PTSD. The authors proposed that anger is a highly specific construct for PTSD⁶. Furthermore, the new factor structure and symptoms included in the DSM-5 may be capturing other psychiatric disorders rather than PTSD, albeit highly related ones.

Another study investigating specificity of PTSD symptoms found that a number of the proposed DSM-5 symptoms for PTSD that fall under a general dysphoria category were non-specific to PTSD¹². Researchers investigated whether veterans without trauma exposure still reported some of the new DSM-5 dysphoric symptoms. Twenty per cent of 348 National Guard soldiers who were deployed to Iraq who had not experienced trauma, presented with substantial levels of dysphoric symptoms, such as diminished interest, detachment, sleeping difficulties, irritability and trouble concentrating. The authors proposed that dysphoria criteria are not trauma-specific, and can result from other stressors and anxieties relating to deployment. That is, dysphoric symptoms were more indicative of general distress. In addition, for those presenting with PTSD, the re-experiencing criterion was shown to be most associated with trauma. The implications for DSM-5 is that a number of criteria are required that tap into the presence of a dysphoric state, whereas only one criterion for intrusion is required to diagnose PTSD. The authors proposed that this may result in an overestimation of the prevalence of PTSD rather than general distress pertaining to deployment¹². They cautioned that the new factor structure of the DSM-5 emphasises items that are non-specific to PTSD and may represent a different disorder. More prevalence studies are needed to confirm this.

Subtypes of PTSD

The changes to the diagnostic structure of PTSD in DSM-5 have re-initiated debate regarding the very nature of PTSD. The *Journal of Traumatic Stress* published a special feature in June 2012 on complex PTSD (CPTSD) discussing whether it should also be included in the DSM-5 as a new disorder. CPTSD is relevant for veterans as it is marked by prolonged and repeated trauma, such as what might be experienced in a war zone. As such, CPTSD is rarely found in survivors of natural disasters but commonly found, for example, in victims of child abuse¹³. A review of the CPTSD literature was featured in



the special issue, which concluded there is insufficient data to support the inclusion of CPTSD as a separate disorder in the DSM-5¹⁴. However, the authors stated that having a sole diagnosis of PTSD to capture the entire range of responses to trauma may be insufficient.

Other researchers have suggested that a spectrum of posttraumatic disorders should be recognised and that CPTSD might be conceptualised as an extreme form of traumatic stress on the PTSD spectrum¹⁵. In a similar way there has also been suggestion that a subtype of PTSD exists with a dissociative focus. Dissociation is thought to be a core feature of PTSD, and is marked by a reduction in awareness of surroundings, derealisation and depersonalisation¹⁶. One study with two samples of either 360 male Vietnam War veterans with PTSD, or 284 female veterans and active duty service personnel with PTSD, found three types of PTSD: (i) those with moderate PTSD, (ii) those with high PTSD, and (iii) those with high PTSD and high levels of dissociation¹⁶. Approximately 15% of the males in this sample and 30% of females presented with the high PTSD dissociative subtype, characterised by depersonalisation and derealisation symptoms. These studies reinforce the view that how PTSD is understood (in terms of diagnostic criteria) is continually evolving as research identifies the complexity of PTSD and how individuals react differently to traumatic experiences.



Mild traumatic brain injury

A traumatic brain injury (TBI) is defined as an event in which an individual experiences an external physical force that results in a structural injury to the brain, a physiological disruption of brain function, or an acute alteration in consciousness, ranging from immediate confusion/disorientation to a loss of consciousness¹⁷. TBI is categorised into three levels of severity, mild, moderate and severe, with most TBIs classified as mild. After the initial mild TBI, postconcussive symptoms can occur in many patients, including neuropsychological deficits in memory, attention, concentration, and increased levels of anxiety, fatigue, poor sleep, headaches, and dizziness¹⁸. Most of these symptoms will resolve within three months of injury, however, some individuals with mild TBI will go on to develop a persistent pattern of these symptoms, termed postconcussive syndrome¹⁹. Research shows that few neuropsychological deficits persist after the initial mild TBI, whereas subjective health-related or psychological issues persist in a significant proportion of individuals²⁰.

Mild TBI prognosis research in military populations has dramatically increased in the past few years as TBI has been identified as the “signature injury” for OEF/OIF operations^{21,22}. Blast exposure has been attributed as the most common cause of TBI in deployed members²¹. Frequency of occurrence is not the sole reason for research into military rates of TBI. That is, mild TBI has also been shown to be highly comorbid with other psychiatric disorders. One recent study in OEF/OIF veterans found that the costs of treating TBI (severity not reported) in veterans was four times higher than those without TBI because of the level of clinical complexity²³. Research in 2012 focussed on prevalence rates of TBI, comorbid psychiatric disorders, and the nature of postconcussive syndrome.

TBI and prevalence rates

Accordingly, a number of recent studies have been conducted in order to estimate prevalence rates of TBI in OEF/OIF populations. A recently published study investigated over 300,000 OEF/OIF veterans using the US Veterans Affairs services in 2009, 6.7% presented with a TBI²³. More recent samples report higher rates. In a sample of over 7,000 active duty personnel, 13.9% reported experiencing a TBI on deployment²⁴. A study comparing pre- and post-deployment found, in 760 US Army soldiers, 9% reported TBI between pre- and post-deployment²⁰. In a larger sample of 1,500 US OEF/OIF Army soldiers, 17% reported a TBI during their deployment and 59% of these reported having more than one TBI during deployment²⁵. Lastly, in a non-US sample of over 4,600 UK military personnel deployed to OEF/OIF, 4.4% reported a TBI on deployment, with a higher rate of 9.5% in those with a combat role²⁶. The lower rates of



TBI in UK military compared to the US military may be due to types of combat exposure, differences in the nature and length of deployment, or cultural differences between emphasis and focus on TBI²⁶. While the US military has shined a spotlight on TBI, other Allied forces have not had such strong reactions.

In summary, a recent meta-analysis of research conducted with OEF/OIF populations determined rates of TBI to be between 4.9-19% of general active duty and veteran populations, and 15-41% in injured service members²⁷. Moreover, the start of the OIF operation saw a 61% increase in TBI rates²⁸, indicating higher risks for the current wave of veterans. The majority of these TBIs are mild, and the majority of them resolve within three months post-injury. Regardless, there remains concern for active duty and veteran members whose postconcussive symptoms after experiencing a mild TBI do not resolve, and the subsequent relationship with psychiatric disorders.

TBI and comorbid conditions

Recent research has set out to investigate the relationships between TBI and other psychiatric disorders, particularly for disorders that have been found in high frequency in veterans. PTSD and TBI are closely linked in both prevalence and symptomatology, and both have been found in significant numbers in OEF/OIF veterans. In a large study of over 300,000 OEF/OIF veterans using VA services in the US, 73% of individuals with TBI had PTSD²³. Of the veterans with TBI (severity not reported), 89% suffered from at least one psychiatric disorder²³. A recent meta-analysis of studies with military-specific populations estimated rates of PTSD in those with diagnosed TBI (mild-severe) ranged between 33.3 and 68.2%²⁷.

However, separate 2012 studies have found much lower rates of PTSD in those with TBI. In a sample of 760 US Army soldiers at post-deployment, 17.6% of individuals with mild TBI screened positive for PTSD and 31.3% screened positive for depression²⁰. In a sample of UK military personnel, between 14.5 and 17.5% of OEF/OIF veterans with mild TBI reported PTSD, depending on the severity of the TBI²⁶. While these rates are significant, they are lower than other recent studies mentioned above. Differences may be due to the characteristics of the samples, with higher rates of PTSD in veterans than active duty members (used in the last two studies). Alternatively, differences may result from how PTSD is diagnosed (e.g., interview versus checklist). Regardless, there remains strong evidence that mild TBI overlaps with psychiatric disorders, particularly PTSD²³.

There is some speculation that PTSD and TBI are highly comorbid because the initial injury causes both neurological damage (i.e., TBI) and psychological trauma which can lead to psychiatric disorders^{18,29}. However, a recent study using an animal model found that even without the psychological stressor, TBI can induce PTSD traits³⁰. Alternatively,



the physical and psychologically demanding nature of combat may independently result in both TBI and psychiatric disorders¹⁸. Furthermore, psychiatric disorders may result after an individual is unable to adapt to the dysfunction TBI can produce, or as a continuation of pre-existing psychiatric conditions¹⁸. Support for this proposal comes from recent research in military populations indicating that pre-existing psychiatric conditions at pre-deployment stage, such as alcohol abuse and PTSD, can contribute to likelihood of reporting a TBI post-deployment^{20,26}.

In addition to PTSD, TBI has also been associated with alcohol abuse. In a sample of over 7,100 active duty veterans, those with TBI were significantly more at risk for developing alcohol abuse, even after controlling for PTSD, combat exposure, and other variables that can affect alcohol abuse²⁴. Another study with over 4,600 UK OEF/OIF members showed that having a TBI was associated with alcohol abuse²⁶. This pattern is concerning because alcohol abuse has damaging effects on cognitive functions, which are often disrupted from TBI. Thus, alcohol abuse is likely to have a negative effect on recovery from TBI²⁹. Furthermore, research has shown that alcohol abuse recorded before deployment was also a risk factor for subsequent reporting of a TBI²⁶. How alcohol abuse prior to deployment can affect either sustaining a TBI or likelihood of reporting a TBI remains an important question. Lastly, long-term risks associated with TBI include dementia, with research showing that those with TBI are at significantly higher risk of developing dementia, particularly for those who have experienced multiple TBIs³¹. Multiple TBIs have also been associated with increases in depression, anxiety and PTSD, relative to a single incidence of TBI³².

There is debate regarding best practice care for those with TBI, given that so many symptoms overlap with other psychiatric disorders. Despite this, prolonged exposure therapy, considered the gold standard treatment for PTSD, was effective in one study treating veterans with PTSD and mild to moderate TBI³³. Modifications were made to the treatment manual to account for the cognitive impairments seen in veterans with TBI and the treatment remained effective. Moreover, another 2012 study found that treatment for veterans with PTSD and TBI showed that a reduction in PTSD symptoms was associated with a reduction in postconcussive symptoms for veterans with mild to moderate TBI³⁴.

While the military has implemented population-wide screening for postconcussive symptoms after deployment, there is evidence that screening for mild TBI post-deployment is more likely to tap into features of depression and PTSD, which risks over-diagnosing TBI and under-diagnosing psychiatric disorders²⁵. Researchers in 2012 recommended that if clinicians want to assess for TBI and minimise false positives, focussing on unique TBI symptoms will be most useful²⁰. Symptoms unique to TBI



including dizziness, headaches, memory problems, and light sensitivity, tend not to overlap with psychiatric disorder symptoms³⁵.

Controversy regarding postconcussive syndrome

There is evidence that once PTSD and other psychiatric disorder symptoms are taken into account, there are few mild TBI-specific symptoms^{21,32,36}. Given the significant overlap between mild TBI and other disorders such as PTSD, depression, stress and anxiety, researchers have questioned the validity of the postconcussive syndrome^{21,25,37,38}. It is an extremely important issue regarding whether the disorder is better subsumed under other, established psychiatric disorders, particularly in relation to treatment options. Misattribution of PTSD or depression symptoms to postconcussive syndrome would have significant negative consequences in terms of treatment selection for the individual.

The 2012 literature outlined a number of studies showing that postconcussive symptoms are not specific to mild TBI. For example, in a civilian sample, postconcussive symptoms were found in a similar rate in trauma patients both with and without mild TBI at three months post-injury³⁹. Postconcussive symptoms were useful to distinguish between groups at one week post-injury however, at three months post-injury, postconcussive symptoms were more attributable to psychological disorders such as depression, anxiety, or PTSD, rather than being caused by a mild TBI³⁹. Another study with civilians found no difference in rates between postconcussive symptoms and mild TBI and those without mild TBI³⁸. Further research using military samples shows postconcussive symptoms are not unique to mild TBI. In a sample of 4,400 Vietnam veterans, only 32% of veterans with a history of mild TBI had postconcussive symptoms, whereas, 40% of the sample with PTSD, 57% with depression and 91% with somatisation disorder, presented with postconcussive symptoms⁴⁰. The study concluded that postconcussive symptoms are more likely to be secondary to PTSD and depression than be attributable to TBI. Finally, in a UK military sample, the majority of postconcussive symptoms in OEF/OIF personnel were not associated with mild TBI²⁶. Thus, there is accumulating civilian and military research that challenges the validity of postconcussive syndrome after mild TBI when it may be better explained by other psychiatric disorders.

One solution to the challenges in distinguishing or even validating the presence of postconcussive syndrome may lie in neuroimaging research. However, research that has attempted to uncover the neurological basis of mild TBI has been met with difficulty as conventional methods of brain scanning, such as CT and MRI, often show the brain as normal^{41,42}. As a result, researchers are turning to other methods of neurological investigation in an attempt to determine the neurological basis of mild TBI, postconcussive symptoms and related psychiatric disorders, however, more research is needed to establish a diagnostic imaging technique⁴².



Substance (non-alcohol) use and veterans

Substance use disorders and DSM-5

In the DSM-IV-TR, a substance use disorder (SUD) was defined as a compulsion to excessively use a psychoactive substance(s) that led to significant impairment for the individual⁴³. Ingested substances within this class of disorders include: alcohol, amphetamines, cannabis, cocaine, hallucinogens, opioids, and sedatives. Symptoms for *substance dependence*, commonly known as addiction, included withdrawal, tolerance (increasing amounts needed), the inability to cut back or control the behaviour, detrimental effects to social or occupational functioning, and continued use despite significant mounting negative consequences⁴³.

In the DSM-5, substance use disorder combines the DSM-IV categories of “substance abuse” and “substance dependence” into a single disorder within a new “Substance-Related and Addictive Disorders” category, measured on a continuum from mild to severe. Each specific substance (other than caffeine) is addressed as a separate use disorder in the revised DSM-5 (e.g., alcohol use disorder, stimulant use disorder, etc.), but diagnosed based on the same overarching criteria. Whereas a diagnosis of substance abuse previously required only one symptom, mild substance use disorder in DSM-5 requires two to three symptoms from a list of eleven symptoms⁴⁴. Although mental health professionals use the term substance use disorder for any type of chemical substance that is used for medication or recreation (including nicotine and caffeine), the following review focusses on illicit drugs or prescription medication.

Prevalence of illicit drug use

Illicit drug use in active duty personnel has a long history influenced by both the theatre and the attitudes of the defense departments involved⁴⁵. The Vietnam period had high numbers of active-duty personnel using illicit drugs⁴⁶. Subsequent mandatory routine analysis for illicit drugs has resulted in significant reductions in rates of use, dropping from 28% in 1980 to 3-5% in the early 1990s, at which point it has remained relatively stable. This substantial decrease is largely attributed to the re-introduction of regular drug testing in 1981⁴⁵. OEF/OIF theatres involve long deployments in unique environments, low mortality rates for serious injuries, and increased rates of TBI, PTSD, and/or other psychiatric disorders, which can all significantly contribute to SUD rates⁴⁶. It is important to note here that prevalence rates of SUDs in active duty and veteran populations are difficult to determine as studies are limited by the nature of the substance use, poor introspection, false reporting on the amount and type of substances



used, the illegal nature of illicit drug use, and concerns of active duty members regarding career repercussions for reporting a SUD.

Nonetheless, in a recent published survey⁴⁷ of 678,382 US active duty military personnel during 2001-2006 (approximately 25% of the entire active duty population), SUDs were diagnosed in 6.1% of Air Force personnel, 7.6% of Army personnel, and 8.8% of Navy personnel⁴⁷. Roughly 70% of these numbers were due to drug abuse, and 30% were due to alcohol abuse. Being deployed to Iraq or Afghanistan theatres significantly increased SUD rates in this survey, indicating that OEF/OIF veterans may be particularly susceptible to SUDs.

Another US study found significant increases in illicit drug use rates between 2005 and 2008 from 5-12% which the authors attributed to increased recognition of prescription drug misuse⁴⁵. Interestingly, active duty personnel who were deployed to OEF/OIF operations and active duty non-combat personnel had significantly lower rates of illicit drug use than active duty personnel who were deployed to other conflicts⁴⁵. The authors offered no explanation for this trend, which may be attributable to opportunity to access drugs in different theatres.

A more recent survey found 3% of 596 OIF/OEF veterans within a year of post-deployment were identified with a probable SUD⁴⁸. Seven per cent of Marines and 3% of Army veterans reported a probable SUD compared with less than 1% of Air Force or Navy respondents. Moreover, OIF veterans had higher rates of SUDs than OEF veterans, which corresponds with the higher rate of general mental health issues in Iraq veterans compared to Afghanistan⁴⁸.

Although the survey data presented here shows variance in prevalence rates for SUDs between 3 and 12%, it is worth noting that one study using a sample of 3,826 OIF/OEF veterans showed rates of SUD for veterans and civilian populations did not differ at 5%, with the majority of SUDs being alcohol related⁴⁹. However, while SUD rates were comparable overall to civilian rates, this study also showed a general increase in prevalence between 2004 and 2010, consistent with research that demonstrates the susceptibility to SUDs among Iraq veterans^{48,49}. Finally, due to their illegal nature and concerns about repercussions, SUDs are often under-treated in military populations⁴⁹. One study sampling 3,826 OIF/OEF veterans, for example, found that despite an 18% incidence of probable SUD (alcohol and drug), only 2% received treatment⁴⁹.

Comorbidity and substance use disorders

SUDs often co-occur with PTSD, and the use of substances has been recognised as a maladaptive strategy for coping with the effects of PTSD⁵⁰. Despite this, research has



shown that the presence of a SUD does not impede improvement after treatment for PTSD. For instance, one study showed that after treatment for PTSD, veterans with comorbid SUDs showed significantly greater PTSD symptom improvement than veterans with only PTSD and no SUDs⁵¹. These findings were replicated twice using two large samples of veterans, leading the authors to conclude the synergistic nature of the two disorders, where treatment of PTSD reduces the severity of the SUD, rather than improves the PTSD, *per se*.

In 2012, there was evidence that SUDs affect mortality rates differently for different groups of veterans. For example, presence of a SUD was a strong predictor of non-injury related mortality (e.g., disease) in veterans less than 45 years of age diagnosed with PTSD, mostly OIF/OEF veterans⁵². In comparison, presence of a SUD was a greater predictor of injury-related mortality (e.g., accidents, suicide) in veterans over 45, including primarily Vietnam veterans. In general, SUDs significantly increased overall rates of mortality for all populations and the association between SUD and PTSD was particularly strong for younger veterans.

Pain, PTSD and prescription drugs

Pain and PTSD are often comorbid with SUDs⁴⁶ and these disorders have been shown to be higher in OEF/OIF populations, conferring greater risk for SUDs to contemporary veterans. A key factor impacting the rates of pain and prescription drug use in OEF/OIF veterans is the low mortality rate in OEF/OIF theatres, resulting in a greater number of veterans surviving severe injuries and needing to manage subsequent pain⁵³.

In a sample of veterans reporting pain, those who reported comorbid PTSD or other mental disorders were more likely to be prescribed opioids⁵³. The study also found that veterans with PTSD using opioids for pain experienced more negative outcomes, such as accidents, overdose and self-inflicted injuries, compared to veterans without PTSD. Veterans with SUDs were also more likely to be prescribed opioids, especially if they also had a PTSD diagnosis. The authors cautioned that VA providers should re-assess prescription of opioids for veterans presenting with complex psychopathology and associated risks. These conclusions are supported by another study that showed the rate of alcohol abuse was as high as 1 in 10 in veterans with PTSD who were prescribed a long-term supply (more than three months) of benzodiazepines⁵⁴.

Synthetic drug use and the military

While case studies are typically excluded from DVA annual literature summary reviews, the relatively new nature of synthetic drugs means rigorous, good quality research in this area has not been done. Hence, a number of case studies and commentaries are



reported here which relate to the use of synthetic substances in the military. The US Army first reported on synthetic cannabinoid use in 2008⁵⁵. Synthetic cannabinoids, with names such as “Spice”, or “Kronic”, mimic or contain tetrahydrocannabinol (THC), the active ingredient in marijuana⁵⁶. Other synthetic substances such as “Bath salts”, mimic the effect of cocaine or methamphetamine. Since their documented use, there have been some reports indicating “widespread” use of synthetic cannabinoids amongst active duty US military, with large amounts often purchased prior to deployment⁵⁵. Synthetic drug use has risen in military populations primarily because of their barely legal status and their inability, as synthetic drugs, to be easily detected in drug tests⁵⁶.

In 2012 there were a number of case studies documenting admissions to emergency departments following synthetic cannabinoid use among active duty US soldiers. These case studies outlined presentations involving tachycardia, high blood pressure, short-term deliriums and hallucinations⁵⁷, acute psychosis⁵⁸, paranoia, and strange behaviour⁵⁵. Prevalence studies are currently being conducted in the US Army to determine “Spice” usage rates⁵⁶. Similarly, reports of the use and effects of “Bath salts” are scarce because of their relative newness. Loeffler and colleagues⁵⁶ however, described cases involving the ingestion of the main ingredient in “Bath salts” – mephedrone. These included symptoms such as, anxiety, agitation, hallucinations, paranoid delusions, insomnia, poor concentration, memory impairment, tremors, seizures, extreme aggressive or violent behaviour, and death from overdose.



Anger and aggression in veterans

Prevalence of post-deployment anger and aggression

Anger can be defined as a negative, internal feeling state associated with specific cognitive and perceptual distortions (e.g., misappraisals; attributions of blame)⁵⁹. Anger is similar to, but distinct from the related concept of aggression, which consists of behaviours that are intended to cause harm to another person⁶⁰.

Engaging in combat necessitates at least some degree of anger and aggression, and as these emotions/behaviours play adaptive roles in survival during combat, veterans may naturally experience anger and aggression after deployment⁶¹. These strategies however, can become maladaptive in post-deployment situations.

For example, one study showed that 57% of OIF/OEF veterans (N=754) in a VA medical sample reported increased difficulty in controlling anger since returning from combat, and 35% reported thoughts about hurting another person. Among this group, 27% presented with diagnosed PTSD, implying that while increases in anger and aggression are associated with PTSD symptomatology, there are a range of factors that influence these behaviours⁶². The observed high incidence of anger and aggression replicates previous rates of post-deployment anger and aggression of up to 40% in OEF/OIF samples⁶³. Indeed, the 2012 literature produced evidence to suggest that aggression and anger are significant problems for OEF/OIF veterans, especially for those with PTSD⁶⁴.

PTSD, depression and anger and aggression

Anger is often considered a complex symptom of PTSD, and is associated with poor response to treatment⁶⁵. In a longitudinal study examining the influence of PTSD on aggression in US OEF/OIF and pre-OEF/OIF veterans (N=376) newly diagnosed with PTSD, PTSD symptom severity was linked to aggressive behaviour. OEF/OIF status was also associated with increases in aggressive behaviour⁶⁴.

The relationship between PTSD and aggression was further investigated by another study⁶⁶ of male National Guard/Reserves deployed to OEF/OIF (N=143). This study found that while anger and aggression were independently associated with PTSD symptoms, the relationship between PTSD and aggression was mediated by anger. This was supported by another study using a sample of 359 OEF/OIF mostly male veterans with threshold or sub-threshold PTSD⁶⁷. Importantly, this latter study considered the different factors of PTSD proposed for DSM-5 and found that re-experiencing symptoms had a direct effect on levels of aggression, whereas numbing and hyperarousal



symptoms had an indirect effect on aggression through anger levels⁶⁷. Avoidance had no effect on aggression, but had an effect on anger. These findings are consistent with an avoidant coping strategy being associated with anger levels, but not aggression⁶⁶. Thus, the nature of PTSD may affect anger and aggression differently, and aspects of treatment for anger, aggression, and/or PTSD may need to consider these influences.

A longitudinal study of 522 US OIF Army soldiers also measured pre- and post-deployment functioning and post-deployment anger⁶⁸. Poorer pre-deployment functioning that included a diagnosis of depression (two months prior to deployment), predicted higher anger levels post-deployment. Intensity of combat exposure was also positively associated with anger levels post-deployment.

Personal characteristics and anger and aggression

Although anger and aggression are influenced by many factors across the pre- and post-deployment phase in veterans, antisocial traits are commonly found to predispose the presence of post-deployment anger and aggression. One 2012 study, for example, found that high levels of aggressive personality traits were positively related to combat exposure in a sample of 1,104 Army and Marine veterans of the Vietnam War⁶⁹. The authors speculated that more aggressive soldiers tend to volunteer for, or be assigned to, greater combat roles, and may have more deployments, thereby increasing combat exposure, and subsequent post-deployment anger and aggression⁶⁹.

Combat exposure and post-deployment anger and aggression

Alongside anger, combat exposure has been shown to increase post-deployment aggression^{70,71}. One 2012 study investigated archival data in 1,328 male Vietnam veterans and showed that combat exposure was related to aggression after deployment⁷⁰. Hence, despite the greater prevalence of aggression in contemporary veterans, the effect of combat exposure on aggression is not unique to OEF/OIF populations. Although combat exposure is a significant factor influencing anger and aggression in veterans, the co-occurrence of PTSD and alcohol abuse as shown above can significantly increase risk for anger and aggression. For example, a UK study sampling all armed forces branches (N=4,928) found that in the first few weeks of returning home from OIF deployment, 13% of personnel committed a violent act⁷¹. Alongside combat exposure, the likelihood of committing a violent act was significantly related to the presence of PTSD and alcohol abuse. Indeed, this study found that almost 50% of those who reported post-deployment violence also reported alcohol abuse, providing evidence for a risk-accumulation model of factors predicting anger and aggression.



Despite the significance of these risk factors, the study described above also found that the most significant risk for post-deployment violence was the presence of pre-enlistment anti-social behaviour, such as physical fighting at school. Interestingly, when the influence of pre-enlistment anti-social behaviour was controlled for, the risk of post-deployment violent behaviour remained high when combat exposure and other traumatic events during deployment were present. Consistent with the general literature, the risk of post-deployment violence is higher in Army veterans and for those who have left the military⁷¹. It may be that Army soldiers have higher levels of combat intense exposure, increasing the likelihood of post-deployment violence. Thus, there is evidence that both pre-deployment soldier-intrinsic factors, in addition to peri-combat (i.e., near or during combat) and military factors increase the likelihood of anger and aggression post-deployment.

Another 2012 study also found military-related variables influenced levels of aggression post-deployment. In a sample of 6,128 active duty Army combat and non-combat soldiers over 12 months, 15-39% committed at least one minor aggressive act (including pushing or shoving someone), and 2-22% had committed a serious aggressive act (such as using a knife/gun, choking, kicking, beating up, punching someone)⁷². Again, those diagnosed with PTSD, TBI and alcohol abuse committed significantly more violent acts, and those with the highest levels of combat intensity reported highest levels of aggression. In terms of rank, junior soldiers (Private–Corporal) reported more aggressive behaviours. The effect of more junior ranking was replicated in a different study in 2012 with Air Force active duty personnel, where junior soldiers committed more spousal abuse than commissioned officers⁷³. The authors speculated that junior levels are typically associated with a younger age and higher combat intensity, which are more likely to increase aggression, although this has not been tested⁷².

Spousal abuse rates and veterans

Military families face unique stressors compared to civilian families, which may contribute to the higher prevalence of intimate partner violence in military versus civilian populations⁷⁴. The 2012 literature identified substance use, negative emotions such as depression or shame, and antisocial personality traits as major predictors of intimate partner violence in the military⁷⁴.

One study⁷⁵, for example, sampled 129 male veterans (65% Vietnam and 13% OEF/OIF) and found that anti-social personality traits were more predictive of intimate partner violence than PTSD. Experiencing a mild TBI and more severe PTSD appeared to reduce the risk of intimate partner violence, though, which was a finding even the authors cautioned as anomalous. In a different study of 264 veterans (62% Vietnam) presenting to a mental health outpatient clinic, feelings of shame were most predictive of



intimate partner violence⁷⁶. Like the previous study, PTSD was a key factor in intimate partner violence. The authors suggested that feelings of inferiority associated with shame can increase the likelihood of attacking another. While male veterans are more likely to perpetrate intimate partner violence than female veterans, one study showed that among female Vietnam veterans (N=89), just over 20% had perpetrated intimate partner violence against their male partners, compared to about 12% of male partners who had perpetrated intimate partner violence against their female veteran partners⁷⁷. It was unclear in this study whether the higher rates of female perpetrated physical aggression resulted from victimisation by the male partner. In contrast to other studies, PTSD was not a significant correlate of physical aggression acts in female veterans. Although this could be explained by less combat exposure in female veterans, this was not examined by the study.

A larger scale UK study of married Army soldiers (N=20,166) who had been deployed in OEF/OIF also showed that 18% of males and females reported persistent concerns regarding serious conflicts with spouses, family members, close friends or colleagues in the post-deployment phase⁷⁸. Along with PTSD symptoms, alcohol abuse increased the number of reported conflicts. It was unclear in this study, however, whether the 'conflicts' described by soldiers involved physical aggression, verbal aggression, or anger.

Distinguishing anger and aggression in veteran studies

A significant limitation of the literature in anger and aggression is that it is difficult to distinguish the internal emotional experience of anger from the external experience of physical or verbal aggression⁶⁶. Thus, while the emotional experience of anger can produce aggressive behaviour, this is not always the case. One 2012 study⁶⁶ highlighted this important difference in anger and aggression through demonstrating their differential relationship to other variables. Investigating 143 male National Guard/Reserves deployed to OEF/OIF operations, the authors found that post-deployment verbal and physical aggression was influenced by a younger age, whereas post-deployment anger was not⁶⁶. Similarly, using avoidant coping strategies to deal with PTSD was associated with higher post-deployment anger, but not higher post-deployment verbal or physical aggression. Differences in anger and aggression constructs and their relatedness to other constructs are therefore important to understand in future research.



Suicide and veterans

Prevalence rates

Suicide-related behaviours include suicidal ideation (thinking about killing oneself), developing a plan, obtaining means for completing suicide, attempting to kill oneself, and the act of suicide⁷⁹. Historically, suicide rates have been lower in the military than civilian populations⁸⁰. This effect has been attributed to the “healthy soldier effect”, where compared to civilians, the physical health of military personnel, along with access to routine psychological assessment, employment, housing and education are thought to reduce the stressors that influence suicidal behaviour⁸⁰. However, after a stable level of suicidality between the 1970s and early 2000s, rates of suicide in the US Army have increased by about 80% between 2004 and 2008 to surpass civilian rates⁸¹. In 2012, the US military reported that suicide had become the leading cause of death in the military, outnumbering combat-related deaths⁸².

The 2012 literature showed that increase in military suicides is not specific to the Army. For example, a comparison study between active duty branches across the entire US active duty population between 2005 and 2007 showed an increase in suicide rates across all service branches⁸³. Moreover, there is evidence that rates of suicide increase after deployment. In a non-help seeking sample of 4,546 active duty National Guards who were deployed to OEF/OIF, 1% of individuals who showed no peri-deployment suicidal behaviour reported suicidal behaviour post-deployment. Three per cent of individuals reported suicidal behaviour both during and after deployment⁸⁴. These rates are for non help-seeking military samples; in help-seeking military samples, the rates of suicidal behaviour are thought to be significantly higher⁸⁵.

The increase in military suicides is similarly not contained to active duty populations. One study of treatment-seeking OEF/OIF veterans (N=167) showed as many as 1 in 5 displayed suicidal behaviours⁸⁵. Another larger study of 8,440 male veterans showed that being a veteran aged from 18–64 increased risk of suicide compared to civilian-matched groups⁸⁶. For veterans over 65, there were no differences in suicide risk compared to civilian populations. Thus, there is concern for both active duty members and veterans being at risk for suicide. Among active duty personnel, being male, younger, and a lower enlisted rank, were additionally associated with suicide rates during the mid-2000s^{81,86}.

Military-specific risk factors for suicide

Suicidal behaviour has a complex psychopathology, affected by a broad range of risk and protective factors⁸⁷. Some of these factors apply to both civilian and military



populations, whereas others are unique to military populations. Due to increased suicide rates since 2003, researchers have investigated OEF/OIF factors to explain these increases. One study found that of the 5.77 million veterans who used the US veteran health administration in 2007 and 2008, having OEF/OIF status did not increase risk of completing suicide⁸⁸. However, OEF/OIF veterans with psychiatric problems such as depression, PTSD, or substance abuse were at greater risk of suicide compared to non-OEF/OIF veterans with the same psychiatric disorders⁸⁸. Thus, while psychiatric disorders are strongly linked to suicidal behaviour in both military and civilian populations, the link is more established in OEF/OIF veterans. It is important to note that although these findings indicate that OEF/OIF status itself is not a risk factor for suicide completion, this study measured only suicide deaths, precluding an examination of differences in overall suicidal behaviour across different veteran theatres. Indeed, two 2012 studies showed that suicidal ideation is highest amongst veterans with diagnosed rates of depression, anxiety or PTSD^{83,89}, which have been found to be higher in OEF/OIF populations.

While OEF/OIF veteran status was not directly linked to higher rates of suicide in 2012 papers, OEF/OIF deployments and risk of suicide in active duty populations were linked. A study found amongst nearly 2 million US active military personnel in 2007, one or more OEF/OIF deployments was associated with higher risk of completing suicide⁸³. Adding to the findings of the aforementioned study which showed suicidal behaviour increasing among all military service branches, increased suicide rates have been found mostly in Army and Marine personnel, compared to Navy or Air Force^{83,90}. The increased risk to these branches of deployment might be associated with combat-related exposure. In a sample of 1,663 OEF/OIF deployed Army soldiers for instance, combat exposure was a risk factor for suicidal behaviour.⁹¹

Comparing this to another 2012 study of over 4,500 OEF/OIF US National Guards however, combat exposure was not directly associated with changes in suicidal behaviour post-deployment⁸⁴. Instead, combat exposure indirectly affected suicidal behaviour by directly affecting PTSD and mood disorders. This implies that PTSD and other disorders can influence the relationship between combat exposure and suicidality, and the relationship between these inter-related variables is complex. Regarding older veterans, another study showed combat exposure was not related to suicidal behaviour in a sample of Vietnam veterans; however, exposure to killing in combat was a unique predictor of suicidal behaviour even after mental health status was taken into account⁹². Thus, there appears to be some combat-specific aspects that can influence suicidal behaviour, and this effect can occur across all veteran theatres. Moreover, consistent with previous research⁹³, another 2012 study confirmed that pre-military experiences such as childhood trauma are strongly linked with suicide attempts⁹⁴, and pre-



deployment factors may be more influential than deployment factors⁸⁴. Similarly, deployment is not an essential risk factor for suicidal behaviour in the military. For example, in a sample of 255 suicides among Army personnel in the years 2007–2008, 31% had never been deployed⁸¹.

Other related risk factors for suicide

While unique combat and deployment factors increase risk of suicide for OEF/OIF veterans, psychiatric disorders can also influence suicide rates in OEF/OIF veterans. In 2012, two studies respectively confirmed that depression and substance abuse are related to suicidal behaviour. Sleep disturbance associated with these appears to elevate this risk^{95,96}. The role of sleep disturbance is particularly interesting to note given that sleep disturbance is common in PTSD. It is also high among OEF/OIF veterans, irrespective of psychiatric or medical conditions. For example, in 1,666 OEF/OIF US Army soldiers, 24% reported sleep disturbances 3–4 months post-deployment.²¹ In an Australian Vietnam theatre sample, (N=152), 90% reported significant sleep disturbances⁹⁷. Thus, with new evidence that sleep disturbance is a strong risk factor for suicide^{95,96}, and earlier evidence that sleep disturbances are a significant problem for veterans^{21,97}, it is clear that more research is needed in this area.

Young veterans (aged 18–34) present a number of unique risk factors compared to older veterans with respect to psychiatric disorder and suicidality. For example, mental health, substance abuse, and financial and relationship problems were more closely linked to risk of suicide in younger veterans compared to older veterans⁸⁶. In this study, nearly 50% of young veterans who committed suicide experienced relationship problems shortly before their death⁸⁶. Moreover, nearly a third who committed suicide had an elevated blood alcohol level at the time of death compared to only 10% of older veterans who committed suicide⁸⁶.

Other factors identified as risk factors to suicide in 2012 included the presence of TBI in an OEF/OIF population^{83,98-100}, aggressive behaviour among OEF/OIF veterans (underpinned by impulsivity)⁶⁷, and adjustment difficulties⁸¹. Regarding adjustment difficulties, one study found 25% of active duty soldiers who committed suicide in the years 2007–2008 had been diagnosed with an adjustment disorder.⁸¹ Cognitive factors such as fearlessness of death and high pain tolerance (which commonly occurs in military populations), as well as perceived burdensomeness, was strongly associated with suicidal behaviour amongst deployed members in one study¹⁰¹. In another study, post-deployment lack of social support was correlated with suicidal behaviour⁸⁴. Despite many studies in 2012 investigating different risk factors for suicide, there is a need for research that incorporates multiple suicide risk factors in the same study to evaluate the strength and relationships between risk factors.



The 2012 literature regarding risk factors appears to point to a range of single factors that increase the risk for suicide. However, the complexity of inter-relationships between risks needs further elucidation. For instance, one 2012 paper argued that veterans are significantly more likely to commit suicide using a firearm compared to civilian populations¹⁰², and that older veterans are more likely to use a firearm than younger veterans to commit suicide⁸⁶. Rural status for veterans was also associated with higher rates of suicide and more deaths by firearms in a US population¹⁰³.

Protective factors and preventing suicide

There are a number of protective factors which reduce suicide risk among active duty personnel and veterans. In one study of veterans who committed suicide, the strongest predictor of suicide was documented suicidal ideation within a week of last contact with VA providers¹⁰⁴. These findings are contrasted, however, with another 2012 study which found that 30% of veterans who committed suicide had not reported symptoms to healthcare providers¹⁰⁵. Accessing veterans without reported risks therefore presents a challenge for suicide prevention and intervention.

The protective role of social support post-deployment was again confirmed among 167 OEF/OIF veterans contemplating suicide⁸⁵. The presence of a depressive disorder or PTSD however, was shown in this study to reduce the protective effect of social support on suicidal behaviour. Similarly, strong unit cohesion was also found to act as a protective factor against suicidal behaviour⁹¹. This latter study also found that marriage was protective against suicidal ideation. Conversely, separations and divorce have been related to increased suicidal behaviour in the military⁸³. Furthermore, among active duty soldiers who had attempted suicide, reported emotional distress from multiple stressors and relationship conflict in the 24 hours prior to a suicide attempt posed the greatest risk to suicide¹⁰⁶. However, while marital status is a protective factor against suicidal behaviour generally, one 2012 study found that marital status was not associated with reduced suicide rates in veterans⁸¹. The authors of this study attributed this to the long-term separations and overseas deployments that can reduce marriage quality. In summary, the presence of social support within the military and from a spouse is important in protecting military personnel and veterans against suicide. In particular, social support appeared to be an important buffer against feelings of perceived burdensomeness, and it increased feelings of belongingness in post-deployed members¹⁰⁷.

One 2012 pilot study investigated ways to reduce suicide rates in the military through a project known as "Caring Letters"¹⁰⁸. The premise of this initiative is that sending caring messages to those at risk of suicide may reduce suicidal behaviour, potentially through increasing perceived levels of social support and feelings of belongingness. Caring



Letters has been around since the 1970s, however, the recent 2012 study was the first to test the efficacy in a military sample, comprising mostly active duty personnel. Although the sample size was small and the study in pilot phase, fewer hospitalisations were observed in those who received caring messages compared to those who received treatment as usual. Moreover, there were no adverse events for those in the Caring Letters condition, and the feedback received was all positive. The authors concluded that such programs hold promise for reducing suicidal behaviour in the military, and have advantages of being inexpensive and suitable for those who are remotely located or resist usual forms of treatment.



E-health interventions

What are e-health interventions?

Telecommunication systems such as telephones, mobile phones, videoconferencing, and internet are now being used to treat distant patients for health-related (telehealth) or behavioural and psychological issues (telemental health). Technology-assisted treatment methods include various software programs and newer technologies such as virtual reality. Together, these services are referred to as e-health interventions.

Military populations have unique needs for psychological and health services, particularly veterans who may: live in rural areas, be overseas on operational service, have mobility issues, hold beliefs regarding stigma about accessing mental health services, and/or be experiencing financial difficulties. These factors suggest e-health interventions could be useful in assisting veterans to access care. Telemental health has been embraced by the VA, where over 230,000 patients were treated this way in 2008 alone¹⁰⁹.

E-health interventions for screening and assessment

Telemental health methods have been shown to be effective assessment tools for PTSD and traumatic brain injury (TBI). One small study (N=14) found that over 50% of veterans referred for neuropsychological assessment preferred to have evaluations conducted via videoconferencing at the local community outpatient centre, and all of them preferred feedback delivered via videoconferencing¹¹⁰. Mobility and convenience were cited as reasons for this preference.

The availability of telemental health may actually increase barriers to accessing treatment, despite their intended aim to decrease them¹¹¹. A study by Jones and colleagues¹¹¹ found extremely low acceptance rates for telemental health in returning OIF soldiers undergoing initial screening for their mental and physical health status post-deployment. Less than 1% of the 7,037 soldiers opted for videoconference screening over in-person screening. For those soldiers who required a second level of assessment (N=138), the assessment was scheduled only via telehealth. Seven per cent of these soldiers refused to have their assessments conducted via telehealth. Dislike of telemental health modes was particularly high for those soldiers who had only ever had face-to-face screening previously. Interestingly, those soldiers who had experience with telemental health screening were more ambivalent towards it. The authors cautioned against a mass uptake of telemental health screening and recommended in-person screening for soldiers post-deployment¹¹¹.



Surprisingly, in the study described above, significantly more referrals for follow-up assessment were made from the telehealth screenings (29.6%) compared to 3.7% of soldiers referred from in-person screening. The authors offered no explanation for this finding, which may be attributable in part to the self-selection in soldiers. For example, those with more mental or physical health issues may have initially chosen the telehealth screening method. Alternatively, it may be that providers are less confident of the outcome of a telehealth screen compared to an in-person screening and thus, more seek a follow-up assessment.

The findings described here conflict with previous studies indicating a majority of veterans are generally accepting of telehealth modes^{112,113}. This highlights the complexities around barriers to care, as in, while certain modalities can be effective in reducing barriers, they can also introduce them. For instance, in-person screening might be preferred when soldiers are not actively seeking help and have no reason to prefer telehealth (e.g., distance/mobility is not a barrier). Alternatively, those with self-identified mental health issues seeking treatment may prefer telemental health over face-to-face, perhaps due to stigma issues. Nonetheless, in the 2012 literature, there was support for the idea that soldiers who are educated about telemental health methods may be more inclined to use them¹¹¹. Therefore, education on telemental health could be used as a way to increase acceptance.

E-health interventions for psychological disorders

A large-scale study in 2012 reviewed the outcomes for 98,609 patients enrolled through the VA in 2006–2010, to determine the efficacy of telemental health services in reducing psychiatric hospitalisation rates¹¹⁴. Across the four years, hospitalisation rates fell by 24% after enrolment in telemental health services. The review concluded telemental health services can have a significant impact on the welfare of veterans, particularly those unable or unwilling to access in-person care.

The 2012 research also focussed on outcomes for specific disorders. Niles and colleagues¹¹⁵ found high rates of completion for the delivery of two different treatments (mindfulness and psychoeducation) for PTSD via telephone, with over 80% (N=33) of male veterans completing treatment, and 70% completing the follow-up assessment. The high completion rates were comparable to those found in a VA PTSD clinic, and attributed to two in-person rapport sessions which accompanied six telephone sessions¹¹⁵. As for the efficacy of the telephone-delivered treatment, only mindfulness showed a significant reduction in PTSD symptoms from baseline. The lack of effectiveness in the psychoeducation condition was attributed to the psychoeducation itself, rather than the delivery mode. An interesting finding of this study was that older



veterans were as engaged in the telephone treatment as younger veterans, who also dropped out of the follow-up assessment more frequently¹¹⁵.

Carmody and colleagues¹¹⁶ found a small but significant effect for telemental health treatment for chronic pain and depression in older veterans. Two groups of veterans received either telephone-administered cognitive behavioural therapy (CBT) or telephone psychoeducation for the management of chronic pain. There was a small reduction in pain levels and depressive symptoms in both groups, however, the changes were smaller than comparable studies investigating in-person CBT. The lower effectiveness of the telephone CBT compared to in-person CBT may be due to the lack of face-to-face interaction. Despite this, veterans reported a high level of helpfulness of the telephone-delivered treatments.

In comparison, another study investigated telemental health services for veterans with hepatitis C, anxiety, and depression symptoms, and found significant improvement as a result of telephone-delivered CBT¹¹⁷. The CBT group showed decreases in anxiety symptoms after starting antiviral treatment for hepatitis C, compared to the treatment-as-usual group, which showed significant increases in both depression and anxiety symptoms. The CBT group also reported high satisfaction with the telephone-delivered CBT, and drop-out rates were comparable between groups. Like the other studies described in this section, the first session of telephone CBT was conducted in-person, thus providing supporting evidence for models of telemental health care that incorporate in-person initial sessions^{115,117}.

Virtual reality and PTSD treatment

Although varied in methodological rigour, there is a growing volume of research demonstrating the effectiveness of virtual reality exposure therapy (VRET) for anxiety and PTSD. One 2012 study¹¹⁸ showed that deployed OIF personnel viewed VRET equally favourably to traditional exposure therapy, with both types of therapy seen as less shameful or debasing than taking medication to treat PTSD.

Gonçalves and colleagues¹¹⁹ reviewed PTSD treatment studies, in which 80% of studies used veteran samples. Six of the studies reviewed used control groups to demonstrate significant reduction in symptoms following VRET, and drop-out rates reviewed across all studies were comparable to traditional exposure therapy. Despite these positive findings, no differences in effectiveness were observed between VRET and traditional exposure therapy, and a number of the studies reviewed had methodological limitations to suggest further research was required to firmly establish VRET as an effective therapy.



Nelson and colleagues¹²⁰ also conducted a review of six studies using veteran or active duty populations to assess VRET for PTSD. In general, older veterans required greater time to familiarise themselves and engage with VRET than younger veterans. Because the amount of time elapsed since trauma exposure was greater in older veterans, and because greater efforts may have been made over time to suppress PTSD symptoms (and therefore there is greater difficulty re-living experiences in therapy), these authors suggested that VRET may be better suited to younger veterans who may be versed in gaming technologies¹²⁰. These difficulties may not be specific to VRET, but rather more related to exposure therapy in general.

McLay and colleagues¹²¹ found VRET to be effective in treating PTSD in active duty OEF/OIF veterans (N=42) diagnosed with PTSD, many of whom also had a TBI and were treatment-resistant. Seventy-five per cent of treatment completers no longer met the criteria for PTSD, and depression and anxiety symptoms were also significantly improved in the majority of veterans. However, this study had a high drop-out rate of 50%, with a young age the only difference between those who completed the treatment and those who dropped out. Thus, while there is promising empirical support for VRET with veterans, challenges remain in increasing acceptance in older veterans and reducing drop-out rates across all age groups. Moreover, traditional exposure therapy remains an important treatment mode for PTSD in veterans.

Other telehealth applications in military populations

E-health intervention opportunities continue to evolve as technology rapidly develops. The year 2012 saw a number of novel ways to use technology as e-health interventions. One study explored how the US army “AKO” (Army Knowledge Online) tele-consultation software program has been expanded to include neurological disturbances, with specific focus on traumatic brain injury¹²². Using this program, deployed troops in remote regions could be assessed over the internet for neurological disorders and the effects of TBI, enabling and decreasing the number of necessary and unnecessary evacuations.

Mishkind and colleagues¹²³ similarly reported on the novel way of reaching remotely located military personnel to provide medical and psychological health services via deployable telehealth centres (DTeCs). These centres consist of modified shipping containers equipped with video teleconferencing stations, telephones, and computers for users to connect with health and psychiatric professionals. Another study by Luxton and colleagues¹⁰⁸ also reported on active duty personal willingness to utilise smartphones for telehealth services with positive feedback from participants.

Despite the increased use of e-health interventions and the potential benefits, there remains significant concern regarding the unsupervised nature of internet or online



testing, privacy and confidentiality, and other related issues to replacing in-person therapy with technology¹²⁴. Although more evidence-based research is required, e-health interventions continue to hold a promising future for veteran mental and physical health.



Alternative therapies for PTSD

What are alternative therapies?

Alternative therapies are defined as being outside the realm of traditional treatments and often used as an alternative to or in conjunction with conventional medicine, although when used in conjunction with conventional therapies, are considered complementary¹²⁵. Not all sufferers of PTSD respond to traditional treatments alone. Alternative therapies are considered as providing another avenue for recovery. Common examples of alternative therapies include meditation, acupuncture, music therapy, yoga, massage, prayer, spiritual practices, or taking herbs (e.g., chamomile, St. John's Wort)^{126,127}.

There was a dearth of rigorous studies on alternative or complementary therapies in relation to PTSD outcomes in 2012. Of the studies that were published in this field, mindfulness, biofield therapy and music therapy showed results that were encouraging, albeit lacking in methodological strength.

Mindfulness and meditation

The majority of research into alternative and complementary therapies for PTSD in 2012 focussed on meditation and mindfulness. Kearney and colleagues¹²⁸ conducted a prospective study of evaluated mindfulness-based stress reduction (MBSR) to veterans (N=92, 70 male and 22 female) receiving care at a large VA hospital¹²⁸. Participants were a heterogeneous group of veterans with a high prevalence of PTSD symptoms as measured by the PTSD Checklist–Civilian version (PCL-C). MBSR took the form of general group classes focussing on learning mindfulness skills (such as disengaging from rumination, sustained attention, and flexible attention), sitting meditation, and gentle yoga. Homework was assigned in each of the eight weeks in the form of meditation or yoga CDs. Following the intervention, 48% of the veterans showed clinically significant improvements in PTSD symptoms at six months, and 6% had clinically significant worsening of symptoms. The authors suggested that MBSR could be a safe and cost effective group intervention, however, no explanation was provided for the percentage whose symptoms worsened, and further investigation is required.

A smaller pilot study compared the effectiveness of a mindfulness intervention to a psychoeducation intervention for combat-related PTSD (N=33 male veterans)¹¹⁵. Both interventions were delivered using a telehealth approach. The mindfulness intervention used the same program (MBSR) as the study described above. PTSD scores measured by the Clinician Administered PTSD Scale (CAPS) in the mindfulness group significantly dropped from baseline to post-treatment ($p < .005$), in contrast to the psychoeducation group which did not change. These positive effects were not maintained at six-month



follow-up, suggesting that these findings be interpreted with caution, alongside the limitation of being a small pilot study.

Past research into mindfulness and PTSD has hinted at the therapeutic benefits of using mantrams, a form of concentrated meditation in which words or phrases that have a spiritual meaning to the individual are repeated. A study by Bormann and colleagues investigated the use of mantrams for veterans with war-related PTSD in a prospective, single-blind, randomised trial (N=146)¹²⁹. The intervention design consisted of two groups: mantram repetition program (MRP) plus treatment as usual (TAU), versus TAU alone. The MRP intervention involved teaching participants three synergistic tools to train their attention and regulate their emotion: silently repeating a mantram, slowing down to make thoughts and actions deliberate, and one-pointed attention. The study yielded some meaningful results: 24% of subjects in the combined MRP/TAU group had clinically significant PTSD symptom improvement at post-treatment compared with 12% of those in the TAU group. However, the effect size of the intervention was small, and, of the three symptom clusters, only hyperarousal had significantly changed. The authors suggested that MRP could potentially be useful as an adjunct to traditional therapies where patients find it hard to tolerate treatment due to hyperarousal.

In a related study, the same researchers found some evidence to suggest that existential spiritual wellbeing partially mediated the change in PTSD symptom severity in the previous study¹³⁰. However, the analyses performed were post-hoc and sought to find indirect effects only. There were major limitations to this trial (and the previous study), including a lack of an active control condition (the TAU group did not meet weekly like the intervention group), subject self-selection, and a lack of a sample representative of the wider veteran population. Taken together, the results of these studies suggest the use of mantrams alongside conventional treatments of PTSD may be beneficial; but more substantive evidence is required to confirm (or disconfirm) any benefit.

Biofield therapy

Biofield therapy, which presupposes the existence of biologic energies surrounding the body that can be accessed in various ways for diagnostic and therapeutic purposes, is an emerging therapy in alternative and complementary medicine¹³¹⁻¹³³. It was explored in a randomised controlled trial to determine the efficacy of a combined complementary therapy intervention to reduce PTSD symptoms, compared to usual care (N=123)¹³⁴. The study sample was comprised of military personnel on active duty experiencing at least one standard PTSD symptom. The intervention comprised two components: healing touch and guided imagery. Healing touch is a type of biofield therapy that involves gentle non-invasive touching of a patient's head and body by a trained practitioner. It is designed to stimulate the movement of energy through the body to promote a healing



response. The guided imagery component included a recorded CD designed to induce a deep state of relaxation through visualisation of relaxing imagery and affirmations. Results indicated a significant reduction in PTSD symptoms (large effect size) and improvements in several of the secondary outcomes (depression, cynicism and quality of life). This was a robust study, utilising repeated measures analysis of covariance with intention-to-treat analysis, however, the generalisability of the results is limited, due to sampling from only one military base. Additionally, this trial tested a combined intervention where the isolated effects of each component could not be assessed. Moreover, dose-response effects and the long-term effectiveness of the intervention remain unknown. The acceptability of biofield treatment also remains largely unknown to date, however, the authors suggest that therapies like this, which are not centred on treating a disorder, may help reduce the stigma about receiving mental health care in a military setting.

Music therapy

Music therapy is a very small area of research; however, in 2012 there were two empirical studies into its effectiveness in treating PTSD^{135,136}. A small but novel qualitative study of Israeli army veterans, for example, sought to investigate how music might enable access to and processing of traumatic memories (N=9)¹³⁵. The researchers noted that as both music and traumatic memories are sensory mediated, music perception may function as an acceptable pathway to traumatic memories. The nine male veteran participants (aged 20–23 years old) who had been diagnosed with chronic PTSD participated in 10–15 minutes of instrument playing and free talk amongst the group, followed by 10–15 minutes of solely listening to relaxing music, for 16 sessions. Decreased ruminations of traumatic emotions and increased expressions of positive feelings were observed following the music session. Unfortunately, no baseline measures were recorded in this study and qualitative analysis was of descriptive utility only (e.g., frequencies of stated positive feelings).

Another small but well-designed randomised controlled trial also found evidence supporting the use of group music therapy in a civilian population who had undergone CBT for PTSD without success (N=17)¹³⁶. Following ten weeks of music therapy, participants had clinically significant improvements on all three PTSD symptom domains on the IES Revised (IES-R) scale. Encouragingly, the researchers also found through qualitative analysis that participants found value in the therapy sessions and were able to translate some of what they had learnt into everyday life. Without replication in a larger scale randomised controlled trial, the results of both of these studies should be interpreted with caution.



Other therapies

Yoga therapy is gaining popularity in the treatment of PTSD for veterans^{137,138}, however, no empirical studies relevant to military populations were published in 2012.

In terms of animal-assisted therapy, the US Army Medical Department Journal devoted an issue to this topic in 2012¹³⁹. Unfortunately, this consisted of policy notes and anecdotal and descriptive reports, and no relevant empirical studies were described.

A survey of staff at 125 VA specialised PTSD treatment programs found that 96% (N=120) of programs reported using at least one complementary or alternative medicine treatment. The most common were mindfulness, relaxation therapy, progressive muscle relaxation, guided imagery, art therapy, yoga, meditation, spiritual practices, tai chi, biofeedback, and music therapy. In this study, each of these treatments was found in over 15 programs. Mindfulness was the most common, appearing in 96 programs¹⁰. Data on how often these programs are used by veterans was not reported. However, another study by the same researchers found that among a sample of 599 civilians with PTSD, 39% of individuals reported using a complementary or alternative therapy for their self-reported emotional and mental problems in the past year¹⁴⁰. Only 13 of these individuals saw a practitioner for their treatment, and many used these therapies instead of conventional care. These studies demonstrate that alternative and complementary therapies are widely used in both military and civilian populations, and thus highlight the need to empirically test the efficacy and safeness of these treatments.



Utilisation and barriers to care

A range of initiatives to reduce barriers and stigma associated with accessing care among military personnel and veterans was identified in the 2012 literature. These are reviewed in three main areas including: (1) financial constraints, (2) digital technologies, and (3) rural and cultural applications.

Reducing the barriers around financial constraints

Financial constraints, including the cost of travelling to appointments, are commonly cited as a barrier to care¹⁴¹. A study by Nelson and colleagues¹⁴¹ examined the effect of a policy change that more than doubled reimbursement for travel to outpatient, inpatient, and pharmacy services for all US veterans eligible for reimbursement (N=192,559). Regardless of distance from a VA service, following the increased travel reimbursement, compared to non-eligible veterans, eligible veterans had more outpatient encounters, and incurred higher costs associated with outpatient encounters. Pharmacy and prescription service use also increased, while no change was observed in the use of inpatient services. Nelson and colleagues¹⁴¹ concluded that the decision to double the travel reimbursement influenced the way veterans chose their healthcare. A limitation acknowledged by the authors is that health outcomes were not assessed. In a study comparing female veterans and non-veterans on barriers to care, no differences were observed, although female veterans did report poorer health and quality of life overall¹⁴².

Use of digital technologies

The use of digital technologies to effectively provide screening for treatment in comparison to face-to-face screening was examined by Sipos¹⁴³. Following a 12-month deployment in Iraq, US soldiers (N=307) were randomly allocated to receive behavioural health screening interviews by video teleconference (VTC) or face-to-face. When soldiers were followed up at four months post-screening, no differences were observed in satisfaction with the screen, mental health symptoms, stigma, or barriers to care. However, soldiers with higher symptoms of depression and anxiety and those with longer deployment expressed a preference for in-person modalities for future mental health treatment. Limitations of the study included a bias towards face-to-face modalities among soldiers, particularly those assigned to the face-to-face screening group who had not previously encountered videoconferencing, and restricted generalisability due to lower rates of combat exposure in the sample relative to other units.

Strachan and colleagues¹⁴⁴ also reported on preliminary data from an ongoing clinical trial comparing outcomes in OEF/OIF veterans with PTSD (N=40), who were randomly allocated to receive a brief behavioural treatment using digital technology (home-based



telehealth) or in-person. Veterans in both treatment groups reported pre- to post-treatment reductions in depression, anxiety and PTSD symptoms. The authors attributed the lack of difference in these modalities to a lack of statistical power to draw any conclusions regarding the effectiveness of the telehealth relative to in-person treatment delivery. The study does nonetheless provide promising evidence that using digital technology for brief interventions may be feasible and effective, particularly if in-person care is not undertaken or available.

Two significant review papers were published in 2012 regarding the effectiveness of digital technologies such as videoconferencing and/or e-health to treat PTSD, depression and other mental health related issues among military personnel^{145,146}. In the first review by Paul and colleagues¹⁴⁵, those studies which incorporated a control condition consistently found no differences between military personnel receiving videoconferencing or in-person treatment (e.g., using prolonged exposure or CBT therapies), with both groups reporting equal, and significant reductions in symptoms over the treatment period. Findings regarding older, culturally diverse and rurally located veterans showed uptake to digital technologies varied¹⁴⁵.

In the other 2012 review paper by Zinzow and colleagues¹⁴⁶, studies that were included involved military personnel living in rural and remote areas, where access to in-person treatment was limited. Overall, the studies showed high acceptability and satisfaction with videoconferencing, which still provided a sense of interpersonal support. Like the review described above, this review found, despite one study which questioned the credibility of video teleconferencing, no differences between videoconferencing and in-person treatments. These authors stated that the lack of difference may be influenced by social supports (e.g., families or communities), the service provider supporting the access to digital technologies, and diverse demographic factors. Regarding the latter, while several authors have suggested that younger personnel may be more comfortable with telehealth approaches, as they are more comfortable using digital technology in their daily lives, the findings from the two studies mentioned at the beginning of this section^{143,144} suggest that assumptions regarding age cannot be made.

One interesting 2012 study by Fortney and colleagues¹⁴⁷ evaluated the effectiveness of using digital technologies to deliver treatment for depression by a multidisciplinary care team through VA Community Based Outpatient Clinics. At each clinic (N=11), the delivery of the treatment programs and support for clients and staff were adapted to reflect local resources and needs. For example, at some sites close to 70% of primary care providers referred patients to the program, and this increased the reach of the program to primary care patients diagnosed with depression and not already receiving care, by 9%. Over time, of the participants across all clinic programs, 19% (N=298) were symptom free, and



another 22% responded to treatment with a 50% reduction in symptom severity. The majority (10 out of 11) of the clinics decided to continue with the program. Some caution is warranted, as this study did not include a comparison group receiving face-to-face or usual care, but the results do highlight the potential utility of a combined approach.

Rural and cultural applications

Veterans returning from OEF/OIF deployment have been found to be difficult to engage in care, have been disproportionately recruited from rural areas, and are likely to be community-based outpatient clinic (CBOC) users. In a qualitative study, Sherman and Fischer¹⁴⁸ interviewed service providers (N=5), veterans (N=3), and their families (N=3) about attitudes to the introduction of a family education program (SAFE) at local community-based outpatient clinics. Structural and logistical barriers to running the program through the CBOC were identified by providers, along with the potential for attitudinal barriers among rural veterans and their families. Veterans and their families noted practical barriers (scheduling time off, transport, child care), but the use of digital technologies to address these issues was not attractive (“impersonal”). Further, family members noted the veteran’s opposition to their attending as a barrier (fears of disclosure). All participants identified the needs of children and youth for support and education to understand what their parents with PTSD and other mental disorders are experiencing, as well as a need for the provision of childcare to enable families to take part. The findings were integrated into an appendix to the SAFE Program Implementation Toolkit to provide practical suggestions to service providers to minimise barriers to community education programs among rural veterans and their families. These included: support to service providers using multiple modes (reading, phone, peers, training); assessing local families’ needs and preferences before starting (time, date, location of meetings); providing reimbursement for travel expenses and/or holding family and veteran sessions concurrently to minimise travel costs for families; and combining in-person and digital formats, especially for the younger veterans.

Shore and colleagues¹⁴⁹ provided a retrospective review of their experiences over ten years of running the “telemental health program” with American Indian veterans. The authors acknowledged the markedly increased rate of PTSD (31% current, 59% lifetime) and substance misuse (72% current, 84% lifetime) among American Indian veterans, and the fact that these veterans are the most rural of all veteran groups in America. Additional barriers to care experienced by these veterans include, basic access to care, healthcare provider recruitment and retention, access to culturally appropriate care, underfunded healthcare resources, and geographically isolated and dispersed communities. The authors described a model where mental health treatments for American Indian veterans with PTSD and other mental health issues are provided using videoconferencing in collaboration with local service providers, American Indian workers, community-based organisations, and traditional healers. The authors noted the success



of the program over the ten years in reducing mental health symptoms, but also in finding ways of working collaboratively in challenging environments that draw on the strength of technology, clinical knowledge, the cultural and community knowledge of the American Indian workers, and the insights and understandings of the traditional healers.

In summary, although there are methodological limitations to studies providing support for digital technologies which help to reduce barriers to care and treat mental health conditions in military personnel, particularly in younger and rural populations, the 2012 literature shows digital technologies in service delivery is growing, because the technology allows for the adaption of interventions for populations that are inherently difficult to access¹⁵⁰. Adopting practices sensitive to local populations might further mitigate barriers towards access to service providers¹⁵⁰.



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