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IN-DEPTH REVIEW

Work-related post-traumatic stress disorder

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Background	Work-related post-traumatic stress disorder (PTSD) is an important condition encountered by many occupational health practitioners.
Aims	To carry out an in-depth review of the research on occupational groups that are at particular risk of developing work-related PTSD.
Methods	A literature search was conducted in the databases OVID MEDLINE, OVID Embase, Ovid PsycINFO, ISI Web of Science and CSA Health and Safety Science Abstracts.
Results	Professionals such as police officers, firefighters and ambulance personnel often experience incidents that satisfy the stressor criterion for the PTSD diagnosis. Other professional groups such as health care professionals, train drivers, divers, journalists, sailors and employees in bank, post offices or in stores may also be subjected to work-related traumatic events. Work-related PTSD usually diminishes with time.
Conclusions	Mental health problems prior to the traumatic event and weak social support increase the risk of PTSD. Prevention of work-related PTSD includes a sound organizational and psychosocial work environment, systematic training of employees, social support from colleagues and managers and a proper follow-up of employees after a critical event.
Key words	Occupational groups; post-traumatic stress disorder; work-related PTSD.

Introduction

Stress reactions to severe events have been recognized for centuries [1,2], but post-traumatic stress disorder (PTSD) was not accepted as a clinical diagnosis until 1980 [3]. PTSD 'arises as a delayed or protracted response to a stressful event or situation (of either brief or long duration) of an exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone' [4]. The diagnosis of PTSD has a traumatic event as a necessary diagnostic criterion [5]. Furthermore, the individual must re-experience the event, avoid stimuli associated with the traumatizing event and experience increased arousal [5].

More than half of the adult population are exposed to a severe stressor at some point during the course of their life [1]. The prevalence of potentially traumatic events that are reported in the USA is generally higher than in Europe [6]. Lifetime prevalence of PTSD in the USA has been reported to be around 10 % for women, who seem more vulnerable than men where the corresponding figures are 5%. Countries in Europe generally have a lower prevalence of PTSD [6,7], whereas data from developing countries suggest higher numbers [1].

The risk of developing PTSD depends on the nature of the critical incident, the individual's personality and life history, and events that may occur in the aftermath of the trauma. Social support, mainly emotional support [8], has been shown to be protective against the development of PTSD [8,9].

Almost everyone develops post-traumatic stress reactions shortly after being exposed to severe stressors [10–15]. However, most stress reactions will diminish within days, weeks or a few months without any intervention. In a significant proportion of those exposed to severe stressors, the outcome is increased resilience, acceptance and post-traumatic growth [1].

In many cases, there is a co-morbidity between PTSD and disorders such as depression, anxiety and substance abuse [1]. Chronic PTSD is often associated with neuroticism and personality pathology. In a study

of combat veterans, nearly 80% of chronic PTSD cases met the criteria for at least one personality disorder [16].

The diagnosis of PTSD is mostly based on the patient's self-reported symptoms. This major methodological problem may encourage symptom exaggeration, or malingering that is the intentional production of false or grossly exaggerated physical or psychological symptoms motivated by external incentives [17]. In a study of 'Vietnam veterans' where 94% were diagnosed with PTSD and reporting combat experience, one out of three had apparently not had any traumatic exposure, and 5% had never been in Vietnam according to archival data [18].

The aim of this paper was to carry out an in-depth review of PTSD in an occupational setting.

Methods

A literature search was conducted in the databases OVID Medline, OVID Embase, Ovid PsycInfo, ISI Web of Science and CSA Health and Safety Science Abstracts with the last search on 8 July 2010 [19]. Additionally, we searched for books that deal with psychotraumatology in BIBSYS. Key search terms were 'post-traumatic stress disorder (s)' or 'PTSD' and the literature search covered the period 1950–2010 in MEDLINE and the period 1967–2010 in PsycINFO. As for the other databases, only new literature was searched for. Occupational search terms included 'occupation', 'employ', 'work' or 'profession'. During the first selection process, only literature in the English and Scandinavian languages were included. Here, we excluded articles on treatment and PTSD not relevant for occupational settings and also studies of military personnel and of '9/11'. This search yielded 3525 articles from which 360 were included. In the second selection process, we included studies we considered had the highest scientific quality starting with longitudinal studies, systematic reviews and cross-sectional studies with more than 100 participants. Clinical studies with more than 10 participants were also included. All papers were published in peer-reviewed journals. This yielded 140 eligible articles (Figure 1) [19]. In the present article, we have also excluded occupational groups without direct traumatic exposure, such as forensic personnel, therapists and flight attendants. Furthermore, some Norwegian studies were excluded.

In addition, two of the authors (TH, LW) have published on the topic and have a personal library, which was available to the authors of this article.

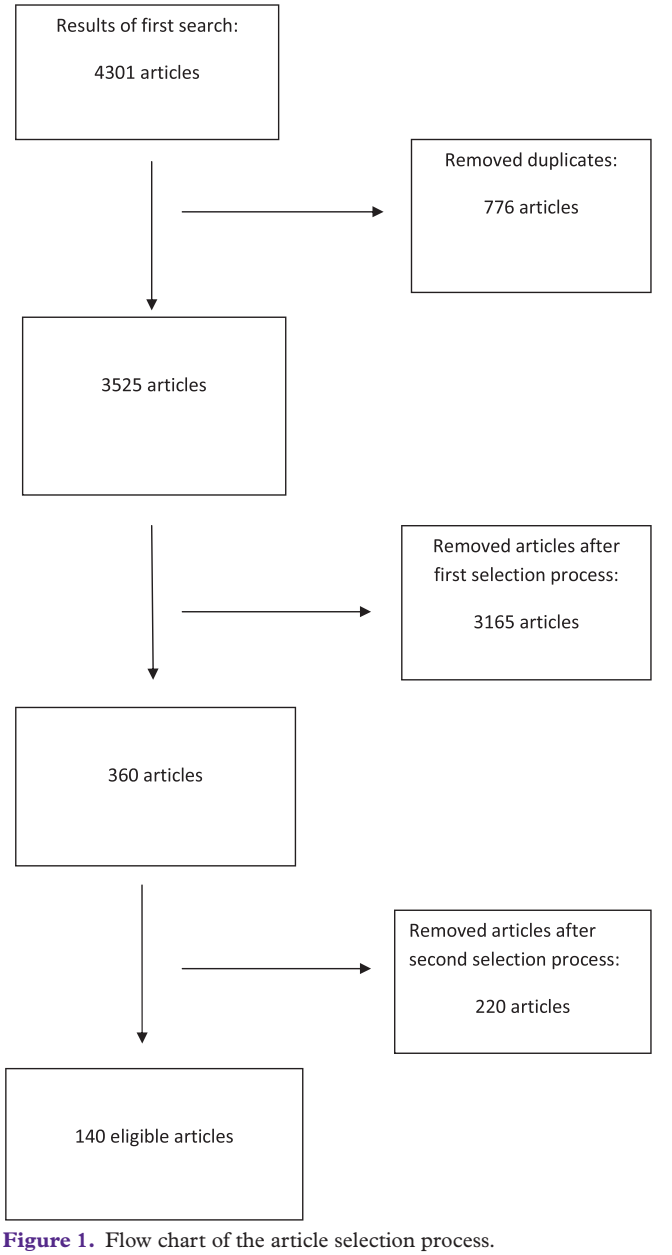

Figure 1. Flow chart of the article selection process.

Results

Police officers

Compared with other occupational groups, police officers face an increased and anticipated risk of exposure to life-threatening and potentially traumatic events through the nature of their work, for example when intervening in violent situations and when witnessing other peoples suffering and death (Table 1, available as Supplementary data at *Occupational Medicine* Online) [20,21]. The prevalence of PTSD among police officers has been reported to be less than 10% despite the high frequency of direct exposure to a traumatic event [22].

Among 262 police officers followed after a critical incident, factors associated with post-traumatic stress reported after 3 months included introversion and difficulties expressing feelings, insufficient time given by the employer for individuals to deal with the trauma, dissatisfaction with the support from the organization and a low degree of job security [23]. After 12 months, post-traumatic stress was associated with acute hyper-arousal, subsequent traumatic events, job

dissatisfaction, negative thoughts about work and lack of social support and hobbies. Age and police experience were found to bear no relation to post-traumatic stress symptoms.

The police officers working with body search and discovery after the Piper Alpha Oil Rig accident in 1988 where 167 men lost their lives, reported no increase in PTSD or other mental disorders after 3 months [20]. Compared with the control group, no increase in sick leave was registered. Lower anxiety levels, compared with pre-accident levels, were found among the officers [20]. Three years after the accident, anxiety levels were *lower* compared with pre-accident levels, possibly explained by the police officers' self-esteem and their ability to implement new coping strategies [24].

It has been found that the organizational and psychosocial work environment of police officers may affect the degree and strength of PTSD symptoms [23,25–28]. Malfunction of equipment, a low degree of role clarity, dysfunctional social interaction between colleagues, the experience of being discriminated against and offence against physical integrity may increase the prevalence of PTSD [28]. Finally, police officers with PTSD are more likely to be depressed and to score lower on a hardiness measure than officers without PTSD [22].

Firefighters

Firefighting, which in many countries also includes performing paramedical work, is considered a highly dangerous and stressful occupation. Firefighters may be exposed to both direct and indirect stressors, such as risking own life when entering a burning building and witnessing the suffering of others. A PTSD prevalence reaching 20% has been described in this group [29,30].

Certain psychological characteristics are associated with increased risk of PTSD. Firefighters with high levels of hostility and low self-efficacy developed more post-traumatic symptoms, depression, anxiety and alexithymia (deficiency in understanding, processing or describing emotions) [31]. In a longitudinal study of Australian firefighters engaged in a bushfire disaster, neither the severity of exposure nor losses of property were major determinants of morbidity at the last follow-up. Pre-morbid factors such as neuroticism and a history of psychiatric disorders were better predictors of post-traumatic stress symptoms [32]. Fear of emotions and negative social interactions have also been associated with high levels of post-traumatic stress symptoms [33]. In a cross-sectional study support from the trade union, employers, family and friends were associated with less depression [34]. This may indicate that social support protects against depression, but it may also imply that individuals who are less depressive experience other people's actions as more positive and are better able to obtain support from their network [34].

Volunteer firefighters may be called in to assist in fires of extreme magnitude. PTSD symptoms in volunteers exceed those of the professional firefighters, suggesting that training and experience protect against PTSD [35,36].

Ambulance personnel

Ambulance personnel are frequently exposed to critical incidents and generally report more health problems than workers in comparable professions and the general population [37]. PTSD prevalence in some studies has been close to 20% [38–40]. In the aftermath of the 2005 London bombings, however, the 4% prevalence of PTSD was not higher among the ambulance rescue workers, provided with staff support, than in the London population in general [41]. The authors report that the staff were 'well informed as to how to access support should they have needed it' but delay in collecting data (2–4 months after the bombings in this case) may give a lower prevalence of reported symptoms compared with collecting data shortly after the event.

Lack of social support, unacceptable organizational conditions at work and individual factors have been associated with more PTSD symptoms among ambulance workers [39,42]. They may suffer from persistent stress symptoms as a result of frequent exposure [40]. Certain personality traits could be important predictors of PTSD symptoms, and selection mechanisms may explain the high prevalence of PTSD in this profession compared with police officers [43,44].

Health care professionals

Health care workers, especially nurses in intensive-care units and in mental health care have been shown to have high rates of PTSD symptoms. The suffering and death of patients are part of the workday, and physical assaults on health care personnel are a challenge in this occupational setting [45]. Emergency health care workers who had experienced an emotionally distressing work event, which presented *either* a direct threat to themselves *or* a witnessed threat to patients, displayed similar levels of PTSD symptoms. Those exposed to a direct threat experienced greater fear during the incident, more ongoing arousal symptoms post trauma and being more dissatisfied with their work situation. Those witnessing a threatening situation were more likely to attribute their PTSD symptoms to personal weakness. Thus the two groups differed in symptom profiles and work consequences, presumably depending on the nature of the trauma [45].

Mental health professionals may be exposed to violence from patients and report high levels of PTSD symptoms [46,47]. Senior nurses had fewer post-traumatic stress symptoms and symptoms of burn out syndrome compared with junior nurses [48]. It is possible that nurses with persisting post-traumatic stress reactions leave the profession earlier, while the more resilient remain.

Among Israeli physicians, the prevalence of PTSD was not higher among surgeons regularly exposed to victims of terror compared with physicians not regularly exposed [49].

Train drivers

Cross-sectional studies based on questionnaires consistently show higher symptom scores among train drivers who have been involved in 'person under train' incidents [50,51].

In follow-up studies, post-traumatic stress symptoms have been shown to be transient [52,53].

Divers

No significant difference in PTSD symptoms was found between rescue divers who participated in work following a plane crash in New York in 1996 compared with control divers [54]. Selection of divers and training in the management of physical and emotional challenges in water may explain the results. Time to prepare for rescue work, work experience and social support are factors that reduce the risk of PTSD among divers [54].

Journalists

War correspondents are at increased risk of being killed, injured and maltreated. Media employees who have been in war zones have far more post-traumatic stress symptoms compared with those who have not, but refusing dangerous assignments may have adverse career consequences. A lifetime prevalence of PTSD close to 30% in this group may be explained by not receiving treatment for PTSD, depression and alcohol abuse, lack of training in dealing with being in a war zone and lack of social support in 'a culture of silence' [55].

Sailors

The war sailor syndrome, an occupational psychiatric disorder, was first described in the mid 1970s. One-third of Norwegian sailors who survived World War II became disabled and received disability pension [56]. Today, sailors may be subjected to critical incidents such as hijacking and hostage-taking thus facing an increased risk of PTSD [57].

Armed robbery

In recent years, bank- and postal robberies have been less frequent, possibly due to increased security measures. Other enterprises are now more exposed, such as night open convenience stores, where the number of armed robberies annually in Norway is close to 100 compared with banks and postal offices where the number is less than 10 (Robert Lalla, National Police Directorate Norway, personal communication). Exposure to more than one robbery increases the rates of PTSD [58,59]. Proximity to the robber and the presence of a weapon during the robbery increase the likelihood of adverse symptoms among employees [58,59].

Industrial disasters

Stress symptoms have been shown to be very high shortly after industrial disasters but have decrease in the majority of cases during follow-up [11–13]. A high level of competency in handling dangerous situations is associated with optimal behaviour during a disaster and is a preventive factor for PTSD. Levels of stress symptoms measured during the first week after the event predict PTSD several years later [12,13]. Among survivors of an oil rig disaster a general neurotic personality diagnosed at baseline and disaster exposure gave a poorer prognosis after the group had been followed for 27 years after the event [60].

Discussion

Professional first responders, such as police officers, firefighters and ambulance personnel, have an increased risk of being exposed to traumatic events through their daily work.

However, the PTSD prevalence varies in these groups, being lower among police officers compared with the other professional first responders [43]. Individual differences in vulnerability and resilience appear to be important factors for the intensity and duration of trauma-related symptoms experienced in the aftermath [31,34]. The nature of the trauma is also an important factor, for example dealing with child victims is known to be particularly distressing [61,62]. Personality traits such as neuroticism are vulnerability factors for developing PTSD and are often better predictors of post-traumatic morbidity than the degree of exposure to serious stressors [32].

A challenge among uniformed personnel is their unwillingness to seek help for psychological problems. This may be due to a 'macho culture', which includes having difficulties admitting weakness, denial and/or a constant pressure to control emotions and a desire to appear efficient [63].

Most studies on work-related PTSD have been cross-sectional with very low response rates, and in many of the studies, workers respond to a questionnaire where they report symptoms and exposure levels. A variety of different questionnaires have been applied in these studies making comparison of results difficult. Furthermore, there is a risk of self-report bias in these studies, which could lead to an 'artifactual covariance between the predictor and criterion variable' due to the fact that the same person is assessing both measures [64].

Workplace prevention

There are three main preventive strategies to prevent psychological distress following a traumatic event developing into mental illness: pre-employment selection, training in stress management and early intervention [65].

Both self-selection and employment selection might explain why some people in high-risk occupations are more resilient to traumatic stress [66]. The lower prevalence of PTSD among police officers, compared with other rescue workers, could be due to pre-employment selection among the police officers [43]. However, *optimal* selection for mental fitness is difficult given that the most vulnerable often have been excluded initially, as shown for selection of soldiers [67]. There is limited research into the effect of pre-employment selection on levels of injury or disease [68].

Firefighters who have been trained seem to cope better compared with non-professional firefighters [35,36], and thus, training in stress management is important for personnel who have a high risk of encountering traumatic stress. Here, the workers become familiar with and learn to manage their own stress reactions. Also, stress-management programmes [69], experience in dealing with stress [12,15], and physical fitness [70] may preserve the well-being of highly stressed staff.

Intervening early with psychiatric treatment ('forward psychiatry') has been practised in military psychiatry for centuries. Under this scheme, soldiers are treated as quickly as possible, while still close to the battlefield, and are returned to duty after a short rest. Furthermore, it is emphasized that their stress response is a normal reaction to an abnormal situation. This treatment approach is more effective than completely taking them out of service [71].

At the civilian organizational level, there is evidence that 'the company disaster model', which implies a mobilization of the internal resources of the company, is more effective in preventing psychiatric work disability than the utilization of the ordinary health care system [72]. Attachment to the workplace and early return to work is among the important preventive measures in this model. Support from employees and providing evidence-based treatment in the aftermath of a traumatic exposure is important [73].This model was put forward after the Oslo bombing on 22 July 2011. The governmental occupational health service, with assistance from experienced occupational physicians, examined 400 employees for PTSD symptoms, physical symptoms and work ability within 1 month of the traumatic event.

Treatment

Early intervention

In the acute phase following the traumatic event, it is important that the individual regains emotional control, restores interpersonal communication and group identity, regains a sense of empowerment through participation in work and strengthens hope and the expectation of recovery [74,75]. It should be emphasized that what they are experiencing 'is a normal reaction to an abnormal situation, and you will do well'. Such an approach, known as psychological first aid, has been shown to give promising results [76].

A workplace crisis management plan, with a trained team, will ensure that employees receive information and support which can aid their recovery, and help rapid return to work [75]. Later on, surveillance of health may be recommended [77], whereas compulsory psychological debriefing is not [78].

Medical/psychological treatment

Medication could be prescribed if the worker suffers from prolonged insomnia and/or excessive anxiety. Some guidelines for the treatment of PTSD recommend selective serotonin reuptake inhibitors in serious cases of chronic PTSD, whereas others emphasize the limited evidence for pharmacological interventions, particularly in the early phase [75,79]. Cognitive behavioural therapy is an effective form of treatment for acute stress disorder and acute PTSD, recommended for those who develop symptoms within the first 3 months [79,80].

Conclusion

Occupational groups such as police officers, firefighters and ambulance personnel are at increased risk of experiencing stressful events that make them more likely to suffer PTSD. As with post-traumatic stress in general, work-related PTSD symptoms usually diminish with time. Furthermore, professionals without special training have higher risk of developing PTSD than trained personnel. Selection prior to potentially stressful occupations may have beneficial effects. Certain personality traits, a history of psychiatric morbidity and weak social support, increase the risk for PTSD. Post trauma, factors that favour prevention of work-related PTSD include a sound work environment, social support from colleagues and managers and a proper follow-up of employees.

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Conflicts of interest

None declared.

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An elusive occupational toxin

While I was working at Ford Motor Co we used to carry out routine annual blood counts, lead levels, chest x-rays and urinalysis on all paint sprayers. In 1977 my technician alerted me to the presence of an unusual number of operators showing much reduced neutrophils. The most likely cause to an occupational physician would be benzene. So I persuaded our chemists to work through the weekend analysing all 53 paints, thinners and solvents available in the paint-shop. But no benzene was discovered. Then a nurse remarked to me that curiously some of the workmen had French names. It emerged that these all came from the Antilles in the West Indies, and I wondered whether this could be a genetic abnormality. Searching the literature I found that neutropenia had only been mentioned among Africans and to a very minor degree in African-Americans, but not in other countries. We reassured our workers that they were not being poisoned, and I published a short article in the *Journal of the Royal Society of Medicine* to alert other occupational physicians.

Soon afterwards a paediatrician in Bristol wrote to me to say he had seen this in adults with rheumatoid arthritis and children with Felty's syndrome. He had found that an intravenous bolus of cortisone would rectify the condition. I tried this on myself and felt no ill effects, so I offered this procedure to 20 of the paint-sprayers involved. Incredibly, they all consented and were given 100 mg of hydrocortisone. Four hours later their neutrophils had all been raised to normal.

I since understand that in many Africans some neutrophils tend to adhere to the blood vessel wall in what is called 'laking'.

When I think back 35 years later it still amazes me that everybody consented without demur or a randomized control trial. Today I shudder to think how the General Medical Council or trade union would castigate this procedure. It was disappointing that there were no occupational causes, but it quickly reassured the workers. A sobering thought is that this had all been anticipated in George Bernard Shaw's *The Doctor's Dilemma*, produced in 1906, where Sir Ralph Bloomfield Bonington famously states 'There is at bottom only one genuinely **scientific** treatment for all diseases, and that is to stimulate the phagocytes.' Nothing new under the sun?

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