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Post Traumatic Stress Disorder Related to Workplace Trauma

A Systematic Review

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Abbreviations

ACPMH	Australian Centre for Posttraumatic Mental Health
ASD	Acute Stress Disorder
NHMRC	National Health and Medical Research Council (Australia)
NICE	National Institute for Clinical Excellence (UK)
NIH	National Institute of Health (US)
PTSD	Post Traumatic Stress Disorder
RCT	randomised controlled trial
WCT	World Trade Centre

Executive Summary

The purpose of this project was to determine evidence based principles for prevention, identification and management of post traumatic stress disorder (PTSD) in relation to workplace trauma.

These guiding principles inform a range of interventions on a continuum from prevention, screening and early identification, to management and return to work. They have been derived from analysis and critical review of 46 articles identified in a systematic literature search. The literature analysis has been complemented by the review and comments of experts from the Australian Centre for Posttraumatic Mental Health, University of Melbourne, Australia.

These guiding principles are specific to the prevention and management of PTSD in relation to workplace trauma, and the scope of this document does not include all mental health consequences of workplace traumatic events. Spontaneous recovery and depression are more common outcomes of exposure to traumatic events than PTSD. Significant mental health problems may arise from reactions to physical injury, medical interventions and disability where these have occurred and the resultant social and occupational consequences as well as from the traumatic event itself.

1. Awareness of PTSD risk and protective factors

Although it is difficult to predict exactly who will go on to develop PTSD after exposure to a traumatic event at work, there is sufficient body of evidence for employers to attempt to identify those at higher risk. Factors which appear to protect against PTSD development have also been identified, and should be strengthened through workplace structures and processes.

- 1.1 Demonstrate awareness of personal/non-modifiable PTSD risk factors:** previous life trauma, psychiatric history, peri-traumatic dissociation, lower socio-economic status. These associations were relatively weak.
- 1.2 Demonstrate awareness of trauma-related PTSD risk factors:** nature and severity of the trauma, repeated exposure to traumatic events. These factors are strongly related to development of PTSD.
- 1.3 Demonstrate awareness and implement strategies to address environmental/modifiable PTSD risk and protective factors:** low social support, organizational stress and negative work environment, self esteem, cognitive beliefs, coping strategies. These associations were relatively strong.
- 1.4 Recognize that interactions of personal, trauma related and environmental risk factors have a stronger association with PTSD than single factors alone.**

Strength of the body of evidence matrix for recommendations 1.1 to 1.4

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	3 systematic reviews (military and civilian, NHMRC level I but some bias, as mix of prospective and retrospective studies included) 4 prospective cohort studies, NHMRC level II 13 cross sectional studies NHMRC level IV	Good: B
Consistency	most studies consistent and inconsistencies can be explained	Good: B
Impact	Associations for risk factors in prospective studies ranged from moderate-substantial Associations in cross sectional studies, no evidence of temporal relationship. Some of these associations relatively weak	Satisfactory: C
Generalisability	Nurses, emergency services, some retail covered, but only for selected risk factors	Satisfactory: C
Applicability	Very few Australian studies (exception Bryant 2005), most from US. Mostly in emergency situations.	Satisfactory: C

Research recommendation: interventions which address modifiable PTSD risk factors in the workplace should be evaluated in terms of their impact on PTSD prevalence. In particular, the effect of training in resiliency and health behavior appears to be a potential prevention strategy for subsequent PTSD in high risk occupations, and should be further evaluated.

2. Preparation for care: monitor those exposed to traumatic events

While the majority of persons exposed to traumatic events will readily recover from their initial distress, it is vital that employers monitor those exposed in order to identify people who would benefit from early intervention to prevent long term mental health consequences of trauma.

2.1 There is insufficient evidence to support pre-employment screening**Strength of the body of evidence matrix for recommendation 2.1**

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	1 prospective cohort study in military population (Level II) 1 narrative review (military) NICE guidelines (expert opinion) Upheld in legal case	Good: B
Consistency	All studies consistent	Excellent: A
Impact	Difficult to determine as prevalence of PTSD at 2 years was low in the available study. Cases detected through screening would not justify costs or high numbers of people excluded.	Good: B
Generalisability	Studies mostly of military, not civilian occupations, but clinically sensible to apply this evidence to target population	Satisfactory: C
Applicability	Probably applicable to Australian occupational context with some caveats	Satisfactory: C

2.2a Service planning should consider the application of targeted screening of individuals at high-risk for PTSD after major disasters or incidents. Good practice point (ACPMH, 2007, p19). **The need to screen for broader mental health consequences of trauma** using a more universal mental health screening tool should be considered, as PTSD is not the only possible mental health consequence to traumatic events. Depression, anxiety and psychosocial problems are also possible outcomes of trauma exposure.

2.2b Screening may be effective in identifying people who require further services. Screens identify people with PTSD effectively and that if treated in a timely manner, people with PTSD are more likely to have good outcomes.

Strength of the body of evidence matrix for recommendation 2.2a and b

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	1 comparative study with concurrent controls level III-2 ACPMH guidelines: good practice point (expert opinion) Narrative reviews (expert opinion)	Satisfactory=C
Consistency	Study and expert opinion consistent	Excellent: A
Impact	Substantial. In the screening study, enhanced services recipients had on average 6 symptoms of PTSD compared with 4 in crisis counselling group.	Good: B
Generalisability	Population studies differs from target population (general public disaster exposure vs. workplace trauma exposure) and hard to judge whether it is sensible to generalize to target population	Poor: D
Applicability	<i>Possibly</i> applicable to Australian occupational context with some caveats	Satisfactory-Poor: C/D

2.3 Screening should be undertaken in the context of a service system that includes adequate provision of services for those who require care. Good Practice Point (ACPMH, 2007, p19). Screening in the absence of timely, confidential, compassionate and effective services for people who require further care is ethically unacceptable and associated with disillusionment in both screening and therapy processes. Although no further evidence was available with regard to PTSD, a systematic review and meta-analysis of screening for depression without also providing enhanced patient care services (collaborative care) was found to have little or no impact on detection and management of depression by clinicians.

2.4 Employers, supervisors, peers and OHS staff should be alert to signs of post-traumatic mental health problems and refer for assessment and management when signs fail to diminish over the course of the two weeks after the traumatic event. These include the clinical symptoms of PTSD and the typical indirect manifestations of PTSD, which include increased alcohol use, interpersonal and/or family conflict, social withdrawal, depression, somatic distress, and performance deterioration. Good Practice Point (ACPMH, 2007, p142), no further experimental evidence available.

2.5 PTSD development in conjunction with work-related physical injuries should be considered as a further indication for screening: Australian prospective cohort studies indicate that PTSD may develop in around 10% of injuries severe enough to require hospitalization, and that following ICU admission trauma survivors had a 17% risk of developing

PTSD. Where PTSD does occur in conjunction with physical injury, it is a marker of later disability.

3. First response in the event of trauma

Most people exposed to one-off traumatic events will not go on to develop PTSD, and will recover with the usual supports of community, family and friends. While structured psychological interventions for all persons exposed to trauma are not indicated, workplaces need to provide support, meet basic employee needs, encourage adaptive coping strategies and monitor those exposed over time.

3.1 For adults exposed to trauma, single or multiple structured psychological interventions (such as psychological debriefing) should not be offered to all on a routine basis.

Strength of the body of evidence matrix for recommendation 3.1

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	ACPMH guidelines (based on NICE guidelines, from 7 RCTs) Systematic review of 11 RCTs One level III-2 study: (occupational setting, after WTC)no evidence of reduction in PTSD prevalence One cross sectional study in retail	Excellent: A
Consistency	Most studies consistent and inconsistencies can be explained	Good: B
Impact	Substantial	Good: B
Generalisability	Populations studied varied, but results were consistent enough to be reasonably applied to the civilian occupational setting	Satisfactory: C
Applicability	Probably applicable to the Australian occupational setting with some caveats.	Satisfactory: C

3.2 For adults exposed to trauma, the appropriate first response is psychological first aid in which survivors of potentially traumatic events are supported, immediate needs met, and monitored over time.

Psychological first aid includes provision of information, comfort, emotional and instrumental support to those seeking help. Psychological first aid should be provided in a stepwise fashion tailored to the person's needs. Good Practice Point, no further experimental evidence available (ACPMH, 2007 p108).

Research recommendation: The effectiveness of implementing psychological first aid in response to traumatic events in the workplace should be evaluated with regard to PTSD incidence. The relationship between peer support and PTSD, and/or protective factors against its development, should be further examined.

4. Assessment and treatment

When PTSD or other mental health reactions are identified in workers that do not diminish in the first two weeks after a traumatic event, referral to a primary care physician for specialist assessment and access to early, evidence-based treatment is essential. While the specific recommendations around clinical assessment and treatment relate mostly to health professionals, workplaces should be informed so they can support access to effective care and facilitate return to work.

4.1 Comprehensive assessment by trained health professionals

Assessment is multifaceted, and should involve validated instruments as well as clinical interviews with trained mental health professionals (psychologist/psychiatrist). Other aspects of assessment include family, social and occupational issues, and may involve a team of health care professionals including social worker, occupational therapist, rehabilitation counsellor and general practitioner. ACPMH Rating= Good Practice Point: Expert consensus opinion, no further experimental evidence available.

4.2 Evidence-based intervention: Trauma focused cognitive behavioural therapy

Strong evidence in guidelines and from high quality systematic reviews support the effectiveness of early treatment (from 2 weeks to 3 months after symptoms identified) using trauma focussed cognitive behavioural therapy in the treatment of PTSD.

ACPMH Rating= A: body of evidence can be trusted to guide practice

5. Return to work: balance recovery with avoidance of further injury

Returning to work has been associated with less PTSD symptoms than non-return. However, when PTSD occurs following a workplace traumatic event, it is important to avoid re-exposure to traumatic events. There is minimal research in this area, but a prospective cohort study of PTSD in road trauma survivors suggests specific barriers to employability should be identified (time management, preoccupation with health and depression in the road trauma population) and addressed with early occupational rehabilitation strategies.

All guiding principles are summarised diagrammatically in Figure 1.

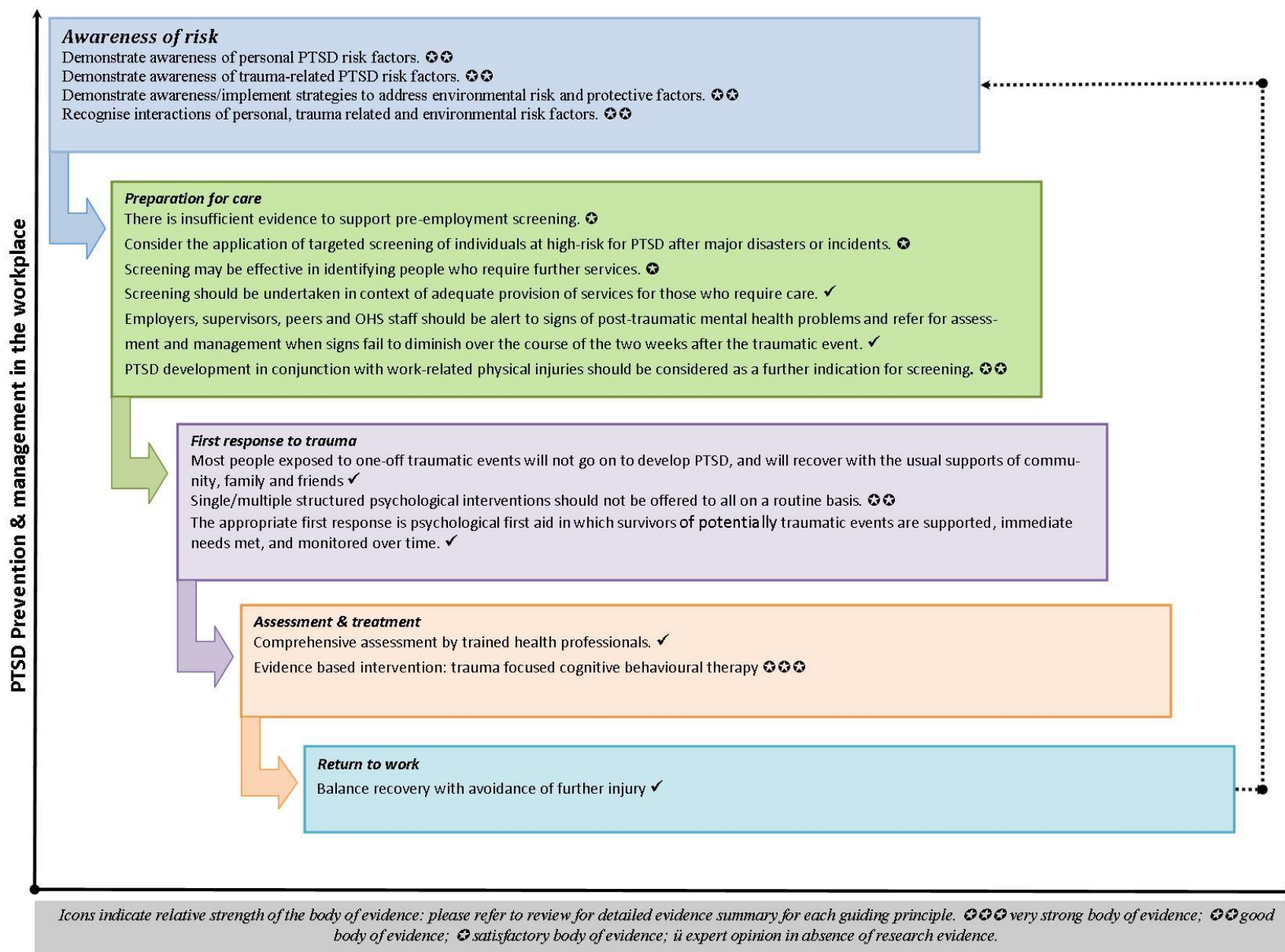


Figure 1: Guiding principles

Background

Traumatic events at work may result in significant injury and costs due to post-traumatic stress disorder (PTSD). First formally recognised as a psychiatric disorder in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1980), PTSD can develop when a person is “exposed to a traumatic event that involves actual or threatened death or serious injury, or a threat to the physical integrity of self or others” (Bisson, 2007, p399). Reported prevalence of PTSD in civilian emergency service workers (police, fire fighters, ambulance, and first responders to disasters including World Trade Centre [WTC] attacks, Ash Wednesday fires, earthquakes and oil rig disasters) ranges from 6% to 32% (McFarlane et al., 2009).

These guiding principles are specific to the prevention and management of PTSD in relation to workplace trauma, and the scope of this document does not include all mental health consequences of workplace traumatic events. Other mental health disorders including depression, anxiety and substance abuse frequently co-exist with PTSD (Creamer et al., 2001), and these conditions need to be identified and addressed in the management of the affected person.

While PTSD has a recognised impact in a few occupations (e.g. military and emergency services), serious accidents occur in many industries, and issues of compensation and employee duty of care in relation to PTSD affect all workplaces (McFarlane & Bryant, 2007). The Australian Guidelines for the Treatment of Adults with Acute Stress Disorder and Post-traumatic Stress Disorder (Australian Centre for Post-traumatic Mental Health [ACPMH], 2007 and endorsed by the National Health and Medical Research Council [NHMRC]) brings together a robust body of literature on the prevalence and management of PTSD, with most of the research based on trauma experienced in military and emergency service settings as well as motor vehicle accidents.

In contrast, there are relatively few studies about the identification and management of PTSD in relation to other workplace trauma (e.g. industrial accidents, events that occur in construction, sheet metal and hydraulic industries, or involving 24 hour petrol stations, taxi-drivers and security guards). Workplace bullying may also involve potentially life-threatening incidents (e.g. being locked in confined places) and cybervirtual and actual stalking and other behaviours reported by victims to threaten their physical safety. Traumatic events are more common in emergency and military workplaces so this is where the bulk of the research has been conducted. However, these studies are also relevant to the wider occupational setting, and it seems reasonable and necessary to draw on literature from emergency and military populations, while bearing in mind the limitations to generalisability and applicability of doing so.

This gap between current evidence about the impact of traumatic events, and lack of translation to the wider occupational setting has serious health, safety and legal implications. Current knowledge about the impact of traumatic events “obliges employers to have an active strategy to anticipate and manage the aftermath of such events, as well as cumulative traumatic exposures” (McFarlane & Bryant, 2007) such as occur in high risk occupations. This project was established to develop guiding principles to assist SafeWork SA apply this knowledge to occupational health and safety. This research is an essential pre-requisite to intervention studies which may go on to examine the implementation of these guiding principles in high risk workplaces, and determine the effectiveness of the guiding principles for prevention, early action, identification and management of PTSD in the workplace.

Aims

The purpose of this project was to determine evidence based principles for prevention, identification and management of post traumatic stress disorder (PTSD) in relation to workplace trauma.

Methodology

The project aim was achieved through (1) a systematic review of the literature; (2) consultation with expert panel on prevention, identification and management of PTSD, and the workplace implementation of evidence based strategies in this area; and (3) production of a final report (Figure 2).

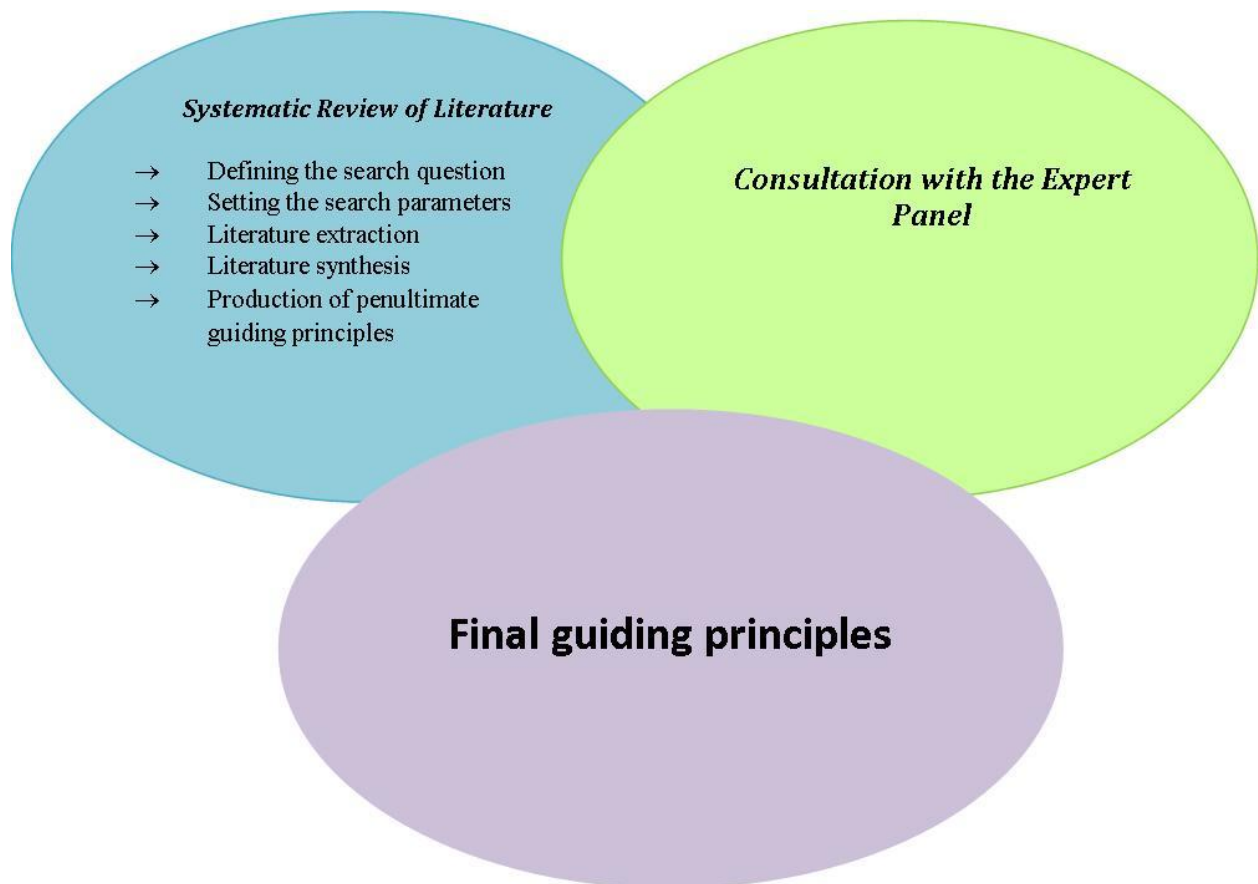


Figure 2: Diagrammatic overview of the process

Systematic review

Defining the search question: This search was designed to identify:

Evidence based information on effective strategies for prevention of PTSD relevant to the occupational setting in South Australia.

Existing workplace principles designed to prevent, identify and/or manage PTSD.

Setting the search parameters: McFarlane and Bryant's review of the literature in this area (2007) highlighted the limitations of taking a traditional "keyword search" approach and the need to explore the vast body of aligned literature from non-occupational trauma. Our search continued this approach, with particular attention to publications from 2005 to the present (although publications from 2000 were accepted if identified from secondary searching, e.g. reference lists of identified articles). Therefore, the selected search inclusion parameters were:

Study types	Primary and secondary research
Types of participants	Adults exposed to traumatic events in the workplace
Types of intervention	Interventions intended to prevent PTSD from exposure to traumatic events in the workplace which may consist of one or more of the following elements risk reduction, modeling and management first response to trauma screening and early identification of PTSD facilitating appropriate treatment of PTSD
Type of comparators	No intervention
Type of outcomes	Including but not limited to: Incidence and severity of PTSD Worker outcomes (disability, quality of life, symptoms of PTSD/anxiety/depression) Costs (compensation/loss of income) Other outcomes as indicated during the literature search or stakeholder consultation.

Other inclusion/exclusion criteria

Workplace: While most studies identified involved emergency services personnel, or first responders after a traumatic event (e.g. WTC responders), this review particularly sought studies involving non-emergency workers (e.g. in education, health, retail and transport). Studies of combat-related PTSD were excluded in the keyword searches due to the substantial differences between the military and other occupational settings. These differences include the nature of trauma exposure, the type of training received, and the likelihood of repeated trauma exposure (McFarlane & Bryant 2007; McFarlane et al., 2009). A small number of studies with a military setting were identified from hand-searching reference lists, and included because findings were innovative, and had applicability to other settings, or no other data on the question was available in other occupational settings. Two important review papers (Brewin et al., 2000; Ozer et al., 2003) were also included, whose findings were based on military, emergency, and disaster services groups.

Traumatic events: This review only considered PTSD in relation to a traumatic workplace incident. According to the DSM-IV definition, a traumatic stressor means the person experienced, witnessed or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of the self or others; and the person's response involved intense fear, hopelessness or horror.

PTSD measures: We adhered to a DSM-IV related definition of PTSD, so included PTSD measures which adhered to these criteria. We therefore excluded studies which **only** used the 1979 Impact of Event Scale (Horowitz, 1979) to indicate PTSD, but studies which used the Revised Impact of Events Scale (Weiss & Marmar, 1997) were included. The Revised Impact of Events Scale, while not a PTSD diagnostic

measure, appears a “useful instrument in the assessment of post-traumatic stress” (Creamer et al., 2003, p1495). Creamer and colleagues report it “may be sensitive to a more general construct of traumatic stress in those with lower symptom levels” (2003, p1489).

Conducting the search: The following peer reviewed databases were searched: OVID: EMBASE, MEDLINE, AMED, ICONDA, EBSCO, CINAHL, HealthSource, PsychINFO, The Cochrane Library, Web of Science, ScienceDirect, Scopus, OSH-ROM . Guideline resources including NIH, NICE, NHMRC were examined. Non-peer reviewed sources and unpublished databases will included Google Scholar, Metacrawler, National Institute of Occupational Safety and Health database (NIOSHTIC) and International Labor Organisation database (CISDOC), Australian Centre for Post traumatic Mental Health website. The reference lists of key articles were searched to identify further relevant publications

Search keywords: Searches of each database used combinations of these keywords

post-traumatic stress disorder acute stress disorder	occupational workplace	intervention Risk reduction first response psychological first aid screening early identification treatment
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As a result of searching the reference lists of articles, a further search for literature about PTSD screening after the World Trade Centre attack was conducted, using keywords Project Liberty, World Trade Centre, PTSD, screening.

Strength of the body of evidence supporting each recommendation: Included studies were appraised using the NHMRC criteria for levels of evidence (Appendix 1, NHMRC 2008). Where evidence of level III or higher was available, the consistency, clinical impact, applicability and generalisability of the evidence was graded according to NHMRC criteria for each domain (Appendix 2, NHMRC 2008). While studies providing lower levels of evidence (level IV) or expert opinions were noted, recommendations based on these reports are listed as “good practice points” to indicate this lower level of evidence-base.

Consultation with expert panel: Primary research evidence attained from the review of the literature was layered with consultations from a panel of experts in PTSD. For this purpose, one of the review team members (Anne-Laure Couineau), based at The Australian Centre for Posttraumatic Mental Health (ACPMH), University of Melbourne coordinated this phase of the project. She invited purposively selected members from ACPMH, including Associate Professor John Pead and Andrea Phelps, who working together reviewed a penultimate version of the guiding principles. After review, the expert panel made a number of suggestions, in terms of the processes and outcomes of this review, and the guiding principles. Amendments were then undertaken to reflect expert panel suggestions and the panel’s recommendations have been incorporated into the final version of the guiding principles. The peer review by the expert panel provided opportunity to address evidence gaps and develop guiding principles which could be readily operationalised in a workplace setting.

Results

Search Results

Figure 3 shows the results of the literature search. From initial identification of 448 possibly relevant articles, 46 were included in the review. Included articles are listed in the References.

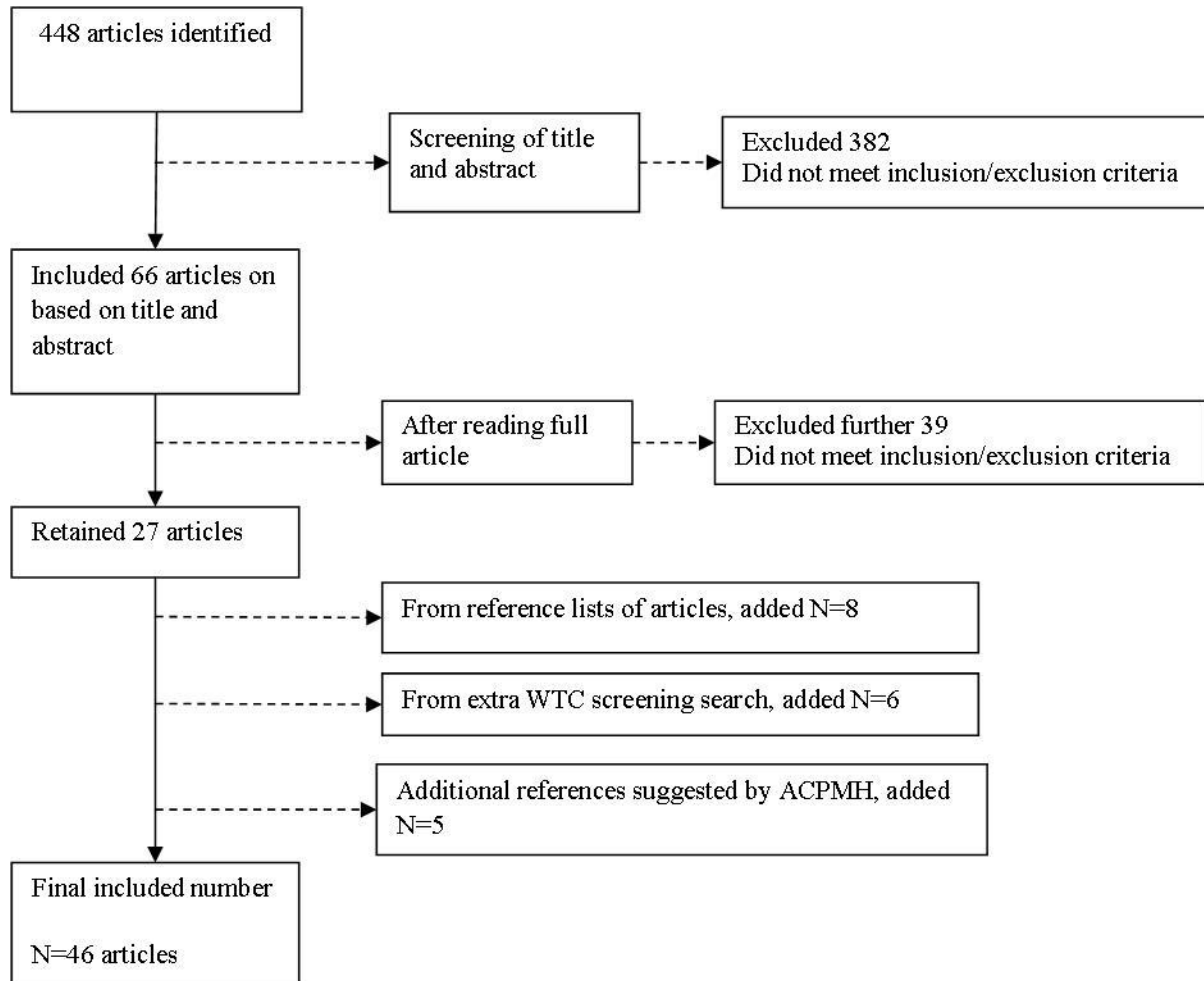


Figure 3: Article selection process and results

Evidence findings

Evidence for interventions to prevent and manage PTSD in the workplace was found to varying levels of strength across a continuum of care summarized in 4 main areas:

1. Awareness of PTSD risk and protective factors
2. Preparation for care: monitor those exposed to traumatic events
3. First response in the event of trauma
4. Assessment and treatment

1. Awareness of PTSD risk and protective factors

What we know from previous systematic reviews: It is difficult accurately predict who will go on to develop PTSD after exposure to a traumatic event. Systematic reviews in large numbers of military and civilian participants have found **weak positive associations** of PTSD with risk factors occurring before, during and after the trauma (Box 1) (Brewin et al., 2000, Ozer et al., 2003 and reviewed by Bisson, 2007) Brewin included 18 prospective and 59 retrospective cohort studies, so not a true NHMRC level II rating, although little differences comparing retrospective with prospective trials in the results; Ozer all retrospective)

Box 1: Risk factors associated with development of PTSD (Brewin et al., 2000, Ozer et al., 2003, Bisson, 2007)

Pre trauma: Psychiatric history, childhood abuse, family psychiatric history, gender (female), race (minority status), lower socioeconomic status, personality (external rather than internal locus of control)

Peri-trauma: trauma severity, perceived life threat, peritraumatic emotions, peri-traumatic dissociation

Post trauma: lack of social support, life stress

Brewin and co-authors (2000) concluded each of the pre-trauma risk factors accounted for relatively little variance in PTSD, but **trauma severity**, additional **life stress**, and **social support** had greater influence.

Findings from this review

17 studies reporting risk factors for occupational PTSD, and published subsequent to the systematic reviews (i.e. 2003 on), were included. Most of the studies located were from high-risk occupations including police, paramedics, nurses, train drivers, firefighters and physicians, with fewer studies in retail workers and journalists.

Cross sectional studies

13 studies were cross sectional surveys, which identified correlations between PTSD and risk factors. However, the evidence provided by these studies is low (NHMRC level IV), as it is not possible to determine the temporal relationship between the risk factor and presence of PTSD. For example, in a survey of 1878 Swedish workers, those exposed to a robbery who developed PTSD had lower ratings of **work environment** and **social support** than those who did not develop PTSD (Sondergard, 2008). However, deterioration in work environment and social support may have occurred as a result of PTSD symptoms (like withdrawal and isolation), rather than have been a causative factor.

Prospective studies

Four prospective cohort studies provide stronger evidence (NHMRC level II) for the temporal relationship between certain risk factors and development of PTSD. A prospective study of 43 firefighters (Heinrichs et al., 2005) found **low self esteem** and **high levels of hostility** at baseline predicted PTSD at 24 months. Together these factors accounted for 42% of the variance in PTSD

symptomatology in this group. Another prospective study (Bryant & Guthrie, 2005) in 68 Australian fire fighters found PTSD at 6 months after commencing active service correlated with **pre-trauma catastrophic thinking** ($r=0.52$, $p<0.001$), with 24% of the variance in PTSD accounted for by this factor. Other factors highlighted in prospective studies:

- Exposure to **greater severity of trauma** in train drivers (person under train accidents) was causative of PTSD (Cothreau et al., 2004).
- Longitudinal studies of people living in New York at the time of the WTC attack examined differences in risk factors between resilient cases (defined as no PTSD at either 1 or 2 years after the event), remitted cases (PTSD at 1 but not 2 years), delayed cases (PTSD at 2 but not 1 years) and persistent cases (PTSD at 1 and 2 years after the event). In addition to factors present in remitted cases (female gender, negative life events, lifetime traumatic events, pre-existing depression), persistent PTSD cases were more likely to have **low self esteem** (RR = 0.75, $P<0.001$) and **greater WTC exposure** (RR = 1.70, $P = 0.001$).

Interaction of workplace, trauma-related and personal risk factors

Trauma-related, workplace-related and person-related risk factors identified from studies in this review are summarized in Table 1. Studies emphasized that multiple risk factors had a greater association with PTSD than any single factor. In many instances these factors are the same as those identified in generic reviews (eg trauma severity and repeated exposure, peri-traumatic dissociation). However these studies highlight the importance of the work environment (workplace organizational factors, night shift, workload, workplace social support, communications), with negative aspects of the occupational setting showing greater association with PTSD cases (in cross sectional studies only).

Personal factors, including cognitive beliefs (e.g. catastrophic thinking), low self esteem, hostility, and maladaptive coping and problem solving, showed cross sectional and longitudinal associations with PTSD. These personal factors may reflect components of psychological resilience, which refers to an individual's capacity to successfully adapt or change in the face of adversity (Connor & Davidson, 2003). Resilience, or hardiness, appears protective of PTSD in the military setting (Piertzak et al., 2010; King et al., 1998; Waysman et al., 2001; Bartone, 1999; all cross sectional studies).

Table 1: Trauma-related, workplace-related and person-related risk factors

Factor	Population	Study type/Author	Strength of the association
TRAUMA FACTORS			
exposure and intensity of traumatic incident	police	Survey Marmar 2006	Multivariate model consisting of greater peritraumatic distress and peritraumatic dissociation, greater problem-solving coping, greater routine work environment stress and lower social support accounted for 39.7% of variance in PTSD symptoms
	police	survey Maguen 2009	Work environment, negative life events and critical incident exposure were directly related to PTSD symptoms. Work environment had the strongest correlation with PTSD ($r=0.45$)
	Train drivers	Prospective study Cothreau 2004	PTSD symptoms more frequent in those exposed to person-under-train trauma than those not exposed (4% vs. 0%)
	NYC residents after WTC attack	Prospective cohort study Boscarino 2009	In addition to factors present in remitted cases (i.e. present at 1 but not 2 years after attack: female, negative life events, lifetime traumatic events, pre-existing depression), persistent PTSD cases (PTSD at 1 and 2 years) were more likely to have low self esteem (RR = 0.75, $P<0.001$) and greater WTC exposure (RR = 1.70, $P = 0.001$).

Factor	Population	Study type/Author	Strength of the association
frequency of traumatic incidents	medical technicians/paramedics	survey Bennett 2005	Organizational factors, frequency of traumatic incidents , dissociation at time of event, and length of service accounted for 48% of variance in PDS scores
	physicians	Survey in cases vs. controls Weiniger 2006	Higher level of exposure to terror outside of work was predictive of PTSD (OR=3.5, p=0.013).
	journalists	survey Pyeovich 2003	Work exposure to traumatic events, personal exposure and cognitive belief accounted for 25% of the variance in PTSD
	Trade union members (retail)	survey Sondergaard 2008	Greater number of traumatic events (3.55) for those who had PTSD (1.6) compared to non-PTSD
Dissociation at the time of the event	medical technicians/paramedics	survey Bennett 2005	Organizational factors, frequency of traumatic incidents, dissociation at time of event , and length of service accounted for 48% of variance in PDS scores
	Nurses	survey Kerasiotis 2004	Peritraumatic dissociative experience associated with PTSD (r=0.6, p<0.001)
	police	survey Marmar 2006	Multivariate model consisting of greater peritraumatic distress and peritraumatic dissociation , greater problem-solving coping, greater routine work environment stress and lower social support accounted for 39.7% of variance in PTSD symptoms
WORKPLACE-RELATED FACTORS			
workplace organisational factors	medical technicians/paramedics	survey Bennett 2005	Logistic regression predicting PTSD case vs. no case found only significant predictor was stress experienced as a result of organisational factors (OR=1.095)
work environment	ambulance personnel	survey Jonsson 2003	Physical and psychological workload correlated with PTSD but associations very small (r=-0.189 and r=-0.197 respectively)
night shift	nurses	survey Mealer 2009	Inpatient nurses had significantly higher PTSD diagnosis (20%) than outpatient nurses (5%) Most nurses with PTSD also had symptoms of burnout syndrome (98%)
workload	Nurses	survey Mealer 2007	Intensive care nurses significantly associated with PTSD cf ward nurse (OR=1.45, 95% CI=1.24-1.72) Intensive care nurses working night shift significantly associated with PTSD cf day shift (OR=1.47, 95% CI=1.23-1.71)
	police	survey Maguen 2009	Work environment , negative life events and critical incident exposure were directly related to PTSD symptoms. Work environment had the strongest correlation with PTSD (r=0.45)
	Trade union members (retail)	survey Sondergaard 2008	Members exposed to a robbery who developed PTSD had lower ratings of work environment and social support in the workplace than those who did not develop PTSD
Occupational stress	police	survey Marmar 2006	Multivariate model consisting of greater peritraumatic distress and peritraumatic dissociation, greater problem-solving coping, greater routine work environment stress and lower social support accounted for 39.7% of variance in PTSD symptoms
Length of service	medical technicians/paramedics	Survey Bennett 2005	Independent Pearson correlation between longer length of service and PDS r=0.25. Along with organizational factors, frequency of traumatic incidents, and dissociation at time of event, length of service accounted for 48% of variance in PDS scores
	Nurses	survey Mealer 2009	shorter length of service no significant relationship in multivariate analysis
	Nurses	survey Kerasiotis 2004	found no relationship between years of experience in emergency room and PTSD
INTERACTION OF PERSONAL AND WORKPLACE FACTORS			
Interpersonal conflict stress	ED nurses	survey Laposa 2003	Interpersonal conflict stress significantly related to PTSD (r=0.36, p<0.05)

Factor	Population	Study type/Author	Strength of the association
Perceived social support	Nurses	survey Kerasiotis 2004	found no relationship between perceived social support and PTSD
	police	survey Marmar 2006	Multivariate model consisting of greater peritraumatic distress and peritraumatic dissociation, greater problem-solving coping, greater routine work environment stress and lower social support accounted for 39.7% of variance in PTSD symptoms
	Trade union members (retail)	survey Sondergaard 2008	Members exposed to a robbery who developed PTSD had lower ratings of work environment and social support in the workplace than those who did not develop PTSD
Communications variables	police	Survey Stephens and Long 2000	Traumatic stress accounted for 8% of the variance in PTSD, while communications variables accounted for a further 19%
PERSONAL FACTORS			
Frequency of negative life events	police	survey Maguen 2009	Work environment, negative life events and critical incident exposure were directly related to PTSD symptoms. Work environment had the strongest correlation with PTSD ($r=0.45$)
	utility workers at WTC site	interview Evans 2009	history of trauma associated with greater incidence of PTSD
Depression, panic disorder, anxiety	nurses	survey Kerasiotis 2004	Depression ($r=0.7$, $p<0.001$) and anxiety ($r=0.70$, $p<0.001$) associated with PTSD ($r=0.6$, $p<0.001$)
	utility workers at WTC site	interview Evans 2009	PTSD group had higher rates of depression (44.4%) panic disorder (29.5%) and anxiety (2.4%) than group who did not have PTSD
Psychological characteristics: Low self esteem and high hostility	fire fighters	Prospective study Heinrichs 2005	Low self esteem and high levels of hostility at baseline predicted PTSD at 24 months (together accounted for 42% of the variance in PTSD symptomatology)
	NYC residents after WTC attack	Prospective cohort study Boscarino 2009	In addition to factors present in remitted cases (i.e. present at 1 but not 2 years after attack: female, negative life events, lifetime traumatic events, pre-existing depression), persistent PTSD cases (PTSD at 1 and 2 years) were more likely to have low self esteem ($RR = 0.75$, $P<0.001$) and greater WTC exposure ($RR = 1.70$, $P = 0.001$).
Cognitive beliefs	journalists	survey Pyeovich 2003	Work exposure to traumatic events, personal exposure and cognitive belief accounted for 25% of the variance in PTSD. 12% of the effect of work exposure on PTSD incidence was mediated by cognitive beliefs .
	fire fighters	Prospective study Bryant 2005	PTSD (time 2) correlated with pre-trauma catastrophic thinking ($r=0.52$, $p<0.001$) 24% of the variance in PTSD was accounted for by pre trauma catastrophic thinking
Coping strategies	physicians	Survey in cases vs. controls Weiniger 2006	Non-adaptive coping strategies (e.g. substance abuse, behavioural detachment, self blaming) were predictive of PTSD ($OR=5.1$, $p=0.009$).
	police	survey Marmar 2006	Multivariate model consisting of greater peritraumatic distress and peritraumatic dissociation, greater problem-solving coping , greater routine work environment stress and lower social support accounted for 39.7% of variance in PTSD symptoms

Awareness of PTSD risk and protective factors: recommended guiding principles

- 1.1 Demonstrate awareness of personal/non-modifiable PTSD risk factors:** previous life trauma, psychiatric history, peri-traumatic dissociation, lower socio-economic status. These associations were relatively weak.
- 1.2 Demonstrate awareness of trauma-related PTSD risk factors:** nature and severity of the trauma, repeated exposure to traumatic events. These factors are strongly related to development of PTSD.
- 1.3 Demonstrate awareness and implement strategies to address environmental/modifiable PTSD risk and protective factors:** low social support, organizational stress and negative work environment, self esteem, cognitive beliefs, coping strategies. These associations were relatively strong.
- 1.4 Recognize that interactions of personal, trauma related and environmental risk factors have a stronger association with PTSD than single factors alone.**

Strength of the body of evidence matrix for recommendations 1.1 to 1.4

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	3 systematic reviews (military and civilian, NHMRC level I but some bias, as mix of prospective and retrospective studies included)) 4 prospective cohort studies, NHMRC level II 13 cross sectional studies NHMRC level IV	Good: B
Consistency	most studies consistent and inconsistencies can be explained	Good: B
Impact	Associations for risk factors in prospective studies ranged from moderate-substantial Associations in cross sectional studies, no evidence of temporal relationship. Some of these associations relatively weak	Satisfactory: C
Generalisability	Nurses, emergency services, some retail covered, but only for selected risk factors	Satisfactory: C
Applicability	Very few Australian studies (exception Bryant & Guthrie, 2005), most from US. Mostly in emergency situations.	Satisfactory: C

Examples of modifiable risk factors and possible strategy to address are provided in Box 2. These suggested interventions have **not** been evaluated so there is no direct evidence of their effectiveness. However, due to the associations between these factors and PTSD, their **implementation** is supported at the level of a good practice point.

Research recommendation: interventions which address modifiable PTSD risk factors in the workplace should be evaluated in terms of their impact on PTSD prevalence.

Box 2: Examples of modifiable risk factors and strategies to address them

Modifiable risk factor	Workplace response
Repeated exposure to traumatic events	Assess trauma exposure in high risk industries Use job rotation to avoid repeated severe trauma exposure Monitor workers exposed to repeated trauma
Negative work environment and organizational stressors Low workplace social support	Reduce organizational stressors Optimize supervisor/worker relationships and communications Build workplace peer support/mentoring
Psychological characteristics Self esteem, problem solving, coping skills, cognitive beliefs (optimism)	Train individuals in strategies for resiliency and health behaviour

Evidence for pre-incident education on PTSD

We were unable to locate controlled studies which determined the effect of workplace programs which develop resilience, self efficacy, and positive coping strategies, on subsequent development of PTSD. For example, the SA Ambulance Service describe pre-incident education and training which includes skills training in stress management and developing adaptive coping techniques, cognitive behavioural therapeutic principles, problem solving and interpersonal skills (Magliaro, 2006, pp. 40, 41 &144). An evaluation of staff wellness using the Depression Anxiety Stress Scale (DASS) found no difference between those who did and did not attend pre-incident education, but these results could have been related to small sample size and unequal group size (intervention n=26, control n=6) (Magliaro, 2006, pp. 90-91).

In the military setting, Sharpley et al. (2008) conducted a non-randomized, controlled study of US military who did/did not receive a single session pre-deployment briefing about stress, and handling traumatic stressors. No significant difference in incidence of PTSD was found between groups, after accounting for age, branch of service, current serving status and exposure to traumatic events. However, no information was recorded about other significant confounding factors (e.g. social support), and assessment was conducted 2-3 years after deployment. The focus of this session appears to have been “fear training” (McGeorge et al., 2006), rather than building resiliency and coping strategies.

However, two pilot studies demonstrated the potentially positive effects of stress management and coping and resilience training in high risk occupational settings. Arnetz and colleagues (2009) examined the effects of imagery stress and coping training on mood, performance and biological markers in 18 Swedish police recruits. The intervention consisted of 10 weekly, 2 hour sessions of cue controlled relaxation training in response to imagined police-work related stressors; cognitive and behavioural skills training in effective coping; and home practice. In comparison with control group trainees, the nine police recruits who participated in the intervention reported less negative mood, and demonstrated better police performance and lower heart rate in response to a critical incident simulation conducted 12 months after imagery training.

A study in Australian Defence Force recruits (Cohn & Pakenham, 2009) examined the effects of a short cognitive behavioural therapy intervention (2 x 40 minute sessions on Days 13 and 20 of training). The intervention consisted of (1) psychoeducation in cognitive restructuring, encouraging participants to adopt realistic causal attributions for their failures/difficulties; and (2) choosing adaptive coping strategies to match their realistic assessments of failures/difficulties. Measures were compared between intervention (n=101) and control groups (n=75) at baseline, Day 23 and Day 45 of the training. Significant differences between groups over time favored the intervention group in measures of causal attribution, positive adjustment, psychological distress and self-blame coping strategies.

Further Australian studies of resilience training in military and police settings are currently being conducted. The effect of training in resiliency and health behavior on subsequent PTSD in high risk occupations remains unknown in the context of a randomized controlled trial. However, from the findings of this literature review it appears to be a potential prevention strategy for workplaces at high risk traumatic events.

2. Preparation for care: monitor those exposed to traumatic events

Literature findings: Most information related to screening for PTSD in the aftermath of trauma was based on expert opinion rather than higher levels of evidence and identified from:

Guidelines: ACPMH/NHMRC Australian Guidelines for the Treatment of Adults with PTSD and ASD (2007) and NICE (2005), although expert opinion only, with no related evidence-based guidelines related to screening

Narrative reviews: by McFarlane and co-authors (2007 and 2009): expert opinion regarding screening of high risk emergency services workers (ambulance, firefighters and police)

Screening of workers exposed to the WTC attack: 4 studies were identified with direct relevance to the effectiveness of screening trauma exposed workers, one of which was a prospective cohort study.

Due to the small number of studies identified, military studies related to screening were also reviewed (Rona et al., 2005 & 2006).

Preparation for care: recommended guiding principles

2.1 There is insufficient evidence to support pre-employment screening

Rona et al. (2005) presents a narrative review describing the difficulties of screening (pre-deployment) for pre-existing psychological illness in the military setting. Screening needed to be able to:

- identify important health problems
- screening test must be clinically, ethically and socially acceptable; simple precise and valid
- research evidence must demonstrate the efficacy of screening in reducing psychiatric morbidity
- adequate staffing and facilities must be available for all aspects of screening
- benefits should outweigh harms

The authors emphasize a balance which favors patients without stigmatizing those needing care. They highlight the need for medical military staff to be able to recognize and effectively manage symptoms of psychological illness in those who have been exposed to trauma.

In a prospective cohort study Rona et al. (2006) screened randomly selected UK soldiers pre-deployment for mental illness, and performed follow-up questionnaires 2 years later (n=1885). The study provided little support for the value of screening. While the positive likelihood ratio for PTSD was relatively high compared with other psychological conditions, because prevalence was low (<3.2%), the screening had a low positive predictive value.

This view has been endorsed by National Institute for Health and Clinical Excellence (NICE) guidelines. These state that at present there is no accurate way of screening for the later development of PTSD, as all the current predictive screening tools for PTSD “suffer from limited overall efficiency” NICE guidelines, on p.99. This finding was upheld in a legal setting in the 2003 Ministry of Defence PTSD case (McGeorge et al., 2006).

Strength of the body of evidence matrix for recommendation 2.1

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	1 prospective cohort study in military population (Level II) 1 narrative review (military) NICE guidelines (expert opinion) Upheld in legal case	Good: B
Consistency	All studies consistent	Excellent: A
Impact	Difficult to determine as prevalence of PTSD at 2 years was low in the available study. Cases detected through screening would not justify costs or high numbers of people excluded.	Good: B
Generalisability	Population differs from target for guideline (military vs. civilian occupations) but clinically sensible to apply this evidence to target population	Satisfactory: C
Applicability	Probably applicable to Australian occupational context with some caveats	Satisfactory: C

2.2a Service planning should consider the application of targeted screening of individuals at high-risk for PTSD after major disasters or incidents. Good practice point from ACPMH (p19 ACPMH, 2007).

The Australian guidelines, and narrative reviews by McFarlane et al. (2009) and McFarlane and Bryant (2007) make the case for screening of high risk employees exposed to trauma for development of PTSD. Important points for implementation of such screening in the occupational setting identified by these authors are:

- Targeted screening refers to the screening of persons showing direct or indirect symptoms of PTSD (see Section 2.4) which persist for more than two weeks after a traumatic event.
- Emergence of PTSD after a traumatic event may be delayed, so annual screening, as well as initial follow-up are indicated
- A range of screening questionnaires is available (e.g. the PTSD Checklist [PCL], Box 3). Screening questionnaires are only a guide indicating need for assessment by a trained clinician.
- High risk populations may acclimatize to trauma and under-report symptoms, so a lower clinical cut-off for referral should be considered.
- Screening processes should aim to reduce stigma, and thus screen a fixed proportion of people who are asymptomatic.
- Where exposure to trauma is repeated (e.g. emergency services, correctional services) this history needs to be accounted for.

McFarlane and Bryant (2007) cite a legal precedent (Burton versus the State of New South Wales) where an employer was found negligent for failing to monitor the health of an employee who had been exposed to trauma, and ensure early treatment. In view of the positive effects of appropriate early treatment on PTSD, “an obligation emerges for an employer to detect individuals who are symptomatic so that treatment can be instigated” (p. 408)

Box 3: Example of a PTSD screening tool

The PTSD checklist (PCL) (Weathers et al., 1993) assesses the 17 DSM-IV PTSD symptoms, with each rated on a five-point scale from 'not at all' to 'extremely'. The scale takes only five minutes to complete and possesses excellent psychometric qualities (Blanchard et al., 1996; Forbes et al., 2001). A score of 50 is recommended as the diagnostic cutoff. Separate forms are available for military and civilian stressors. (ACPMH Guidelines, p21)

Consider the need to screen for broader mental health consequences of trauma: PTSD is not the only possible mental health consequence to traumatic events. Depression, anxiety and psychosocial problems are also possible outcomes of trauma exposure. Where symptoms displayed are not specifically PTSD related, a more universal mental health screening tool may be indicated.

2.2b Screening may be effective in identifying people who require further services: *lessons learned from Project Liberty*

In the aftermath of the terrorist attack on the World Trade centre, the Federal Emergency Management Agency (FEMA) funded Project Liberty, to provide free crisis counseling and public education, through the New York Office of Mental Health (NYOMH). More than a year after the attacks, reports from Project Liberty providers indicated that enhanced services were required for some people still struggling with serious disaster related problems. The NYOMH worked with the National Center for Post-Traumatic Stress Disorder and the University of Pittsburgh Bereavement and Grief Program to plan the enhanced services program for adults, including developing a screening tool, training crisis counselors to make referrals, and developing manuals for cognitive-behavioral and grief interventions to target an array of disaster-related problems (Donahue et al., 2006).

Results from these screening, referral and intervention programs may have implications for the management of trauma in other workplaces with regard to PTSD.

How often was PTSD identified?

Post trauma screening of related workers was a major component of the response to the WTC disaster. Smith report that 13% of 1138 workers and volunteers were diagnosed with PTSD (a subset of the 11,768 workers and volunteers who were screened by the program).

Was referral for further treatment accepted by those identified through screening?

Amongst a group of 328 workers referred for further treatment (trauma specific psychotherapy), Jayasinghe et al. (2006) report that approximately 48% chose to accept, 28% chose to consider only, and 24% chose to decline. PTSD (specifically reexperiencing and hyperarousal symptoms), depressive symptoms, and previous mental health treatment were positively associated with workers' accepting referral.

Does screening identify those who need further services?

Donahue et al. (2006) compared prevalence of symptoms of PTSD, depression and complicated grief in people who had received crisis counseling (n=153), with those who had been screened and identified as

needing to receive enhanced services (n=93). Enhanced services recipients had significantly more symptoms of PTSD (enhanced services, 6.1±5.0; crisis counseling, 3.9±4.3; $z=-3.28$, $p<.005$), and were more likely to be diagnosed with PTSD ($\chi^2=7.41$, $df= 1$, $p<.01$). Note that this screening of crisis counseling recipients occurred 21 months after the attacks.

Jackson and co-authors (2006) describe a 31 item “event reaction” checklist that was completed for every first Project Liberty crisis care counseling contact (n=465,428). Hierarchical cluster analysis of the 31 factors for these 465,428 contacts found the 2 most robust clusters to map well to the DSM-IV diagnostic criteria for (i) depression and (ii) PTSD. The “traumatic stress” cluster included the event reactions of hyper vigilance, reluctance to leave home, feeling anxious or fearful, difficulty falling or staying asleep, distressing dreams, intrusive thoughts or images, and preoccupation with death. The authors conclude that a checklist of this type assists lay providers to identify event reactions which can be related to PTSD symptomatology, and assist in determining who to refer for further services. They also note the continued presentation of people reporting these event reactions (up to 27 months after attack, the full extent of Project Liberty).

Strength of the body of evidence matrix for recommendation 2.2a and b

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	1 comparative study with concurrent controls level III-2 ACPMH guidelines: good practice point (expert opinion) Narrative reviews (expert opinion)	Satisfactory=C
Consistency	Study and expert opinion consistent	Excellent: A
Impact	Substantial. In the screening study, enhanced services recipients had on average 6 symptoms of PTSD compared with 4 in crisis counselling group.	Good: B
Generalisability	Population studies differs from target population (general public disaster exposure vs. workplace trauma exposure) and hard to judge whether it is sensible to generalize to target population	Poor: D
Applicability	<i>Possibly</i> applicable to Australian occupational context with some caveats	Satisfactory- Poor: C/D

2.3 Screening should be undertaken in the context of a service system that includes adequate provision of services for those who require care. Good Practice Point (ACPMH, 2007 p19). Screening in the absence of timely, confidential, compassionate and effective services for people who require further care is ethically unacceptable and associated with disillusionment in both screening and therapy processes. Screening for depression without also providing enhanced patient care services (collaborative care) was found to have little or no impact on detection and management of depression by clinicians, in a recent systematic review and meta-analysis (Gilbody et al., 2008).

2.4 Employers, supervisors, peers and OHS staff should be alert to signs of post-traumatic mental health problems and refer for assessment and management when signs fail to diminish over the course of the two weeks after the traumatic event. Good Practice Point ACPMH guidelines (p142). Many people will have at least one sign of PTSD in the period immediately following the traumatic event, and recover well without specialist intervention. The characteristic symptoms of PTSD are described according to the DSM-IV criteria (Box 4, Bisson, 2007).

Box 4: Characteristic symptoms of PTSD (DSM-IV criteria, Bisson, 2007)**Re-experiencing phenomena (at least one required)**

- Recurrent and intrusive distressing recollections
- Recurrent distressing dreams
- Acting or feeling as if events recurring
- Intense physiological distress to cues
- Physiological reactivity to cues

Avoidance and numbing (at least 3 required)

- Avoidance of thoughts, feelings and conversations
- Avoidance of reminders
- Psychogenic amnesia
- Markedly diminished interest in significant activities
- Detachment or estrangement feelings
- Restricted range of affect
- Sense of a foreshortened future

Increased arousal (at least 2 required)

- Sleep difficulty
- Irritability or outbursts of anger
- Difficulty concentrating
- Hypervigilance
- Exaggerated startle response

Indirect signs of possible psychological dysfunction (McFarlane & Bryant 2007)

The negative impact of traumatic events can manifest in a variety of indirect ways which employers should be alert to, including:

- Increased alcohol use
- Interpersonal and/or family conflict
- Social withdrawal
- Depression
- Somatic distress
- Performance deterioration

These indicators are particularly important because employers and colleagues are more likely to become aware of these issues than they are of the clinical symptoms of PTSD.

2.5 PTSD development in conjunction with work-related physical injuries: a further indication for targeted screening

Work-related physical injuries which are severe enough to require hospitalization are frequent. Data from NSW report between 9245 and 9859 hospitalizations for work-related injury in each of the years from 2000 to 2005 (Mitchell et al., 2008) Estimates of work-related injuries requiring hospitalization are contentious, and difficult to define due to inconsistencies in coding, so this may be an under-representation of the true incidence (McKenzie et al., 2009)

In around 10% of injuries severe enough to require hospitalization, PTSD may develop (O'Donnell et al., 2004). Patients admitted to an intensive care unit were also more likely to have PTSD at 12 months than trauma controls (17% vs. 7%), after controlling for demographic, pre-injury mental health status and injury characteristics (O'Donnell et al 2010). Where PTSD does occur in conjunction with physical injury, it is a marker of later disability. The presence of PTSD (at both one week and 3 months) after traumatic

physical injury significantly increases the risk of ongoing disability at 12 months (2.4 and 3.7 times more likely increased risk of high disability, after accounting for demographic and injury characteristics) (O'Donnell et al., 2009).

O'Donnell and colleagues (2008) have proposed a model for early screening of traumatic injury survivors in the acute hospital setting for vulnerability to PTSD development. Using symptom-based screening tools, patients at high risk of psychological sequelae could be followed up by telephone a month later for review, with subsequent clinical interview and offer of evidence-based treatment if indicated. The authors propose that "routine assessment of symptoms of depression and PTSD in patients who have been physically injured may facilitate triage to evidence-based treatments, leading to improvement in both physical and psychological outcomes." (O'Donnell et al., 2009, p571)

Based on this body of research, employers should be aware that workers who have sustained a severe physical injury (i.e. requiring hospitalization and admission to an intensive care unit) are at risk of developing PTSD. If PTSD symptoms do emerge, they should be identified, assessed and patients referred for evidence-based treatment, to prevent long term implications for disability.

3. First response in the event of trauma:

Literature findings: Evidence relating to the appropriate first response to traumatic stress in the workplace has been gathered and presented in ACPMH/NHMRC Australian Guidelines for the Treatment of Adults with PTSD and ASD (2007), which build on the NICE guidelines Post Traumatic Stress Disorder: the Management of PTSD in Children and Adults in Primary and Secondary Care (2005).

This section presents the relevant guideline recommendations. This section also comments on a **review by Regel (2007)** which addresses the findings of the NICE Guidelines specifically with regard to psychological debriefing in high risk occupational settings. A **recent systematic review** of multiple session early psychological interventions for the prevention of PTSD (Roberts et al., 2010a) also supports recommendations of the ACPMH guidelines. **Two new studies** which directly relate to first response to trauma in **occupational settings** were identified (evidence levels III-2 and IV), and their findings are also discussed.

Most people exposed to one-off traumatic events will not go on to develop PTSD, and will recover from the event with the usual supports of community, family and friends. Key recommendations made by ACPMH for the right first response to traumatic events, and the level of evidence supporting these guidelines are: **(ACPMH 2007, p103-108)**

For adults exposed to trauma, structured psychological interventions such as psychological debriefing should not be offered on a routine basis.

Rating=C: Body of evidence provides some support for recommendation(s) but care should be taken in its application

For adults exposed to trauma, clinicians should implement psychological first aid in which survivors of potentially traumatic events are supported, immediate needs met, and monitored over time.

Psychological first aid includes provision of information, comfort, emotional and instrumental support to those seeking help. Psychological first aid should be provided in a stepwise fashion tailored to the person's needs.

Rating=Good Practice Point: Expert consensus opinion

Adults exposed to trauma who wish to discuss the experience, and demonstrate a capacity to tolerate associated distress, should be supported in doing so. In doing this the practitioner should keep in mind the potential adverse effects of excessive ventilation in those who are very distressed.

Rating=Good Practice Point: Expert consensus opinion

For adults who develop an extreme level of distress or are at risk of harm to self or others, immediate psychiatric intervention should be provided.

Rating=Good Practice Point: Expert consensus opinion

These Australian recommendations (2007) are based on the NICE recommendations (synthesized results of 10 studies investigating early post-trauma interventions, including the Cochrane systematic review of "Psychological debriefing for preventing post traumatic stress disorder" (Rose et al., 2002 and updated in 2009 with no revisions) and one newly included study (Gamble et al., 2005). The early interventions evaluated in the included studies were: educational intervention, collaborative care, trauma focused counseling, and psychological debriefing.

Psychological debriefing

This intervention is not recommended by ACPMH, on the basis of the available body of evidence. The ACPMH guidelines (2007, p 29) describe psychological debriefing as:

“A class of interventions delivered immediately following trauma (usually within three days) that aim to relieve stress in an attempt to mediate or avoid long-term psychopathology. Psychological debriefing operates on the principles of ventilation/catharsis, normalization of distress, and psychoeducation regarding presumed symptoms.”

Regel (2007) provides a narrative criticism of the findings of the Cochrane systematic review on Psychological debriefing for preventing post traumatic stress disorder (Rose et al 2002) and the NICE guidelines (very similar to the Australian guidelines), based on:

1. Methodological shortcomings in the 2 main studies contributing data to the Cochrane review.
2. Psychological debriefing described in one of the included studies as “imaginal exposure”, which Regel claims should not be a part of this intervention.
3. Regel cites a number of non-RCT which support debriefing.

However, no new evidence is provided in Regel’s review which suggests that debriefing prevents PTSD.

Regel also cites the NICE recommendation for provision of “practical and social support and guidance including,

- *Acknowledgement of the psychological impact of traumatic incidents and workers’ responses to incidents.*
- *Reassurance about immediate distress, information about the likely course of symptoms*
- *Practical and emotional support in the first month after the incident” [NICE, 2005, p. 84].*

and is critical that no further information is provided about how this should be implemented (Regel, 2007, p415).

Sondergaard (2008) conducted a cross sectional survey of **shop assistants** (union members), some of whom had been exposed to a robbery. Debriefing after the incident did not significantly affect PTSD scores, compared with workers who did not receive debriefing. However, as workers were required only to indicate whether they did or did not receive debriefing, no information was provided about the nature, content or extent of the debriefing. In this survey there was a significant correlation between poor support from managers and a long duration of sick leave ($r = -0.43$, $P=0.000$). Support from colleagues was related to sick leave ($r = -0.34$, $P=0.000$). However, a cross sectional survey does not indicate a temporal relationship, so perception of poorer colleague support could have been due to symptoms of PTSD like withdrawal and avoidance.

A recent systematic review (Roberts et al., 2010a) examined 11 randomised controlled trials of brief psychological interventions implemented for people exposed to traumatic events (i.e. not targeted only to symptomatic persons) with the aim of preventing PTSD. Interventions included: integrated cognitive behavioural and family therapy, individual or group counseling, adapted debriefing, cognitive behavioural therapy, integrated counseling and collaborative care. There was no difference between treatment and control groups on rates of PTSD (primary outcome) at initial outcome (RR 0.84; 95% CI 0.60 to 1.17). There was a trend, which failed to reach statistical significance, toward greater PTSD symptomatology in the intervention group at 3-6 months post event. In particular, intervention participants in one included study (Marchand et al., 2006) which used an adapted debriefing intervention for persons exposed to armed robbery, appeared to fare worst in self-reported PTSD symptoms, compared to those in the control condition. Debriefing interventions have previously been associated with worse outcome at longer term follow-up (Rose et al., 2002).

Psychological first aid

The NICE guidelines, ACPMH guidelines, and expert reviews (McFarlane & Bryant 2007; Regel 2007) all recommend a first response to trauma which provides early support, in a context of early identification and diagnosis, and reducing stigma to help-seeking and other barriers to care.

This “treatment for all” has been described in the ACPMH as psychological first aid, but as yet no studies have examined its effectiveness in preventing PTSD. Key features of this early support (NCTSN/NCPTSD, 2006) include:

- Make contact and engage in a non-intrusive, helpful and compassionate way
- Enhance immediate and ongoing safety, and provide physical and emotional comfort
- Calm and orient persons who may be overwhelmed or disoriented
- Identify immediate needs and concerns, to enable input to be tailored appropriately
- Offer practical help to address person’s immediate needs and concerns
- Help re-establish contact with regular supports (e.g. family, friends, colleagues)
- Encourage person’s adaptive coping responses
- Link persons with further helping services.

Psychological first aid is suggested as a humane and practical way to address initial distress following a traumatic event, providing the above elements of debriefing models that are generally valued by employers, without the elements that may be harmful to a small minority.

Boscarino et al. (2006) conducted a population-based observational study (**level III-2**) comparing World Trade Centre (WTC) workers who did and did not receive workplace based brief interventions after the WTC attack. In order to control for differences in the demographics of workplaces that received interventions, propensity score analysis was conducted, accounting for factors including age, gender, marital status, level of education, household income, race/ethnicity, immigrant status, language spoken, borough of residence, exposure to World Trade centre disaster (WTCD) events, history of mental health treatment, history of depression, and having experiences a peri-event panic (PEP) attack during the WTCD. Although not closely described, participants reported that in the intervention session they were:

	% of participants
Educated about stress symptoms	63.7 %
Talked about experiences	62.9 %
Taught to cope with things	65.1 %
Taught to think positively	64.1 %
Taught to evaluate thoughts	57.7 %
Taught to deal with emotions	69.1 %
Taught to relax	65.9 %

Participants were asked about the intervention at the first phone interview (1 year after attack) and most interventions were “anecdotally” described as occurring in the 1-2 months after the attack.

At a phone interview 2 years after the attack,

- Workers with employers that offered brief interventions had (slightly) less severe PTSD symptoms (weighted reduction of 0.8%), but **no difference in prevalence of PTSD in the past year**.
- Intervention groups demonstrated less depression (-7.2%) alcohol dependence (-4.8%) and binge drinking (-5.5%) in the previous 1 year compared with the no intervention group.

Approximately 7% reported receiving brief crisis interventions at worksites after WTCD event.

First response in the event of trauma: recommended guiding principles

3.1 For adults exposed to trauma, single or multiple structured psychological interventions (such as psychological debriefing) should not be offered to all on a routine basis.

Strength of the body of evidence matrix for recommendation 3.1

MATRIX CATEGORY	SUMMARY	GRADE
Evidence base	ACPMH guidelines (based on NICE guidelines, from 7 RCTs) Systematic review of RCTs One level III-2 study: (occupational setting, after WTC) no evidence of reduction in PTSD prevalence One cross sectional study in retail	Excellent: A
Consistency	Most studies consistent and inconsistencies can be explained	Good: B
Impact	Substantial	Good: B
Generalisability	Populations studied varied, but results were consistent enough to be reasonably applied to the civilian occupational setting	Satisfactory: C
Applicability	Probably applicable to the Australian occupational setting with some caveats.	Satisfactory: C

3.2 For adults exposed to trauma, the appropriate first response is psychological first aid in which survivors of potentially traumatic events are supported, immediate needs met, and monitored over time.

Psychological first aid includes provision of information, comfort, emotional and instrumental support to those seeking help. Psychological first aid should be provided in a stepwise fashion tailored to the person's needs. Good Practice Point (ACPMH, 2007, page108).

Discussing the experience: What about peer support systems? Two articles (both surveys, so level IV evidence) were identified which examined effect of peer/spousal support on PTSD.

Stephens & Long (2000) conducted a **cross sectional survey** of **police**, investigating their communications with peers and supervisors, and PTSD symptoms.

In hierarchical regression: Traumatic stress schedule accounted for 8% of the variance in Civilian Mississippi PTSD scale, and communication variables explained a further 19% of the variance in PTSD scores. The authors report that the ease of talking about trauma at work, communications with peers about disturbing events, positive communications with peers about work, non-work and negative communications with the supervisor were the important aspects of communication in direct relation to PTSD symptoms.

The findings of this study indicated that talk with supervisors about distressing experiences reduced the effects of trauma by contributing to the cognitive processing of that experience, but only up to a point. While moderate levels of talk appeared beneficial, at high levels of such talk the trauma-strain relationship became stronger.

Positive work related communication with peers showed a more straightforward positive effect on PTSD symptoms and a buffering effect on the trauma-strain relationship.

Davidson and Moss (2008) examined sets of police officer/spouse couples. Police officers were asked about traumatic incidents and health including PTSD symptomatology. Spouses were asked about the nature and extent of their partner's disclosure about the "most upsetting incident in the last 3 years of police work" (p56) using a newly developed "Trauma event disclosure scale" (reliability analysis performed as part of this study, Cronbach's alpha for subscales between 0.75 and 0.88.)

Matching up partner's responses, inhibition (e.g. to what extent has your partner appeared to hold in his or her feelings about this event?) and negative emotional disclosure (to what extent has your partner expressed **anger** or frustration when talking about this event?) were associated with PTSD symptom severity.

However, conclusions cannot be drawn from this study regarding the protective or exacerbative nature of police officer disclosure of traumatic events to their spouses as the directionality of relationships between disclosures and PTSD symptoms cannot be determined.

These findings concur with the good practice point recommended in the ACPMH guidelines (2007, p108):

"Adults exposed to trauma who wish to discuss the experience, and demonstrate a capacity to tolerate associated distress, should be supported in doing so. In doing this the practitioner should keep in mind the potential adverse effects of excessive ventilation in those who are very distressed."

They also support the protective value of good supervisor/worker communication and social support systems at work and at home. It is feasible that peer support systems in high risk occupations may help protect against PTSD by changing these pre and post trauma risk factors.

Research recommendation: The effectiveness of implementing psychological first aid in response to traumatic events in the workplace should be evaluated with regard to PTSD incidence. The relationship between peer support and PTSD, and/or protective factors against its development, should be further examined (ACPMH are currently leading a project looking to establish expert consensus opinion on peer support).

4 Assessment and treatment

Extensive evidence-based recommendations for assessment and treatment of PTSD have been presented in the ACPMH guidelines, and these are summarized in this section. Two additional studies published subsequent to guideline publication were identified which relate to PTSD in the occupational setting. One concerns treatment of transport workers with PTSD (Hogberg et al., 2007), and confirms the findings of the ACPMH guidelines. The other makes suggestions for occupational rehabilitation consultants to assist people with PTSD in the transition back to work (Strausser, 2008).

Assessment and treatment: recommended guiding principles

4.1 Comprehensive assessment by trained health professional

ACPMH Rating= Good Practice Point: Expert consensus opinion

When PTSD or other mental health reactions are identified in workers that do not diminish in the first two weeks after a traumatic event, referral to a primary care physician for specialist assessment and access to early, evidence-based treatment is essential. The ACPMH guidelines(2007) provide 18 comprehensive recommendations on assessment of PTSD, differential diagnosis, assessment instruments, intervention planning, treatment goals, cultural and linguistic diversity, impact of PTSD on family, and general professional issues (p 19-24).

The guidelines point out that comprehensive diagnostic assessment for PTSD requires a multifaceted approach, using unstructured psychiatric interviews, structured clinical interviews, self-report inventories, and (where possible) the report of significant others in the person's life. As PTSD can be grounds for compensation, assessment needs to include objective elements that can stand up to critical scrutiny. A number of practitioners will contribute to the assessment and care of persons with PTSD. While the specialist, symptom focussed interventions will be conducted by psychiatrists, psychologists and other mental health practitioners specifically trained in recommended treatments. Occupational therapists, rehabilitation counselors and social workers are more likely to address family, social and occupational recovery and rehabilitation issues. General practitioners ideally would continue to provide holistic care for the patient and coordinate the involvement of other members of the health care team (p24).

4.2 Evidence-based intervention: Trauma focused cognitive behavioural therapy

ACPMH Rating= A: body of evidence can be trusted to guide practice

The ACPMH guidelines (2007) provide 44 comprehensive recommendations for the evidence-based treatment of people with PTSD (summarised pXVIII-XX), covering areas of psychological interventions, group vs. individual psychological interventions, self-delivered interventions, pharmacological interventions, combined interventions, psychosocial rehabilitation and sequencing of interventions. These guidelines are supported by the outcomes of two subsequently published Cochrane reviews, one on Psychological treatment of post-traumatic stress disorder (Bisson, 2007), and the other on early psychological interventions to treat acute traumatic stress symptoms (Roberts et al., 2010b).

Key recommendations include:

Evidence-based psychological interventions

Adults with PTSD should be provided with trauma-focussed interventions (trauma-focussed cognitive behavioural therapy [CBT] or eye movement desensitization [EMDR] and reprocessing, in addition to *in vivo* exposure).

Rating= A: body of evidence can be trusted to guide practice (Recommendation 4.1, p 63)

Finding also supported by systematic review (Bisson, 2007)

Individual and group psychological interventions

Group CBT (trauma-focussed or non trauma-focussed) may be provided as adjunctive to, but should not be considered an alternative to, individual therapy.

Rating=C: Body of evidence provides some support for recommendation(s) but care should be taken in its application (Recommendation 4.10, p69)

Self-delivered interventions

For adults with PTSD, self-delivered interventions should not be prescribed in place of evidence-based practitioner delivered interventions.

Rating=B: Body of evidence can be trusted to guide practice in most situations (Recommendation 4.11, p71)

Pharmacological interventions for adults with PTSD

4.14 Drug treatments for PTSD should not be used as a routine first line treatment for adults, either by general medical practitioners or by specialist mental health professionals, in preference to a trauma-focussed psychological therapy.

Rating= A: body of evidence can be trusted to guide practice (Recommendation 4.14, p 85)

Early intervention

Adults displaying Acute Stress Disorder (ASD) or PTSD reactions at least two weeks after the traumatic event should be offered trauma-focused CBT including exposure and/or cognitive therapy once a clinical assessment has been undertaken

Rating=A: body of evidence can be trusted to guide practice (Recommendation 5.6, p 118)

Finding also supported by systematic review (Roberts et al., 2010b)

While these guidelines can be trusted to guide practice in all adults with PTSD, there is a lack of studies directly involving people with PTSD acquired in civilian occupational settings. A randomized controlled trial in transport personnel with PTSD of at least 3 months duration (train drivers, ticket and service staff) compared EMDR treatment (n=13) with waiting list controls (n=11) (Hogberg et al., 2007). After the treatment period (2 months), eight people (67%) in the treatment group no longer fulfilled PTSD criteria, compared with one of nine in the control group (p=0.02). While numbers are small and the follow-up period is short, this study supports the translation of these treatment strategies in the occupational setting.

5 Return to work: balance recovery with avoidance of further injury

Vocational, social and family rehabilitation strategies are recommended as part of PTSD management (ACPMH guideline 4.32 p96) and return to work has been associated with a reduction in psychological symptoms (Mason et al., 2002). Where PTSD has been acquired in the workplace, it is important to avoid re-exposure of employees to traumatic events whenever possible (McFarlane & Bryant, 2007). A descriptive study of 44 workers whose claims for PTSD had been accepted by the Workers' Compensation Board of British Columbia (MacDonald et al., 2003) found that only 43% of this sample returned to work with the previous employer. Of those workers, 74% returned to a modified job, for example transferred to a different location or responsibilities, or workplace modification to improve perceived safety, such as installation of surveillance cameras or extra lighting.

Post traumatic stress disorder appears to impact upon an individual's ability to meet workplace demands. In a narrative review exploring the implications of trauma symptomatology for return to work, Strausser (2008) suggests PTSD reduces an individual's stress tolerance, creates inconsistent patterns of behavior, and reduces energy levels. Practical strategies to assist occupational rehabilitation consultants facilitate return to work in people with PTSD are recommended. While these strategies would need to be individualized by rehabilitation professionals to specific problems and settings, possible examples included:

- Structuring the job to minimize contact with the public
- Increasing structure in the work environment
- Modifying the work schedule to incorporate more frequent breaks to help maintain a higher level of concentration
- Provision of private work spaces or individual cubicles to reduce distractions and promote independent work activities.
- Using cognitive strategies such as check-lists or electronic organizers to assist the individual in completing work tasks
- Facilitating return to work initially through reduced work hours and days (Strausser, 2008, p249)

While PTSD originating from workplace trauma was the focus of Strausser's article, no experimental studies of return to work after PTSD acquired in the occupational setting were found. A prospective cohort study of 41 people admitted to hospital after a road accident compared work potential in those with (n=12) and without (n=29) subsequent development of PTSD. Those with PTSD had lower work potential, with poorer time management, preoccupation with health and depression identified as specific barriers to employability (Matthews, 2005). The small sample size limits the ability to generalise from this study of people involved in a road accident to those with PTSD acquired through a workplace traumatic event. However, it is likely that evaluation of early intervention and occupational rehabilitation strategies which help address specific identified barriers to employment, and work alongside clinical treatment programs are indicated.

Implications for practice and research

Reducing risk factors for PTSD development: As well as measures to improve safety and reduce incidence of accidents and traumatic incidents, interventions which address modifiable PTSD risk factors in the workplace should be evaluated in terms of their impact on PTSD prevalence. These include

- Avoiding repeated exposure to traumatic events
- Reducing organisational stressors
- Optimise supervisor/worker communications
- Build workplace peer support/mentoring
- Train individuals in strategies for resiliency and health behaviour

These factors have been identified in prospective cohort studies as potentially protective of PTSD development, and could now be implemented and examined in randomised controlled trials.

Screening for PTSD symptoms after exposure to traumatic events: This strategy has been recommended by expert opinion in the ACPMH guidelines and narrative reviews. Some evidence from studies of screening post WTC attack indicates that screening is effective in the identification of people who require further mental health services in relation to PTSD. This has yet to be investigated in other occupational settings.

Ensuring occupational health and safety services, and workplace supervisors, should be sufficiently aware of the direct and indirect symptoms of PTSD to watch for and identify their occurrence in employees. Following a traumatic incident in the workplace, emergence of these symptoms may be delayed by many months or years. There is already sufficient evidence in the literature to implement this “watchful waiting”, and studies of its outcomes are urgently required.

Screening and early identification of PTSD appears to be vital, as **psychological intervention for all** persons exposed to trauma is ineffective, and may even have negative outcomes, but **early trauma-focused treatment for symptomatic persons** reduces longer term PTSD.

Psychological first aid as appropriate first response to trauma: This is the preferred first response to trauma, given evidence that other interventions, including psychological debriefing, do not prevent PTSD. However, further evidence on the effectiveness of psychological first aid is required. The practical details of how the elements should be implemented will vary with occupational setting and culture, but common elements include:

- Support should be given for the person’s own adaptive strategies (e.g. enlisting the help of family, colleagues and friends)
- Attend to any injuries or physical health concerns
- Ensure basic needs are met (e.g. housing, safety, childcare)

For example, a study in train drivers found fewer PTSD symptoms in drivers exposed to a person under train incident, if a colleague had given support by driving the train away from the incident, rather than them having to do it themselves. Workplaces need to consider how they are able to provide this first response in a timely and targeted way to meet people’s needs in the event of a workplace trauma. If required, resources and further training are available from specialist centres including ACPMH.

However, the effectiveness of this approach has not yet been determined in controlled trials, and workplaces need to monitor new evidence when it emerges.

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Appendix 1

NHMRC Evidence Hierarchy: designations of 'levels of evidence' according to type of research question (NHMRC 2008)

Level	Intervention 1	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
I	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study	A prospective cohort study	A randomised controlled trial
III-1	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, ⁵ among non-consecutive persons with a defined clinical presentation	All or none	All or none	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: <ul style="list-style-type: none"> ▪ Non-randomised, experimental trial⁹ ▪ Cohort study ▪ Case-control study ▪ Interrupted time series with a control group 	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: <ul style="list-style-type: none"> ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study
III-3	A comparative study without concurrent controls: <ul style="list-style-type: none"> ▪ Historical control study ▪ Two or more single arm study ▪ Interrupted time series without a parallel control group 	Diagnostic case-control study	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: <ul style="list-style-type: none"> ▪ Historical control study ▪ Two or more single arm study
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (no reference standard)	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

Appendix 2

NHMRC Strength of the body of evidence matrix (NHMRC 2008)

Component	A	B	C	D
	Excellent	Good	Satisfactory	Poor
Evidence base	one or more level I studies with a low risk of bias or several level II studies with a low risk of bias	one or two level II studies with a low risk of bias or a SR/several level III studies with a low risk of bias	one or two level III studies with a low risk of bias, or level I or II studies with a moderate risk of bias	level IV studies, or level I to III studies/SRs with a high risk of bias
Consistency	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	evidence is inconsistent
Clinical impact	very large	substantial	moderate	slight or restricted
Generalisability	population/s studied in body of evidence are the same as the target population for the guideline	population/s studied in the body of evidence are similar to the target population for the guideline	population/s studied in body of evidence differ to target population for guideline but it is clinically sensible to apply this evidence to target population	population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	directly applicable to Australian <i>occupational health</i> context	applicable to Australian <i>occupational health</i> context with few caveats	probably applicable to Australian <i>occupational health</i> context with some caveats	not applicable to Australian <i>occupational health</i> context

Appendix 3

Data extraction tables

This section includes data extraction that was performed for the 25 experimental studies specifically relating to PTSD in the occupational setting, and one highly relevant narrative review (Regel 2007). Data extraction tables are not included for the other 20 articles included in the review, as these were generalised PTSD guidelines, generalised PTSD systematic reviews, or related primarily to other populations including road traffic or generalised trauma victims, or exclusively military settings.

Bibliographic citation	Arnetz, B.B., Nevedal, D.C., Lumley, M.A., Backman, L. Lublin, A. (2009). Trauma resilience training for police: psychological and performance effects. <i>Journal of Police and Criminal Psychology</i> , 24, 1-9
Country	Study conducted in Sweden, investigators based in the US
Study type	Subset of a larger RCT (although this RCT not referenced or well described)
Evidence level	RCT (Level II) but moderate risk of bias
Number of participants	18, 9 intervention and 9 control
Participant characteristics	Healthy young male police officers, 1 year experience in Swedish police force
Intervention	Imagery and skills training program, 10 x2 hour weekly sessions. Progressive cue-controlled relaxation training, mental rehearsal in critical incident scenarios. CBT coping skills training, home practice
Comparison	No additional preparatory training
Length of follow up	Outcome assessment was conducted 12 months after training period
Outcome measures	Immediate (within 40 mins) responses to critical incident simulation for Acute stress biomarkers, cortisol and antithrombin, heart rate Behavioural performance (8 factors, up to score of 800) Mood: Profile of Mood States questionnaire Perceived stress: visual analogue scale
Data analysis	Indep t tests to compare group means
Key findings	Significant results favouring intervention group: less negative mood ($p=0.03$) Better performance ($p=0.02$) Less HR increase from pre-simulation to most critical moment ($p<0.001$)

Representative sample: participants were selected as consecutive or random cases Reported as random, BUT randomisation methods not adequately described	Yes but Risk of bias
How many of the people asked to participate actually did so?	18/25 72% response rate
If self-selected sample: survey response rate?	n/a
Assessment of exposure: reliable and valid measure Behavioural performance unlikely to be validated	Yes most measures

Exposure level or prognostic factor measured more than once?	No, immediate effects only
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Not described
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N

Bibliographic citation	Bennett, P., Y. Williams, et al. (2005). "Associations between organizational and incident factors and emotional distress in emergency ambulance personnel." <i>British Journal of Clinical Psychology</i> 44: 215-226.
Country	UK
Study type	Survey
Evidence level	Level IV
Number of patients	n=617 (from 1029 questionnaires distributed) 194 EMTs, 380 Paramedics
Patient characteristics	Emergency Medical Technicians (EMTs) and paramedics employed by UK Ambulance services
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. Ambulance Work Stressors Questionnaire (AWSQ) 2. Hospital Anxiety and Depression Scale 3. Post-traumatic Diagnostic Scale (PDS) 4. Cognitive Appraisal Questionnaire (CAQ)
Prevalence	15% females met criteria for diagnosis of PTSD and 23% among males, significant difference. Levels of PTSD did not differ according to position (EMT or paramedic) n=293 had troubling memories lasting 1 month or more.
Effect size	<ul style="list-style-type: none"> • PDS scores independently associated with stress resulting from organizational factors ($t=2.821$, $p=.006$), frequency of potentially traumatic incidents ($t=3.408$, $p=.001$), length of services ($t=2.767$, $p=.007$) and dissociation at time of traumatic event ($t=2.529$, $p=.013$). • 48% of PDS scores accounted for by organizational factors, frequency of traumatic incidents, length of service and dissociation at time of event ($R^2=.482$). • Logistic regression predicting PTSD "case" versus "no case" found the only significant predictor of caseness was the measure of the degree of stress experienced as a result of organizational factor scores (O.R. = 1.095)
Source of funding	

Key findings	<ul style="list-style-type: none"> • Overall prevalence for PTSD was 22% • No difference in PTSD according to grade of ambulance worker, but significant differences between gender, with more men meeting the PTSD criteria. • Predictors of severity of PTSD were frequency of incident-related stress, length of service, dissociation at the time of the traumatic event and organizational stress. • Organizational stress was the only significant predictor of PTSD in logistic regression.
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Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	617(1029)
If self-selected sample: survey response rate?	60%
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N Used logistic regression and correlations

Bibliographic citation	PTSD onset and course following the World Trade Center disaster: Findings and implications for future research. JA Boscarino, RE Adams. 2009 Social Psychiatry and Psychiatric Epidemiology. 2009 44(10) 887-898
Country	US
Study type	Prospective cohort study
Evidence level	II
Number of patients	2368 baseline 1681 follow up interviews
Patient characteristics	Persons living in New York exposed to WTC disaster. Population sample recruited from telephone by random digit dialling, sample stratified by NY Borough and gender. English and Spanish speaking
Length of follow up	Conducted baseline interviews one year after WTC event, Oct-Dec 2002 Repeat interview at 12 months
Outcome measures	Telephone administered PTSD questions, previously validated Predictor variables: <ol style="list-style-type: none"> 1. Demographics (age, gender, married status, race/ethnicity) 2. Stress exposure variables: WTCD exposure, negative life events, previous traumatic events 3. Psychosocial resource variables(social support[4 questions], self esteem[Rosenberg self esteem scale]) 4. History of lifetime depression 5. Peri-event panic attack (y/n), 4 criteria 6. Neurological (handedness and ADD) Descriptive variables: current psychiatric (BSI-18)or depressive symptoms (SCID)
Prevalence	at baseline WTCD PTSD = 3.2% vs. any PTSD = 4.6% at follow-up WTCD PTSD = 3.9% vs. any PTSD = 5.4%.
Key findings	Compared predictor variables in 4 categories Resilient=no PTSD at baseline or follow-up Remitted=PTSD at baseline but not follow-up Delayed= no PTSD at baseline, but PTSD at follow-up Persistent=PTSD at baseline and follow-up Compared to resilient cases, remitted cases were more likely to be female (risk ratio[RR] = 3.85, P<0.001) to have more negative life events (RR = 1.37, P = 0.037) greater lifetime traumatic events (RR = 1.41, P<0.001) pre- WTCD depression (RR = 3.98, P<0.001). Compared to resilient cases, delayed cases were more likely to be Latino (RR = 2.45, P = 0.005), non-native born (RR = 1.86, P = 0.041) have lower self-esteem (RR = 0.77, P<0.001) more negative life events (RR = 1.97, P\0.001)

	<p>greater lifetime traumas (RR = 1.22, P = 0.003) and to have mixed handedness (RR = 2.46, P = 0.028).</p> <p>Compared to resilient cases, persistent cases were more likely to female (RR = 2.80, P = 0.031) Latino (RR = 2.54, P = 0.033) non-native born (RR = 2.73, P = 0.026) to have lower self-esteem (RR = 0.75, P<0.001) greater negative life events (RR = 2.20, P<0.001) greater WTCD exposure (RR = 1.70, P = 0.001) greater lifetime trauma exposure (RR = 1.40, P<0.001) mixed handedness (RR = 4.63, P = 0.012) and to have a history of pre-WTCD depression (RR = 4.08, P = 0.003).</p> <p>factors present in persistent but not remitted cases = lower self esteem, greater WTC exposure</p> <p>PTSD onset and course following a defined, time-limited event, such as the WTCD, represent complex phenomena that include both psychosocial and environmental factors, both related and unrelated to the indexed traumatic event, as well as preexisting vulnerabilities.</p>
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Representative sample:	Yes,
participants were selected as consecutive or random cases random and representative of NYC population (census data)	
How many of the people asked to participate actually did so?	Baseline cooperation 63%
If self-selected sample: survey response rate?	Follow up survey completion= 71%
Assessment of exposure: reliable and valid measure	yes
Exposure level or prognostic factor measured more than once?	yes
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Not addressed. unlikely, as all in same telephone interview.
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	

BSI-18 = Brief Symptom Inventory 18

Bibliographic citation	Boscarino, J. A., R. E. Adams, et al. (2006). "A Propensity Score Analysis of Brief Worksite Crisis Interventions after the World Trade Center Disaster: Implications for Intervention and Research." <i>Medical Care</i> 44(5): 454-462.
Country	USA
Study type	Population based observational study
Evidence level	III-2
Number of patients	N=1121 N=150 Brief worksite intervention group; n=971 non-intervention group
Patient characteristics	Residents of NYC living there at the time of WTC attack Employed, well educated (>50% had a college degree)
Intervention	Assessed whether people had attended brief sessions organised through their work. Those who attended 4+ sessions were excluded from analysis. Differences in baseline demographics (more females, higher income, higher education). White-collar companies nearer the disaster site were more likely to provide intervention services for employees. Content of interventions: Educated about stress symptoms 63.7 % Talked about experiences 62.9 % Taught to cope with things 65.1 % Taught to think positively 64.1 % Taught to evaluate thoughts 57.7 % Taught to deal with emotions 69.1 % Taught to relax 65.9 %
Comparison	
Length of follow up	1 year(intervention details) and 2 years (outcomes) after WTC disaster
Outcome measures	1. Depression and anxiety: BSI-18 2. CAGE criteria for alcohol consumption 3. Measured 17 PTSD item symptom severity in past 30 days at 1 year follow-up
Prevalence	
Effect size	Intervention and non-intervention groups matched (1:5) <ul style="list-style-type: none"> • PTSD symptom severity in past month - %mean intervention effect (SE)= -0.8 (0.327) p<.05 • Symptoms in the last month mean intervention effect (SE) =-1.7 (0.778), p<.05 • No significant differences for PTSD in past year, and very small effect on symptoms. But much greater effects on reducing depression(7.2%) alcohol dependence (4.8%) and binge drinking(5.5%) in the previous 1 year
Source of funding	National Institute of Mental Health

Key findings	<ul style="list-style-type: none"> Workers with employers that offered brief interventions had less severe PTSD symptoms, but no difference in prevalence of PTSD in the past year. 1 to 3 brief worksite session was associated with positive outcomes up to 2 years after WTCD, although changes in relation to PTSD were small. Approximately 7% reported receiving brief crisis interventions at worksites after WTCD event.
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Representative sample: participants were selected as consecutive or random cases random and representative of NYC population (census data)	Non random
How many of the people asked to participate actually did so?	Baseline cooperation 63%, reinterview rate 71%.
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	yes
Exposure level or prognostic factor measured more than once?	yes
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	N
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors. Population based observational study, thus used propensity score method to control for selection bias (relating to the characteristics making provision of this intervention more likely, ie age, gender, marital status, level of education, household income, race/ethnicity, immigrant status, language spoken, borough of residence, exposure to WTCD events, history of mental health treatment, history of depression, and having experiences a peri-event panic (PEP) attack during the WTCD)	Yes

Bibliographic citation	Bryant, R., Guthrie, R. Maladaptive Appraisals as a Risk Factor for Posttraumatic Stress. (2005) <i>Psychological Science</i> ; 16(10) p.749-753
Country	Australia
Study type	Primary follow-up study
Evidence level	
Number of patients	82 males initially recruited, 68 available at follow-up assessment.
Patient characteristics	Male recruits to the NSW Fire Brigade.
Intervention	n/a
Comparison	n/a
Length of follow up	Participants were initially evaluated whilst undertaking class-based instructions before they had begun active duties. Time Two: Follow-up within 6 months of commencement of active fire-fighting duties.
Outcome measures	Initial Assessment: <ol style="list-style-type: none"> 1. Structured clinical interview for DSM-IV (SCID-IV) 2. Traumatic Event Questionnaire (TEQ) 3. Clinician Administered PTSD Scale (CAPS) 4. Beck Depression Inventory (BDI-II) 5. Posttraumatic Cognitions Inventory (PTCI) Time 2: Subject's trauma exposure was monitored on a weekly basis via Fire brigade's emergency-calls database. Readministered SCID-IV, BDI-II and CAPS.
Prevalence	<ul style="list-style-type: none"> • No participant met criteria for PTSD at Time 1 or 2 Time 2: Mean CAPS score =2.04; mean BDI score =1.96
Effect size	<ul style="list-style-type: none"> • CAPS score at time 2 was significantly correlated with PTCI scores (.52, $p < .001$) • In a stepwise multiple regression analysis, significant predictor of subsequent PTSS was pre-trauma PTCI-Self score accounting for 24% of variance $R^2 = .24$, $b = .51$, $SE = 0.69$, $t(37) = 3.60$, $p < .001$.
Source of funding	National Health and Medical Research Council Program
Key findings	<ul style="list-style-type: none"> • Major predictor of PTSS was the extent to which fire-fighters engaged in catastrophic thinking prior to trauma exposure – specifically maladaptive appraisals about themselves.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	Not specified
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	Y
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	N
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y

Bibliographic citation	Cothereau, C., C. de Beaurepaire, et al. (2004). "Professional and medical outcomes for French train drivers after "person under train" accidents: three year follow up study." <i>Occupational and Environmental Medicine</i> 61(6): 488-494.
Country	France
Study type	Prospective study with matched non-exposed control group. Study took place from May 1996 to September 2000.
Evidence level	
Number of patients	n=388; 202 exposed and 186 non-exposed
Patient characteristics	Male train drivers employed on French railway network
Intervention	n/a
Comparison	
Length of follow up	Exposure group was evaluated immediately after incident, three months later then 1, 2 and 3 years later.
Outcome measures	<ol style="list-style-type: none"> 1. General Health Questionnaire (GHQ-28) 2. MINI interview – administered by occupational physician. Criteria correspond to Axis I of DSM IV, including PTSD. 3. Somatic Health – clinical examination 4. Occupational fitness – completed via medical interview 5. Vulnerability factors – two scales
Prevalence	Post-traumatic stress related symptoms were more frequent in exposed group (4%) compared to non-exposed (0%) p=.0001 Prevalence of PTSD decreased from 4% in first assessment to 1.6% 3 months later, 0.6% in the first and second year after and 0% three years later.
Key findings	<ul style="list-style-type: none"> • 4% of exposed drivers displayed symptoms of PTSD in the first assessment but none demonstrated symptoms at the 3 year follow-up.

Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	89% (7% refused, 4% did not meet criteria)
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	Y
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	N
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N

Bibliographic citation	Davidson, A., Moss, S. Examining the Trauma Disclosure of Police Officers to Their Partners and Officers' Subsequent Adjustment. <i>Journal of Language and Social Psychology</i> 2008, 27, p.51
Country	Australia
Study type	Self-questionnaire sent to both officer and his or her partner
Evidence level	
Number of patients	102 questionnaires returned for officer-spouse couple.
Patient characteristics	Police officers in Victoria police who were married or unmarried couples living in martial type of relationship
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. Posttraumatic Stress Disorder Checklist (PCL) 2. General Health Questionnaire (GHQ-28) 3. Trauma Exposure - Questionnaire gauging level and frequency of exposure to each of the 17 critical incident types 4. Traumatic Event Disclosure Scale – developed by study to assess partner's perception of the officer's disclosure of a work-related traumatic event.
Prevalence	n/a
Effect size	<ul style="list-style-type: none"> • 84.5% police officers discussed event with spouse • Inhibition and negative emotional disclosure correlated positively with overall PTSD symptom severity and scores for its component symptom clusters (re-experiencing, avoidance or numbing, hyperarousal) <p>Regression analysis:</p> <ul style="list-style-type: none"> • Inhibition and negative emotional disclosure positively associated with PTSD severity $\beta=.28$, $t(5,62)=2.34$, $p=.02$ and $\beta=.4$, $t(5,62)=2.36$, $p=.02$ respectively. <p>Role of disclosure on PTSD</p> <ul style="list-style-type: none"> • Inhibition was positively related to re-experiencing ($B=.29$, $t(5,62)=2.31$, $p=.02$) and avoidance or numbing ($B=.27$, $t(5,62)=2.32$, $p=.02$) and hyperarousal ($B=.39$, $t(5,62)=2.16$, $p=.03$)
Source of funding	
Key findings	<ul style="list-style-type: none"> • Inhibition and negative emotional disclosure correlated with PTSD, these associations persisted even after other disclosure characteristics were controlled in regression analysis. Therefore, officers who did not discuss their trauma experience with their spouse experienced more psychological distress and traumatic stress. • Positive emotional disclosure however, did not correlate with psychological measures

Representative sample: participants were selected as consecutive or random cases	Y
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	17.3% for both officer and partner
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Multiple regression analysis

Bibliographic citation	Donahue SA, Jackson CT, Shear KM, Felton CJ, Essock SM. Outcomes of enhanced counseling services provided to adults through Project Liberty. Psychiatr Serv. 2006 Sep;57(9):1298-303
Country	US
Study type	Non randomised experimental trial
Evidence level	III-2
Number of patients	153 crisis counselling recipients (214 contacted) 75 enhanced service recipients (119 initially agreed, 102 contacted, 93 did first interview, 75 completed 2 nd interview)
Intervention	Enhanced services, NYOMH identified 17 agencies that documented their capacity to provide brief, evidence-based, trauma-focused interventions using licensed mental health professionals with experience in treating PTSD and depression.
Comparison	
Length of follow up	Interviews Crisis counselling 18 mths after attacks Enhanced services 24 months after attacks. 2 nd interview varied in between interview timing
Outcome measures	Experiences during attacks Reasons for contacting project Liberty background demographic characteristics extent of symptomatic and functional impairment, interventions received. PTSD and depressive symptomatology, mapped to DSM-IV criteria Complicated grief Daily functioning (4 point scale in 5 categories)
Key findings	Compared with cc group at 1st interview, <ul style="list-style-type: none"> • Sig greater proportions in the enhanced services group had reported knowing someone who was killed in the attacks • Losing their job after the attacks • Being involved in rescue efforts <p>Compared with cc group at 1st interview, enhanced services clients had reported significantly more symptoms of depression, grief, and traumatic stress and significantly poorer daily functioning in five life areas. PTSD incidence in enhanced services group = 36%</p> <p>The number of PTSD symptoms was reduced (second interview, mean=5.1±4.7; first interview, mean=6.1±5.0; z=-1.82, p=.07) but this did not reach significance. Had better results in reducing symptoms of depression, complicated grief and functioning.</p> <p>findings suggest that the screening tool used by Project Liberty crisis counselors was accurate in identifying individuals who needed additional treatment.</p>

Representative sample: participants were selected as consecutive or random cases	no
How many of the people asked to participate actually did so?	71% of cc 63% of es
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Yes, mapped to DSM-IV
Exposure level or prognostic factor measured more than once?	Yes, but inconsistencies in between-interview time
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Yes, independent assessors
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Not adjusted for potentially confounding factors

Bibliographic citation	Evans, S., I. Patt, et al. (2009). "Disability and posttraumatic stress disorder in disaster relief workers: Responding to September 11, 2001 World Trade Center disaster." <i>Journal of Clinical Psychology</i> 65 (7): 684-694
Country	USA
Study type	Data collected from medical and psychological evaluation program occurred 17-27 months following WTC disaster. Interviews were conducted by several psychologists and intraclass correlations of ratings were high.
Evidence level	
Number of patients	N=842 – participants had participated in a larger study.
Patient characteristics	Utility workers deployed to WTC in immediate aftermath of 9/11. 98% worked directly at the WTC site, with 60% present during the first week.
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	PTSD measures 1. Clinician-Administered PTSD Scale (CAPS) (structured interview) Other measures 4. Sheehan Disability Scale (SDS) (disability in work, social life and family life) 5. Structured Clinical Interview for DSM-IV 6. Trauma History Questionnaire
Prevalence	5.9% met full criteria for PTSD, 5.8% rated as having subsyndromal PTSD.
Effect size	<ul style="list-style-type: none"> On SDS total scale, there were significant differences between no PTSD (2.14), subsyndromal PTSD (8.94) and full PTSD (11.88), $F(2,839) = 138.09$, $p < .001$. Positive correlation between CAPS total and SDS in workers with either subsyndromal or full PTSD ($r = .47$, $p < .001$) Full PTSD & subsyndromal had 50% rate of past trauma compared to 37% in no PTSD PTSD group had higher rates of Major Depressive Disorder (44.4%), Panic Disorder (29.5%) and Generalised Anxiety Disorder (2.4%) than subsyndromal group (20.8%, 6.3% and 6.3% respectively) who had higher levels than no PTSD (12.6%, 4.1% and 2.1% respectively) Significant association between PTSD and a history of trauma (full=54.3%, sub=55.1%, no=36.7%) PTSD severity significantly predicted disability after controlling for past & current psychiatric disability, and trauma history ($R^2 = .388$, $F = 60.28$, $\beta = .03$, $t = 1.12$, $p < .001$)
Source of funding	Psychological evaluations included in annual fitness-for-duty evaluations.

Key findings	<ul style="list-style-type: none"> • Approx 12% had substantial PTSD symptoms. • Symptomatic group had mild levels of social/occupational disability • Individuals with PTSD more likely to have had history of trauma, MDD and PD and were at greater risk for impairment in their social and occupational roles. • PTSD significantly predicted disability after controlling for psychiatric disability and past trauma.
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Note: PD=panic disorder, MDD=Major Depressive Disorder, GAD=generalised anxiety disorder

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	Not specified.
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	N
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y – multiple regression analysis

Bibliographic citation	Heinrichs M, Wagner D, Schoch W, Soravia L, Hellhammer D, Uhlert U. Predicting post-traumatic stress symptoms from pre-traumatic risk factors: A 2-year prospective follow-up study in firefighters. <i>Am J Psychiatry</i> 2005; 162: 2276-86
Country	Germany
Study type	Prospective cohort study.
Evidence level	II
Number of participants	43
Participant characteristics	Professional male firefighters (enrolled during probationary period, mean age=25.6 years SD=3.5 years)
Intervention	n/a
Comparison	n/a
Length of follow up	Participants assessed at baseline (immediately after basic training) and at 6,9,12 and 24 months after entry into firefighter service
Outcome measures	<p><i>Psychological measures</i></p> <p>7. PTSD symptomatology: PTSD symptom scale</p> <p>8. Detects diagnosable mental disorder: The General Health Questionnaire</p> <p>9. Depression: Zung self-rating Depression scale</p> <p>10. Anxiety: State-Trait Anxiety Inventory</p> <p>11. Symptoms of psychopathology: SCL-90-R</p> <p>12. Difficulty in recognising and verbalising emotions: Toronto Alexythmia Scale</p> <p>13. Self efficacy: Inventory on Competence and Control Beliefs</p> <p><i>Endocrine measures</i></p> <p>13.1 Salivary cortisol: high predictive value for development of PTSD</p> <p>13.2 Urinary catecholamines: higher 24 hr excretion in PTSD patients cf controls</p>
Data analysis	Identified baseline variables correlated with PTSD at follow up (and not correlated amongst themselves. Stepwise multiple linear regression with PTSD as independent and baseline factors as dependant variables. Examined differences in the longitudinal course of psychological and biological variables comparing high risk (of PTSD) and low risk (of PTSD, divided at median).
prevalence	At baseline, none met criteria for PTSD. At 24 months, 7 subjects (16.3%) met criteria for PTSD and 8 subjects (18.60 met criteria for subsyndromal PTSD.

Key findings	<p>From stepwise multiple linear regression, a high level of baseline hostility (measured with SCL-90-R) and a low baseline level of self esteem (inventory on competence and control beliefs) predicted PTSD at 24 months in service. Together these factors explained 42% of the variance in PTSD at 24 months.</p> <p>Overall, the firefighters with both risk factors—a high hostility score and a low self-efficacy score—showed a general increase in all psychopathological symptoms assessed during the 2-year period of prospective measurement.</p> <p>It is important to note that the risk factors discovered in male high-risk populations cannot be applied directly to other groups, including the general population, assault and rape victims, victims of accidents, or victims of natural disasters. Because of the low predictive value of salient predictors of PTSD symptoms in prospective studies, such as past psychiatric history, prior trauma, and intrusive, avoidance, and hyperarousal symptoms in the immediate aftermath of the trauma (11, 12, 95), a new vulnerability model that includes pretrauma risk factors, type of trauma, and trauma responses is warranted.</p>
	<p>It is surprising that little attention has been directed toward the role of protective or resilience factors against stress-related psychopathology. For example, individuals with low hostility ratings may be those who have better social coping abilities.</p> <p>Results may indicate that coping skills training (e.g., anger/hostility management, self-efficacy training) could be helpful for primary and secondary prevention in high-risk populations.</p>

Representative sample: participants were selected as consecutive or random cases	Not known
How many of the people asked to participate actually did so?	Not known
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Yes: PTSD questionnaire
Exposure level or prognostic factor measured more than once?	Yes, 5 study time points
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	yes
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	yes

Bibliographic citation	Hogberg, G., M. Pagani, et al. (2007). "On treatment with eye movement desensitization and reprocessing of chronic post-traumatic stress disorder in public transportation workers--A randomized controlled trial." <i>Nordic Journal of Psychiatry</i> 61 (1): 54-61.
Country	Sweden
Study type	Randomised control trial
Evidence level	II
Number of patients	EMDR therapy n=13; Waiting list n=11
Patient characteristics	Employees of Stockholm public transport system working as train drivers, ticket collectors or service staff. Subjects had trauma exposure for more than 3 months but less than 6 years.
Intervention	Experimental group given 5 90-minute sessions over 2 months of eye movement desensitization & reprocessing therapy.
Comparison	Experimental group vs. control wait list group
Length of follow up	2 months
Outcome measures	14. Initial psychiatric diagnosis according to DSM-IV criteria – PTSD, Global Assessment of Functioning and Hamilton Anxiety Scale 15. Impact Event Scale (IES) 16. Beck Anxiety Inventory 17. Social Disability Index 18. World Health Organisation Ten Well-Being Scale (WHO-10) 19. Trauma Antecedent Questionnaire (TAQ) 20. Physiological measurements taken after symptom provocation performed after first interview.
Prevalence	n/a
Effect size	<ul style="list-style-type: none"> 8 (67%) treatment group did not fulfil PTSD criteria after treatment compared to 1 of nine in control (p=0.02) , therefore the null hypothesis that treatment would not influence outcome was negated.
Source of funding	Stockholm Public Transport Authority
Key findings	<ul style="list-style-type: none"> EDMR produced positive outcome for 67% of treatment group – produced short term effects on PTSD symptoms.

Representative sample:	
participants were selected as consecutive or random cases	Y
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	Y

Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Interviewer blind to experimental condition
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N

Bibliographic citation	Jackson C.T. Allen G. Essock S.M. Foster M.J. Lanzara C.B. Felton C.J. Donahue S.A. Clusters of event reactions among recipients of Project Liberty mental health counseling. <i>Psychiatric Services</i> . 57(9)(pp 1271-1276), 2006.
Country	US
Study type	Retrospective cluster analysis of a cohort
Evidence level	IV
Number of patients	Cluster analysis on 465,428 first occasions of crisis counselling service
Patient characteristics	Adults (91%) who lived in NYC (97.5%) 31.2 %t were Caucasian, 30.1 % were African American, 25.3 % were Hispanic 52.9 % were women
Intervention	Crisis counselling recipients. Presence of up to 31 event reactions was noted by the provider. These were examined for clusters by hierarchical cluster analysis
Outcome measures	Event reactions were categorized as behavioral (extreme change in activity level; excessive use of drugs, alcohol, or prescription drugs; isolation or withdrawal; hypervigilance; reluctance to leave home; and violent behavior), emotional (sadness or tearfulness, irritability or anger, feeling anxious or fearful, despair or hopelessness, feeling guilty or shameful, and feeling emotionally numb or disconnected), physical (headaches, stomach problems, difficulty falling or staying asleep, difficulty eating, worsening of chronic health conditions, fatigue or exhaustion, and chronic agitation), and cognitive (inability to accept or cope with the death of a loved one, distressing dreams, intrusive thoughts or images, difficulty concentrating, difficulty remembering things, difficulty making decisions, preoccupation with death, and suicidal thoughts or feelings). Each category also had items labeled other, unknown, and none.
Key findings	<ul style="list-style-type: none"> • The 2 most robust clusters included symptoms that were consistent with the DSM-IV criteria for depression, and PTSD. • The cluster corresponding to PTSD contained eight items, seven of which corresponded to <i>DSM-IV</i> criteria for the disorder: hypervigilance, reluctance to leave home, feeling anxious or fearful, difficulty falling or staying asleep, distressing dreams, intrusive thoughts or images, and preoccupation with death. The final item of the cluster was extreme change in activity level. • Service recipients were divided into groups who exhibited 3 or more event reactions from a cluster. While not diagnostic for PTSD, could be considered subsyndromal PTSD symptomatology. 26% of service recipients met this criteria for the PTSD cluster • People with these event reactions continued to seek services in a steady pattern over the 27 months of Project Liberty services with spikes at 1 and 2 year anniversaries of the attack.
Conclusions	<ul style="list-style-type: none"> • A checklist of event reactions could be used by lay crisis intervention providers. Event reactions clustered into symptoms suggestive of PTSD. • Presentations with clusters of symptoms continued for the 27 months post-attack that this service was offered.

Representative sample: participants were selected as consecutive or random cases	Yes, all contacts included
How many of the people asked to participate actually did so?	Audit of all cases
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Exploratory only
Exposure level or prognostic factor measured more than once?	no
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Not related to outcomes
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Not relevant

Bibliographic citation	Jonsson, A., K. Segesten, et al. (2003). "Post-traumatic stress among Swedish ambulance personnel." <i>Emergency Medicine Journal</i> 20(1): 79-84
Country	Sweden
Study type	Survey
Evidence level	IV
Number of patients	362 ambulance workers
Patient characteristics	Ambulance emergency crew in Sweden, 223 (61.6%) of reported having experienced a traumatic event and 137 reported no experience of a traumatic event.
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<p>PTSD measures:</p> <ol style="list-style-type: none"> 1. Post Traumatic Symptom Scale (PTSS-10) – relates to reactions to a particular event, score of 3 considered as cuff off score, 5 or higher indicates relatively strong reaction <p>Other measures:</p> <ol style="list-style-type: none"> 2. Sense of Coherence Scale (SOC) 3. Impact of Event Scale (IES-15) 4. Participants asked to describe traumatic event they had experienced during work. Events categorised as primary or secondary stress. Primary stress was defined as exposure to trauma where they had a direct relation to the victim, i.e. taking care of a family member or co-worker.
Prevalence	<ul style="list-style-type: none"> • Average score of PTSS-10 was 0.91 (SD 1.82). • For those who reported have experienced a traumatic event, PTSS-10 scores were on average 1.34 (SD=2.14), 26 of whom scored 3 to 4 and 27 scoring 5 or more. Therefore over 15% who reported traumatic event in ambulance service reported symptoms of PTSD. • For those who had not experienced a traumatic event, only two persons scored 3-4 and only one scored over 5.
Effect size	<p>PTSS-10 scores were negatively correlated with:</p> <ul style="list-style-type: none"> • SOC scores ($r=-0.403$, $p=.001$) • physical workload ($r=-0.189$, $p=.001$) • psychological workload ($r=-0.197$, $p=.001$) <p>PTSS-10 scores correlated positively with:</p> <ul style="list-style-type: none"> • IES-15 ($r=1.460$, $p=.001$) <p>Primary versus secondary stress events:</p> <ul style="list-style-type: none"> • Significantly higher scores on PTSS for those who described primary event ($M=2.68$, $SD=2.57$) compared to secondary event ($M=1.19$, $SD=2.04$), $t=1.98$, $p=.05$.

Source of funding	PreHosp projected and Provision Committee Office
Key findings	<ul style="list-style-type: none"> • A lower sense of cohesion (SOC) was related to an increase in PTSS scores, suggesting SOC is important to successfully cope with stressors. • Those who had to deal with a traumatic event involving a victim of direct relation had significantly higher scores of PTSS compared to those who did not know their victim. • Scores for PTSS were significantly higher in those who had experienced a traumatic event compared to those who had not.

Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	N=362 (500)
If self-selected sample: survey response rate?	72.4%
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N – correlational and t-tests

Bibliographic citation	Kerasiotis, B. and R. W. Motta (2004). "Assessment of PTSD symptoms in emergency room, intensive care unit, and general floor nurses." <i>International Journal of Emergency Mental Health</i> 6(3): 121-133.
Country	USA
Study type	Survey
Evidence level	IV: survey
Number of patients	Total 125 nurses; 43 emergency room, 51 intensive care unit, 31 general medicine floor.
Patient characteristics	ER, ICU and general medicine nurses working in a Level 1 Trauma Centre
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<p>PTSD measures:</p> <ol style="list-style-type: none"> 1. Modified Posttraumatic Symptom Scale-Self Report (MPSS-SR) – based on a community and a treatment sample, scale authors developed cutoff scores discriminating between PTSD positive and PTSD negative individuals. <p>Other measures:</p> <ol style="list-style-type: none"> 2. Multidimensional Scale of Perceived Social Support 3. Peritraumatic Dissociative Experience Questionnaire (PDEQ) 4. Beck Anxiety Inventory (BAI) 5. Beck Depression Inventory-II (BDI-II)
Prevalence	Not measured
Effect size	<ul style="list-style-type: none"> • One-way ANOVA showed no significant differences between three groups of nurses for scores on MPSS-SR, (though there was a significant difference between groups on dissociative scores, $F(2,120) = 5.123$, $p=.007$) • There was no significant correlation between MPSS-SR scores and scores on perceived social support • No significant correlation between MPSS-SR and years of experience in the emergency room. • Positive correlation found between Peritraumatic Dissociative Experience Questionnaire and PTSD scores ($r=.60$, $p<.001$) • Depression scores were positively correlated with PTSD scores ($r=.70$, $p<.001$) • Anxiety scores were positively correlated with PTSD, ($r=.60$, $p<.001$)

Key findings	<ul style="list-style-type: none"> • No significant differences on PTSD for nurses in ER, ICU or general medicine. • Scores on PTSD were significantly correlated with dissociative experiences, depression and anxiety but were not associated with perceived social support or number of years experience. • Elevated scores in PDEQ for ER and general medicine nurses in the absence of elevated PTSD scores suggests a tendency to rely on dissociation rather than arousal or active avoidance characteristics seen in PTSD. • The lack of association between PTSD and perceived social support may have been due to the fact that all ER nurses experienced a high level of social support. • The lack of relationship between years of experience at PTSD symptoms may reflect positive effects of social support or that traumatized nurses leave their profession early.
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Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	Not specified
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N – correlational analysis only.

Bibliographic citation	Laposa, J. M., L. E. Alden, et al. (2003). "Work stress and posttraumatic stress disorder in ED nurses/personnel (CE)." <i>Journal of Emergency Nursing</i> 29(1): 23-28
Country	Canada
Study type	Secondary analysis of previously reported data. Primary study looked at prevalence of PTSD in ED personnel. Secondary study interested in associations between workplace stress and PTSD.
Evidence level	IV
Number of patients	n=51
Patient characteristics	ED personnel working in major hospital in British Columbia. Respondents were primarily emergency nurses, aged 23-51 years.
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	PTSD measures: 6. Post-traumatic Diagnostic Scale (PDS) – completed the scale with reference to potentially traumatic work events. Respondents chose a traumatic event that upset them the most. Other scales: 7. Health Professional Stress Inventory (revised version) (HPSI-R) 8. Work related responses to stress or trauma
Prevalence	12% met full criteria for diagnosis of PTSD and 20% met criteria for the 3 symptom clusters.
Effect size	Interpersonal conflict was the only type of stress significantly related to PTSD symptom severity ($r=.36$, $p<.05$)
Source of funding	Social Sciences and Humanities Research Council
Key findings	<ul style="list-style-type: none"> • Study found a relationship between stress caused by interpersonal conflicts at work and greater PTSD symptoms • 88% reported that traumatic event did not affect interactions with co-workers, suggesting conflictual interpersonal environment existed before PTSD symptoms. • The majority of respondents did not attend debriefing program offered by hospital (82%) nor did they feel supported by administration following traumatic incident (67% answered not feeling supported, 25% neutral)

Note: Correlational study, direction of relation between PTSD and interpersonal conflict unclear.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	67% completed, representing approximately 44% of ED staff who had extensive patient contact.
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	N – used repeated measures analysis of variance

Bibliographic citation	Magliaro, J. Evaluating a Comprehensive Employee Assistance Program in the SA Ambulance Service. <i>Submitted for degree of Doctor of Philosophy, University of South Australia.</i>
Country	Australia
Study type	Instrumental case study - Integrates self-report measures and semi-structured interviews, incorporating qualitative and quantitative measures. Evaluates Employee Assistance Programs (EAP) which aims to improve wellness by addressing psychological vulnerability. This program incorporates Critical Incident stress Management (CISM) operating in SAAS.
Evidence level	IV
Number of patients	<i>1600 questionnaires were sent out to SAAS stations. 202 were returned, 82 of which had undertaken peer support intervention.</i> Data was collected from 82 SAAS personnel who had received peer support intervention (26 – pre-incident education; 56 – non pre-incident education) Semi-structured interviews were conducted with 26 of these participants who had received peer support within 3 months prior to completing the questionnaire therefore having access to pre-incident education. Of the 56 respondents in the non pre-incident education group, only 6 completed the wellness section of the questionnaire.
Patient characteristics	South Australia Ambulance Service personnel who had been involved in a peer support intervention program.
Intervention	CISM-based EAP SAAS personnel referred by self-referral or supervisor referral to either Peer Support Officer or to an external Mental Health Professional. The program involved CISM group processes and psychological therapy.
Comparison	n/a
Length of follow up	n/a
Outcome measures	Questionnaire: <ol style="list-style-type: none"> 1. Client Satisfaction Questionnaire (CSQ-8) 2. Depression Anxiety Stress Scale (DASS) – depression scale assesses dysphoria, hopelessness, devaluation of life etc. Anxiety scale – autonomic arousal, physiological effects, situational anxiety. Stress scale – chronic and non-specific stress arousal. Interview: <ol style="list-style-type: none"> 1. What have been your experiences with Peer Support Program? 2. What do you consider are the most important features of EAP? 3. What additional requirements may assist in improving the existing program? Organisational data: <ol style="list-style-type: none"> 1. Used to establish no. of stress claims prior to and since the introduction of the pre-incident education program.
Prevalence	

Effect size	<p>Wellness:</p> <ul style="list-style-type: none"> • Pre-incident education group (n=26) rated wellness within normal range and were not significantly different from non pre-incident education group (n=6). • Tentatively suggests that inclusion of pre-incident education did not have a significant impact on wellness (only small sample available). <p>Themes of the most important features of the program:</p> <ul style="list-style-type: none"> • Positive impact • Confidentiality • Practical coping skills • Organisational culture • Multi-component approach • Ventilating • Pre-incident education <p>Organisational data:</p> <ul style="list-style-type: none"> • The number of workers compensation claims for psychological injury reduced from 11 in 1998-99 to 2 in 2004-05. Note that pre-incident education was introduced in 1999-2000. • Accepted stress claims decreased by 81% since introduction of peer support program. • Accepted stress claims related to primary psychological injury, classified according to DSM-IV diagnostic criteria – acute stress disorder, PTSD and adjustment disorder.
Key findings	<ul style="list-style-type: none"> • Program was effective in mitigating effects of cumulative and traumatic stress. • 81% reduction in accepted stress claims • Wellness was within normal range • Use of pre-incident education had no impact on wellness. • Recipients were largely satisfied with service provider and felt very positive about program, particularly in regard to value they obtained from early intervention. • Program was perceived by recipients to impact on their social and occupational functioning, helping them to understand their stress-related feelings.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	202 from 1600 questionnaires
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	Self-report
Statistical adjustment: multivariate analyses	N

Bibliographic citation	Maguen, S., T. J. Metzler, et al. (2009). "Routine work environment stress and PTSD symptoms in police officers." <i>Journal of Nervous and Mental Disease</i> 197(10): 754-760
Country	USA
Study type	Evaluated participants at baseline while still in training at the police academy, and 12 months after commencement of police training. 82% measured at baseline were interviewed again at 12 months.
Evidence level	IV
Number of patients	N=180 academy recruits enrolled in training classes.
Patient characteristics	Police officers recruited from urban police departments
Intervention	n/a
Comparison	n/a
Length of follow up	12 months; 82% participant interviewed at baseline were also interviewed at 12 months. However, all factors not measured at both time points, so tat the moment this report is of a cross sectional survey
Outcome measures	Demographic info(baseline) PTSD measure: 21. Mississippi Combat Scale – Civilian Version (MCS-CV) (12 months) Other measures: 22. Life Stressor Checklist Revised (LSC-R) baseline 23. Life Experiences Survey (LES) baseline 24. Critical History Questionnaire (CIHQ)baseline 25. Work Environment Inventory (WEI) (12 months)
Prevalence	Mean score of MCS-CV was 61 (range 36-100)
Effect size	<ul style="list-style-type: none"> • Proposed model accounted for 33% of variance in PTSD symptoms. Direct effects listed below: Direct effect on PTSD symptoms: <ul style="list-style-type: none"> • ethnicity ($B=-0.20$, $t=-3.25$, $p<.001$), • negative life events in the past 12 months ($B=0.19$, $t=2.94$, $p<.001$), • critical incident exposure ($B=0.15$, $t=2.33$, $p<0.05$) • work environment ($B=0.36$, $t=5.79$, $p<.01$). Significant correlations between factors and PTSD symptoms ($p<.05$): <ul style="list-style-type: none"> • Ethnicity (-.19), • prior trauma (.20) • negative life events (.33) • Critical incident exposure (.28) • work environment (.45)

Key findings	<ul style="list-style-type: none"> • In the specified model, work environment had the strongest association with PTSD symptoms above and beyond the effects of duty-related critical incidents and negative life events. • Work environment stressors such as equipment not working, daily operational hassles, being unclear about work roles, stressful relationships with coworkers and feelings of discrimination have a direct impact on PTSD symptoms. • Work environment mediated relationship between critical incident exposure and PTSD symptoms. • Ethnicity, negative life events and critical incident exposure had direct effects on PTSD symptoms. • Prior trauma history was not significantly related PTSD or work environment – highlights the importance of instead controlling variables such as work environment.
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Note: Correlational study, therefore unclear as to whether work environment was a causal factor in PTSD symptoms or whether the existence of PTSD symptoms influenced the work environment.

Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	180 from 5855
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	Y
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Used a just-identified path analysis model

Bibliographic citation	Marmar, C. R., S. E. McCaslin, et al. Predictors of Posttraumatic Stress in Police and Other First Responders. <i>Psychobiology of posttraumatic stress disorders: A decade of progress</i> (2006). Vol. 1071
Country	USA
Study type	Study 1. Cross sectional evaluation Study 1a. Multivariate model of study 1 group
Evidence level	
Number of patients	Study 1. 747 police officers & 301 peer matched controls Study 1a. 635 (due to missing cases)
Patient characteristics	NY police officers compared to peer matched controls not working in law enforcement or first responder professions
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ul style="list-style-type: none"> • Self report measures of duty-related critical incidents (CI), peritraumatic dissociation, PTSD symptoms. • Peritraumatic Distress Inventory (PDI) – correlates strongly with PTSD symptoms and described by authors as “promising measure of PTSD criterion A2 • Work Environment Inventory (WEI) – assesses work environment stress • Critical incident history questionnaire (CIHQ) • Peritraumatic Dissociative Experience Questionnaire (PDEQ)
Prevalence	n/a
Effect size	<ul style="list-style-type: none"> • Routine occupational stress significantly predicted general psychological distress ($r=0.46$) and three post-traumatic stress symptom (PTSS) cluster scores ($r=0.26$) • Found no gender differences in PTSD symptoms • PTSS significantly related to self-reported somatic symptoms (headaches, dizziness etc) $R^2=0.18$, $P=0.001$ <p>Multivariate model accounted for 39.7% variance of PTSD symptoms</p> <ul style="list-style-type: none"> • Greater peritraumatic distress, greater peritraumatic dissociation, greater problem-solving coping, greater routine work environment stress and lower levels of social support accounted for greater PTSD symptoms. • Ethnicity, duty and non-duty related traumatic exposure, escape-avoidant coping were not significant.
Source of funding	National Institute of Mental Health
Key findings	<ul style="list-style-type: none"> • Peritraumatic reactivity plays a significant role in development of PTSD symptoms • Post-incident recovery environment plays important role – lower social support and greater routine work environment stress are associated with greater PTSD symptoms.

	<ul style="list-style-type: none"> • Females not significantly at risk compared to males • Greater positive planful coping is positively associated with PTSD symptoms.
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Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	
Assessment of exposure: reliable and valid measure	N – no specific mention of PTSD measurement tools used.
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	N
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y

Bibliographic citation	Mealer, M., E. L. Burnham, et al. (2009). "THE PREVALENCE AND IMPACT OF POST TRAUMATIC STRESS DISORDER AND BURNOUT SYNDROME IN NURSES." <i>Depression and Anxiety</i> 26(12): 1118-1126
Country	USA
Study type	Anonymous survey
Evidence level	Level IV
Number of patients	98 ICU nurses, 74 high-stress non-ICU, 118 inpatient non-ICU, 42 outpatient (n=332 from 810 questionnaires distributed)
Patient characteristics	Tertiary care level II trauma nurses divided into 4 pre-defined categories: ICU, inpatient non-ICU in high stress areas, other inpatient non-ICU, outpatient nurses
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. Hospital Anxiety & Depression Scale (HADS) 2. Post Traumatic Stress Syndrome-10 (PTSS-10) 3. Posttraumatic Diagnostic Scale (PDS) 4. Maslach Burnout Inventory (MBI)
Prevalence	<p>22% nurses were positive for symptoms of PTSD (based on PTSS-10) 18% met diagnostic criteria for PTSD (based on PDS) Overall, 61% with diagnosis of PTSD had symptoms greater than 6 months, 26% symptoms 1-3 months and 13% less than a month.</p> <p>Outpatient nurses had significantly lower PTSD diagnosis (5%) compared to other three sub-groups of inpatient nurses combined (20%) Overall 98% of nurses who fulfilled diagnostic criteria for PTSD were also positive for at least one of the three types of BOS.</p>
Effect size	<ul style="list-style-type: none"> • Age, years of practice and how often a nurse is the charge nurse was significant in a univariate analysis but not in multivariate analysis. • Significant differences in age for i) nurses with both BOS & PTSD (34.4+/-8.2 years) ,ii) those with BOS alone (37.4+/-10.2 years) and iii) those with neither BOS nor PTSD (46.2+/-11.9 years) P<.0001. <i>Younger nurses more likely to have BOS & PTSD.</i> • Significant differences in years of employment as a nurse, i) both BOS & PTSD (8.0+/-7.9 years), ii) BOS alone (11.7+/-9.3 years) and iii) neither BOS nor PTSD (19.6+/-12.5 years), P<.0001. <i>Nurses with greater number of years working are less likely to have BOS or PTSD.</i> • ICU nurses who had nightmares were more likely to have nightmares related to end of life issues (56%) compared to non-ICU (31%), P=.008.
Source of funding	NIH

Key findings	<ul style="list-style-type: none"> • Nurses who work in outpatient setting are less likely to have a diagnosis of PTSD compared to inpatient. • Majority of nurses who meet the diagnostic criteria for PTSD have symptoms of BOS. • Nurses with both PTSD & BOS worked on average 11.6 fewer years as a nurse compared to those without PTSD or BOS. • ICU nurses were significantly more likely to have nightmares related to involvement with end of life issues compared to non-ICU nurses suffering from nightmares.
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Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	332 (810)
If self-selected sample: survey response rate?	41%
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Conducted uni- and multivariate, only sig. in univariate.

Bibliographic citation	Mealer, M. L., A. Shelton, et al. (2007). "Increased prevalence of post-traumatic stress disorder symptoms in critical care nurses." <i>American Journal of Respiratory & Critical Care Medicine</i> 175(7): 693-697.
Country	USA
Study type	<ol style="list-style-type: none"> 1. 10 minute self completed Survey to ICU cohort and general medical/surgical ward cohort 2. 10 minute self completed Survey to members of American Association of Critical Care Nurses(AACCN): option for investigators to contact them for interview 3. 20 minute interview in symptomatic subgroup of (2)
Evidence level	IV: survey
Number of patients	Survey 1: 230 ICU nurses, 121 general nurses (n=351) Survey 2: 140 members AACCN Interview questionnaire 2: 18 ICU nurses (self selected)
Patient characteristics	Nurses, ICU vs general wards
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. Post traumatic Stress Syndrome 10 question inventory (PTSS-10) Hospital Anxiety and Depression Scale (HADS) 2. Post traumatic Stress Syndrome 10 question inventory (PTSS-10) Hospital Anxiety and Depression Scale (HADS) 3. Post Traumatic Stress Disorder Diagnostic Scale
prevalence	Survey 1: 24% of ICU nurses and 14% of general nurses positive for PTSD symptomatology (NOT diagnosis) Survey 2: 29% of respondents positive for PTSD symptomatology
Effect size	<p>being an ICU nurse was the only variable that remained significantly associated with positive symptoms of PTSD ($p = 0.02$, OR = 1.45, 95% CI = 1.24-1.72). No difference in incidence of anxiety/depression or both in ICU vs general nurses.</p> <p>(amongst ICU nurses from first sample) working on the evening/night shift was the only variable that remained significantly associated with having symptoms of PTSD ($p = 0.026$, OR = 1.47, 95% CI = 1.23-1.71).</p>
Source of funding	Emory University School of Medicine
Key finding	<ul style="list-style-type: none"> • ICU nurses more likely to have PTSD symptomatology than general nurses • Amongst ICU nurses, working night/evening shift more likely to be associated with PTSD symptomatology

"We used the PTSS-10 and HADS questionnaires to identify psychological disorders in critical care nurses. Though both of these questionnaires have excellent internal validity and reliability they do not definitively diagnose individuals with the DSM-IV criteria for PTSD or depression."

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	Not specified
If self-selected sample: survey response rate?	Not specified
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report, but questionnaire did not include terms such as PTSD, anxiety or depression.
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y

Bibliographic citation	Pyevich, C. M., E. Newman, et al. (2003). "The Relationship Among Cognitive Schemas, Job-Related Traumatic Exposure, and Posttraumatic Stress Disorder in Journalists." <i>Journal of Traumatic Stress</i> 16(4): 325-328.
Country	USA
Study type	Survey
Evidence level	IV
Number of patients	866 respondents from 3713 journalists contacted.
Patient characteristics	Journalists identified from websites of U.S. daily newspapers. 49.5% females, mean age 35.91 years and average of 11.5 years of work experience.
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. Journalist Trauma Exposure Scale 2. Stressor Survey 3. PTSD Checklist (PCL) – cutoff score of 44 4. Negative Cognitions About the World (NCW) 5. Optimism for Future Life Events (OFLE) 6. World Assumptions Scale
Prevalence	Mean work-related PCL score was 24.74. 4.3% had a work-related PTSD diagnosis (score above 44) even though 96% of participants had been exposed to traumatic event (exposure to death or injury)
Effect size	<p>Hierarchical Regression analysis:</p> <ul style="list-style-type: none"> • Work exposure was significantly related to PCL after controlling for personal exposure. $B=3.63$, $SE=.38$, $\beta=.33$ ($p<.001$) • Cognitive beliefs were significantly related to PCL $B=4.02$, $SE=.39$, $\beta=.33$ ($p<.001$) • Overall work exposure, personal exposure and cognitive beliefs accounted for 25% of PCL variance ($R^2=.25$) <p>Significant indirect effect of Work exposure on PCL via Cognitive Beliefs (test ratio=3.35, $p001$) with 12% of the effect of Work exposure on PCL mediated by cognitive beliefs.</p>
Source of funding	Partial funding from DART Centre for Journalism and Trauma
Key findings	<ul style="list-style-type: none"> • Work-related exposure to traumatic events and cognitive beliefs were associated with PTSD • Negative cognitive assumptions were not major generative pathway for trauma exposure to be associated with PTSD.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	N=906 (3,713)
If self-selected sample: survey response rate?	24.4%
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y – hierarchical regression analysis

Bibliographic citation	Regel S. Post-trauma support in the workplace: The current status and practice of critical incident stress management (CISM) and psychological debriefing (PD) within organizations in the UK. (2007) <i>Occupational Medicine</i> . 57(6)(pp 411-416)
Country	UK
Study type	Narrative review
Evidence level	Secondary summary of previous literature and reviews
Number of studies/ patients	n/a
Patient characteristics	n/a
Search methodology	Not specifically discussed.
Clear study inclusion/exclusion criteria?	No
Assessment of study quality?	n/a
Are results combined in meta-analysis?	No
Key findings	<ul style="list-style-type: none"> • Organizations in UK use Critical Incident Stress Management (CISM) and Psychological Debriefing (PD) – London’s metropolitan police and other police forces in UK used a PD model, also known as three stage model (facts, feelings, future) • Current trend is to re-train peer support teams in PD using Dyregrov’s approach – which is defined as “a group meeting arranged for the purposes of integrating profound personal experiences both on cognitive, emotional and group level preventing the development of adverse reactions”. • CISM similar to TRiM (trauma risk management) used by British Royal Marines – described as post-traumatic management strategy based on peer group assessment for hierarchical organisations. This model is based on three stage model of PD and elements of CISM. • This model used by UK police force though it avoids the excessive exploration of emotions or enforced catharsis which occurs in PD (which the Cochrane review suggests is in part responsible for the worsening of symptoms) • However evidence suggests that worsening of symptoms may be due to inappropriateness of application of model and lack of training in PD. • Another criticism for PD is the compulsory nature in organisations – however, this is inaccurate – offered in public sector as voluntary involvement. • 2002 British Psychological Society (BPS) reported on PD – found existing research to be flawed and that to be successful, PD had to be undertaken by competent practitioners within an appropriate context and setting. The provision of PD was viewed as a community support and cohesion strategy rather than a treatment intervention to prevent PTSD.

	<ul style="list-style-type: none">• 2005 – NICE guidelines on Management of PTSD review: found that no trial of CISM or CISM met methodological inclusion criteria, therefore there is a lack of evidence of practice in these situations. The literature on PD do include many RCT however these were deemed detached from clinical reality, losing validity.• Guidelines do not recommend systematic brief single-session interventions focused on a traumatic incident. Do recommend providing general practical and social support and guidance.• Many major international humanitarian aid agencies (International Federation of Red Cross and Red Crescent Societies and United Nations High Commissioner for Refugees) use PD.
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Bibliographic citation	Sharpley, J. G., N. T. Fear, et al. (2008). "Pre-deployment stress briefing: Does it have an effect?" <i>Occupational Medicine</i> 58(1): 30-34
Country	UK
Study type	Controlled non-randomized parallel study. Questionnaires were given post-deployment in Iraq War (deployment phase defined as between 18 th Jan 03 to 28 April 03).
Evidence level	
Number of patients	279 personnel in the attendees group and 456 in the comparison group
Patient characteristics	Service personnel deployed during the Iraq War. <ul style="list-style-type: none"> • Personnel in attendees group attended stress briefs in preparation for deployment. Army and Royal Air Force personnel excluded. • Comparison group were personnel deployed during same period but were not given briefing due to various operational reasons (reasons not specified in article).
Intervention	Brief given in preparation phase leading up to deployment and given by psychiatrist or mental health nurse. Brief covered role of mental health team, outline of medical facilities in Primary Casualty Receiving Facility, definitions of stress, pressure and strain, types of stressors, effects of stress on individuals, advice on handling of human remains, managing stressful thinking, simple advice on reducing stress, the importance of morale, levels of support available and when/where to seek this.
Comparison	
Length of follow up	Outcomes measured in post-deployment questionnaire – measured about 2-3 years post-operational deployment.
Outcome measures	<ol style="list-style-type: none"> 1. Exposure to traumatic events while on deployment 2. SF-36 scale 3. General Health Questionnaire 4. PTSD Checklist – Civilian version
Prevalence	Attendees 2% PTSD symptoms Non-attendees 4% - not significantly different.
Effect size	Significant differences between attendees and non-attendees – attendees younger ($p < .05$), more likely to be marines ($p < .001$) and had more traumatic experiences in theatres ($p < .001$). There were no significant differences between attendees and non-attendees for PTSD symptoms.
Source of funding	UK Ministry of Defence
Key findings	<ul style="list-style-type: none"> • No significant difference between attendees and non-attendees in terms of common mental health disorders, post-traumatic stress disorder or alcohol misuse.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	62% of personnel deployed responded.
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y – multivariate logistic regression examined relationship between attendees & non.

Bibliographic citation	Sondergaard, H. P. (2008). "The work environment, critical incidents, debriefing and psychological functioning - A study of trade union members in Sweden." <i>Scandinavian Journal of Work, Environment and Health, Supplement 6: 111-116.</i>
Country	Sweden
Study type	<ol style="list-style-type: none"> 1. Cross sectional Survey of Swedish trade union members 2. Retrospective survey of persons referred for psychological support after a robbery
Evidence level	IV
Number of patients	<p>1.N=1730 from 5000 questionnaires distributed</p> <p>2.N=148 from 200 surveys distributed</p>
Patient characteristics	Among the respondents, 13.7% were men and 86.3% were women. The mean age of the men and women was 43 (SD 11) years and 45.5 (SD 11.5) years, respectively.
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 26. PTSD Checklist-Civilian Version 27. Life Event Checklist 28. Hopkins symptom checklist for anxiety & depression 29. Positive states of mind (PSOM) 30. Questions on work environment and physical health, social support at work, decision authority at work
Prevalence	12 of 216 men (5.6%) and 102 of 1361 (7.5%) women reported exposure to robbery in the workplace.
Effect size	<ul style="list-style-type: none"> • PTSD among workers who had experienced a robbery: OR=3.27 (CI .64-16.8) for men and OR=2.15 (CI 1.24-3.72) for women • Those above the cutoff for PTSD reported higher number of potentially traumatic events (non-PTSD 1.60, PTSD 3.55, P=0.000). • Workers exposed to robbery and were debriefed did not differ in PTSD symptoms. • There were significant differences for those with PTSD in ratings of general work environment (M=25.8, SD=4.48) compared to non-PTSD (M=27.5, SD=2.5) t=2.265, p=0.026 and in social support in the workplace PTSD:(M=6.3, SD=2.92), non-PTSD: (M=8.1, SD=2.8) t=2.367, p=.02. • No significant differences in influence or balance between demand and control.
Source of funding	

Key findings	<ul style="list-style-type: none"> • Greater chance of PTSD after robbery • People with PTSD rate their work environment as poorer with regard to general negative factors and perceive lower social support. <p>May be related to isolation and withdrawal with PTSD.</p> <ul style="list-style-type: none"> • Even workers who did not report robberies but had scores above the cutoff for PTSD reported poor social support and a poor general environment. • Debriefing after incident did not significantly affect PTSD scores. Debriefed group did have significantly greater self-rated psychological function, and lower depression
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Representative sample:	
participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	28.8% (1730 from 5000)
Low response rate and not known how responders compared with non-responders	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment.	n/a
NB: note if self-reported assessment of exposure or prognostic factors	self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Not well described, but this appears to have been done.

Bibliographic citation	Stephens, C. and N. Long (2000). "Communication with police supervisors and peers as a buffer of work-related traumatic stress." <i>Journal of Organizational Behavior</i> 21(4): 407-424.
Country	New Zealand
Study type	Survey
Evidence level	IV
Number of patients	N=572
Patient characteristics	New Zealand police officers
Intervention	n/a
Comparison	n/a
Length of follow up	n/a
measures	<p>31. Psychological symptoms: Civilian Mississippi PTSD scale</p> <p>32. Physical symptoms: Pennebaker Inventory of Limbic Languidness (PILL): physical symptoms</p> <p>33. Traumatic events: Traumatic stress schedule: number of incidences of stressful events <i>compared with</i> <i>Measures of social support</i></p> <ol style="list-style-type: none"> Adapted Content of Communication (Beehr et al 1990): 4 subscales: non-job communications, negative communications, positive communications and <i>communications about disturbing experiences</i> (new: developed and factor analysed by authors) Ease of talking about trauma (How easy is it to talk about traumatic experiences in the workplace?)
Prevalence	
Effect size	<ul style="list-style-type: none"> Ease of talking about trauma ($\beta=.22$), peer disturbing communication ($\beta=-0.31$), peer positive communication ($\beta=-0.16$), supervisor non-job communication ($\beta=-0.11$) and supervisor negative communication ($\beta=0.11$) were significantly related to PTSD in a regression analysis Moderate levels of peer negative communication and high and low levels of supervisor negative communications were related to a weaker relationship between trauma and PTSD* <p>In hierarchical regression: Traumatic stress schedule accounted for 8% of the variance in Civilian Mississippi PTSD scale, and communication variables explained a further 19% of the variance in PTSD scores</p> <p>"The ease of talking about trauma at work, communications with peers about disturbing events, positive communications with peers about work, non-work and negative communications with the supervisor were the important aspects of communication in direct relation to PTSD symptoms."</p>

	<p>Talk about distressing experiences will ameliorate the health effects of trauma by contributing to the cognitive processing of that experience, but only up to a point. Moderate levels of talk may be beneficial, but at high levels of such talk, the trauma- strainrelationship is again stronger.</p> <p>Positive work related communication with peers showed a more straightforward positive effect on PTSD symptoms and a buffering effect on the trauma-strain relationship.</p>
Source of funding	
Key findings	<ul style="list-style-type: none"> • Various types of communication at work account for significant amount of variance in PTSD symptoms. • Ease of talking about the trauma was related to PTSD symptoms. • Communication patterns with peers and supervisors also influenced the relation between trauma and PTSD. <p>Communications with others have been demonstrated to be not straightforwardly supportive</p> <p>The demonstrated importance of communications with peers and the provision of a balance between the beneficial effects of talk about distressing experiences and the harmful effects that these communications may have, supports the development of interventions such as peer-support programmes</p>

Representative sample:	
participants were selected as consecutive or random cases	Y/N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	52%
Representative (in terms of age, length of service, rank of whole population)	
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment	
assessor unaware of prognostic factors at the time of outcome assessment.	n/a
NB: note if self-reported assessment of exposure or prognostic factors	Self report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y

Bibliographic citation	Weiniger, C. R., A. Y. Shalev, et al. (2006). "Posttraumatic stress disorder among hospital surgical physicians exposed to victims of terror: A prospective, controlled questionnaire survey." <i>Journal of Clinical Psychiatry</i> 67(6): 890-896
Country	Israel
Study type	Non-randomised control versus study group - survey
Evidence level	III-2
Number of patients	Control group: n=110; study group n=102
Patient characteristics	Physicians who work in Hadassah Medical Organization hospitals in Jerusalem. Participants were prospectively assigned to study and control groups based on assessment of degree of involvement in treatment of victims of terror. Study group were physicians who regularly treated victims of terror and the control group did not. Study group were significantly more exposed to victims of terror compared to control.
Intervention	n/a
Comparison	
Length of follow up	n/a
Outcome measures	<ol style="list-style-type: none"> 1. PTSD Symptom Scale – Self Report (PSS-SR) 2. Maslach Burnout Inventory 3. Brief Symptom Inventory 4. Exposure to stressful events at work questionnaire 5. etc.
Prevalence	16% PTSD in the study group and 15% in control group
Effect size	Predictors of PTSD: Nonadaptive coping strategies (e.g. substance abuse, behavioural detachment, self-blaming) (OR=5.1, p=.009) and higher level of exposure to terror out of work (OR=3.5, p=.013)
Source of funding	Funded by private individual donation to Hadassah University Medical Centre
Key findings	<ul style="list-style-type: none"> • PTSD in physicians was unrelated to exposure to terror victims at work. • PTSD was related to level of exposure to terror outside of work and coping mechanisms.

Representative sample: participants were selected as consecutive or random cases	N
How many of the people asked to participate actually did so?	
If self-selected sample: survey response rate?	75% (219 from 281)
Assessment of exposure: reliable and valid measure	Y
Exposure level or prognostic factor measured more than once?	N
Blinded outcome assessment assessor unaware of prognostic factors at the time of outcome assessment. NB: note if self-reported assessment of exposure or prognostic factors	n/a self-report
Statistical adjustment: multivariate analyses conducted with adjustment for potentially confounding factors.	Y – logistic regression analysis