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REVIEW ARTICLE

Social and occupational factors associated with psychological wellbeing among occupational groups affected by disaster: a systematic review

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Abstract

Background: The psychological impact of disasters has been well-documented; less attention has been paid to factors affecting the wellbeing of those exposed to disasters as occupational groups.

Aims: To conduct a systematic literature review identifying social and occupational factors affecting the wellbeing of disaster-exposed employees; to use these factors to identify recommendations for potential interventions.

Method: Four electronic literature databases were searched; reference lists of relevant papers were hand-searched.

Results: A total of 18 005 papers were found, 571 full texts were read and 36 included in the review. The psychological impact of disasters on employees was associated with pre-disaster factors (experience/training; income; life events/health; job satisfaction), peri-disaster factors (exposure; peri-traumatic experiences; perceptions of safety; injury), social factors (organisational support; social support generally) and post-disaster factors (impact on life).

Conclusions: It is important to build a resilient workforce outside of a crisis. Pre-disaster training in recognising signs of distress, understanding vulnerability factors such as those described above, which may put certain employees at greater risk of distress and how to support colleagues may be useful. Further research into the effectiveness of post-disaster interventions is needed.

Keywords

Disaster, employees, mental health, psychological impact, risk factors, trauma

History

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Introduction

Traumatic events are becoming more prevalent worldwide (Guha-Sapir et al., 2013) with natural and human-initiated disasters affecting large numbers of people. Though there has been much research on the psychological impact of disasters on individuals (Harada et al., 2015; Leon, 2004; Neria et al., 2007), there has been less attention on the effect of experiencing disasters as part of a group. Many people experience traumatic incidents as part of an occupational group – for example, an office affected by a fire or an organisation targeted by terrorists. Disasters are by nature unpredictable, yet trauma-exposed organisations require staff to continue to function and carry out their role after disasters occur, to ensure the safety of customers or viability of the business.

Research considering the psychological impact of disasters on occupational groups tends to focus on disaster workers and emergency services personnel. Recent reviews of humanitarian relief workers and disaster responders

(Brooks et al., 2015, 2016) have suggested that the psychological impact of disasters can be great, with some workers experiencing post-traumatic stress disorder (PTSD), anxiety and depression following major incidents. These reviews identified several factors affecting the wellbeing of trauma-exposed workers, such as the amount of social support available (e.g. Thormar et al., 2013), the amount of training received (e.g. Thoresen et al., 2009) and the extent of trauma exposure, including hours spent working at the site (e.g. Stellman et al., 2008) and time of arrival (e.g. Pietrzak et al., 2014). However, less attention has been given to occupational groups unexpectedly caught up in disasters. Given the increasing prevalence of disasters, and the fact that even those trained to assist in recovery are often psychologically affected, it is important also to consider groups of trauma-exposed employees who are not disaster responders and who would not be trained and prepared for such an incident. Identifying risk factors in these groups may allow for identification of ways in which organisations can intervene to reduce negative consequences.

This review forms part of a wider project on the psychological impact of disasters on occupational groups. In other reviews, we consider the wellbeing of disaster responders following any kind of disaster (Brooks et al., 2016)

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and healthcare providers following large scale disease outbreaks (Brooks et al., in preparation). In the current review, we focus on the impact of disasters on occupational groups who are exposed to trauma unexpectedly rather than because of the role they are carrying out – that is, workers who are “victims” of disaster rather than responders. We were interested in any and all psychological outcomes, including symptoms of PTSD, depression, anxiety, alcohol misuse, stress, ability to cope and positive outcomes such as post-traumatic growth. Throughout the paper, we refer to psychological *wellbeing*, which we use broadly to mean the state of one’s psychological health. We examine social and occupational factors predicting psychological outcomes among occupational groups who have been exposed to traumatic incidents, and use these to identify recommendations for interventions for reducing risk and fostering post-incident resilience in trauma-affected organisations.

Method

Study selection

To be included in the review, studies had to: (i) report on primary, quantitative research; (ii) be published in peer-reviewed journals; (iii) be written in English; (iv) report on social or occupational factors affecting the wellbeing of occupational groups who are victims of disasters; and (v) be published post-1984. This cut-off year was chosen as it was 30 years before the beginning of the study in 2014 and reduced the risk of including papers on research conducted pre-1980, when post-traumatic stress disorder was introduced as a diagnostic category in the DSM-III-R (American Psychiatric Association, 1980).

Conducting the review

Three lists of search terms were used: Search 1 covered terms relevant to psychological wellbeing; Search 2 covered terms relating to extreme events (informed by the Emergency Events Database, or EM-DAT (Centre for Research on the Epidemiology of Disasters, 2009)) and Search 3 covered terms relating to occupational groups. The full search strategy can be seen in [Appendix 1](#). The three searches were combined and one author (SKB) ran the searches on MEDLINE®, Embase, PsycINFO® and Web of Science databases. Resulting citations were downloaded to EndNote® software version X7 (Thomson Reuters, New York, NY). Duplicate items were removed and SKB evaluated titles for relevance. Following this, two authors (SKB, RD) used the inclusion criteria to screen abstracts of the remaining citations and exclude any which were not relevant. It was intended that any disagreements about inclusion/exclusion would be discussed with the other authors; however, the two reviewers who did the screening managed to reach consensus between themselves. Full texts of remaining citations were obtained and the same authors reviewed these, excluding any not meeting the inclusion criteria. The reference lists of remaining papers were also hand-searched.

Data extraction, quality appraisal and data synthesis

We designed spreadsheets to systematically extract data from papers. Information extracted included publication year;

country of study; design; participant information; disaster information; wellbeing outcomes and measures used; predictive factors and measures used; results; conclusions; and limitations.

Study quality was assessed in three areas: study design; data collection/methodology; and analysis/interpretation of results. We used quality tools designed for a previous review (Brooks et al., 2015) and informed by existing quality appraisal tools (Drummond & Jefferson, 1996; Effective Public Health Practice Project, 2009; National Institute for Health, 2014). This tool can be seen in [Appendix 2](#).

We used thematic analysis to analyse the results of the studies and group factors affecting wellbeing into a typology. Any predictive factor identified by at least two studies was accepted as a theme.

Results

The initial search yielded 18 005 studies, of which 170 were relevant to the overall set of reviews and 36 were relevant for inclusion in the current paper. Details of the screening stages can be seen in [Appendix 3](#). A summary of the papers included in this review can be seen in Table 1. Further details of the evidence from included papers are presented in the Supplementary Appendix.

Of the 36 studies included, most were cross-sectional surveys ($n=24$); 12 were longitudinal studies. Disasters studied included the September 11th terrorist attacks in New York ($n=12$), natural disasters e.g. earthquakes, hurricanes and tsunamis ($n=10$), explosions ($n=4$) and various other acts of terrorism, nuclear disasters, fires, and sea disasters. “N” ranged from 33 to 4739.

Overall quality (i.e. the total percentage of quality appraisal items for each study) was high (mean = 80.14%; mode = 93.3%, range = 37.5–100%; see Figure 1). Generally, the papers scored very highly for study design; highly for data collection and methodology (tending to be let down only by not stating the participation rate); and the poorer scores tended to be due to analysis and interpretation of results. In particular, many papers did not sufficiently describe the statistical tests used and did not adjust for potential confounding variables.

Based on our previous reviews of humanitarian relief workers and disaster responders (Brooks et al., 2015, 2016), it was decided to group themes into pre-disaster, peri-disaster and post-disaster factors. We also found social factors (pre-, during and post-disaster) to be important so these have been given their own sub-section.

Pre-disaster

Experience

Due to the nature of this review, the majority of included studies focused on organisations which would not routinely expect to face a disaster and thus experience and preparedness were unlikely to be considered as factors which might affect post-disaster wellbeing. However, a small number of studies looked at members of organisations who were unexpectedly exposed to trauma but who *would* be trained and experienced, such as military personnel. Such populations were included

Table 1. Overview of included studies.

Reference	Design	Participants (n)	Occupation	Disaster/crisis	Wellbeing outcomes	Time of measurement post-disaster	Quality appraisal score
Birmes et al., 2005	Longitudinal	Time 1 = 387 Time 2 = 200	Factory Workers	Factory explosion	Peri-traumatic distress inventory; Peri-traumatic Dissociative Experiences Inventory; Stanford Acute Stress Reaction Questionnaire; PTSD Checklist Scale	2 & 6 months	75%
Bland et al., 2005	Comparison - Longitudinal	555	Factory Workers	1980 & 1983 Southern Italy Earthquakes	Symptom Checklist - Italian; Global Symptom Index	5 years pre & post up to 11-14 years	87.5%
Blix et al., 2013	Cross-sectional	197	Ministerial Employees	Oslo Bombing	Study specific peri-traumatic questions; PTG inventory; post-traumatic check-list; work & social adjustment scale; Cantril Ladder of Life	9-10 months	93.3%
Byron & Peterson, 2002	Cross-sectional	108	Employed university students	September 11th	Impact of Events Scale; Michigan Organizational Assessment Questionnaire; 2 absenteeism questions	10 weeks	80%
DiGrande et al., 2011	Cross-sectional	3271	Office Workers	September 11th	PTSD Checklist Stress-specific version	2-3 years	100%
Eid et al., 2001	Longitudinal	78	Navy sailors	Shipwreck	Impact of Events Scale; Post-Traumatic Symptom Scale	3 weeks, 4 & 12 months	75%
Elklit, 1997	Cross-sectional	270	Super tanker workers	Super tanker explosion	Impact of Events	6 months	86.7%
Grieger et al., 2003	Cross-sectional	77	Pentagon Staff	September 11th - Pentagon attack	Impact of Events Scale; peri-traumatic dissociation experiences questionnaire; study specific - 3 questions on safety at work; safety at home, safety throughout the day.	7 months	73.3%
Grieger et al., 2004	Cross-sectional	212	Pentagon Staff	September 11th - Pentagon attack	Impact of Events Scale; PHQ-9; Study specific perceived safety scale - 3 questions	13 months	66.6%
Grieger et al., 2005	Cross-sectional	267	Governmental Employees	September 11th - Pentagon Attack	PTSD Checklist; PHQ-9	25 months	93.3%
Hansen et al., 2013	Cross-sectional	1881	Governmental Employees	Oslo Bombings	PTSD checklist	10 months	93.3%
Holen, 1991	Longitudinal	73 + 89 matched controls	Oil rig workers	Alexander Kiell and Oil Rig disaster	Insurance records	Immediately after to 6 years	56.3%
Jordan et al., 2004	Cross-sectional	4739	Pentagon Staff	September 11th - Pentagon Attack	Study specific screening tool - Pentagon Post-Disaster Health Assessment	1-4 months	80%
Kitamura et al., 2013	Cross-sectional	72	Governmental Employees	Great East Japan Earthquake	K6 & K10	9 months	53.3%

(continued)

Table 1. Continued

Reference	Design	Participants (n)	Occupation	Disaster/crisis	Wellbeing outcomes	Time of measurement post-disaster	Quality appraisal score
Koscheyev et al., 1993	Longitudinal	Time 1 = 55 Time 2 = 111 Time 3 = 106 Time 4 = 97 110 in control group	Power Plant Workers	Chernobyl	Psychiatric Interview – details not reports	Time 1 = 3 months Time 2 = 5 months Time 3 = 12 months Time 4 = 19 months	37.5%
Leon et al., 2007	Cross-sectional	1542	University Staff	Hurricane Katrina	Perceived stress scale; PTSD checklist	6 months	86.7%
Lindal & Stefansson, 2011	Cross-sectional	112 + 59 controls	Seamen	Various North Atlantic Sea disasters	CIDI; IES; GHQ-30; PTSS-10	5–11 years	73.3%
McKimmie et al., 2009	Cross-sectional	33	Various – teachers, car dealers, manufacturing company workers	Workplace fire	Study specific 2 item scale	14 months	73.3%
Miller-Burke et al., 1999	Cross-sectional	141	Bank employees	Bank robberies	Study specific survey	With 12 months	80%
Nasky et al., 2009	Cross-sectional	191	US Sailors & Naval Officers	2000 suicide bombing on USS Cole	IES-R; Zung Self-rating Depression Scale	2 months	80%
North et al., 2009	Cross-sectional	137	Capitol Hill Staff	2001 Anthrax attacks	Diagnostic Interview Schedule-Disaster Supplement	7 months	86.7%
North et al., 2011	Longitudinal	379 (228 at follow-up)	Office workers, utility and disaster response workers	September 11th	Diagnostic Interview Schedule for DSM-IV	3 & 6 years	68.8%
Osinubi et al., 2008	Cross-sectional	369	Public sector union office workers	September 11th	Short form of WHO Composite International Diagnostic Interview; IES-R	2 years	93.3%
Piotrkowski & Brannen, 2002	Cross-sectional	124	Municipal agency after-school staff	September 11th	PCL; study-specific questions; Bartone et al. measure of anxiety and depression symptoms	6 months	100%
Richman et al., 2004	Longitudinal	1594	University Employees	September 11th	GES-D; Profile of Mood States, study-specific alcohol questionnaire	5 years prior, 4 years prior, & during the same month	87.5%
Sanchez et al., 1995	Longitudinal	166 (143 at follow-up)	62 occupations – most common were secretaries, managers, administrative staff, salespersons, etc.	Hurricane Andrew	STAI; BDI; Items from various existing scales	20–30 days & 80–90 days	87.5%
Shigemura et al., 2014	Cross-sectional	1411	Plant Employees	Fukushima Daiichi Nuclear Power Plant disaster	Peritraumatic Stress Inventory; Japanese version of IES-R	2–3 months	86.7%
Suzuki et al., 2014	Longitudinal	3743	Public Servants	Great East Japan Earthquake	Kessler K6 Scale	2 & 7 months	93.3%
Tapp et al., 2005	Cross-sectional	269	New York City Transit Employees	September 11th	CEES-D; PCL	7.5 months	93.3%

Trout et al., 2002	Cross-sectional	346	Federal Employees locally & in another state	September 11th	CES-D; PCL	3 months	93.3%
Van der Velden et al., 2014	Longitudinal	Time 1 = 4500 Time 2 = 3600	Unknown (all at Time 2 worked for > 19hrs per week)	2000 Fireworks factory explosion in Netherlands	Anxiety, depression and agoraphobia subscales of the SCL-90-R; Dutch version of the IES	2-3 weeks & 18 months	87.5%
VanDevanter et al., 2014	Cross-sectional	362	Nurses	Hospital evacuation due to Hurricane Sandy	Study specific questionnaire	9-11 months	53%
Weidmann et al., 2008	Cross-sectional	61	Journalists	South East Asian	Post-traumatic Diagnostic Scale; German version of the CES-D	9-10 months	73.3%
Weiseth, 1989	Longitudinal	246	Industrial Factory Employees	Tsunami in Norway	State Anxiety Inventory; PTSS-30	Soon after & 7 months post	86.7%
Xu & Wu, 2014	Cross-sectional	2080	Various – not reported	Sichuan Earthquake	Posttraumatic Growth Inventory; Perceived Stress Scale	1 year	93.3%

only if they were caught up in an unexpected incident and did not experience the disaster as part of their operational duties. These were included as they had not been specifically trained/prepared for the situation they found themselves in. We included three such papers: one study of naval personnel who experienced a shipwreck (Eid et al., 2001); one study of naval personnel who were victims of a terrorist bombing attack (Nasky et al., 2009); and one study of nurses working in hospitals affected by a hurricane (VanDevanter et al., 2014).

Eid et al. (2001), in a study of Navy sailors, found that previous exposure to fatal accidents at work had no significant impact on psychological distress symptoms. VanDevanter et al. (2014), in their study of hurricane-exposed nurses, found no differences in post-incident stress between new and experienced nurses. These two studies suggest that job experience is not a predictive factor in determining how employees will fare after a disaster. However, Nasky et al. (2009), in a study of the US Navy, found that senior officers were less likely to suffer PTSD symptoms than non-commissioned officers, which may be related to the greater training and experience that senior officers are likely to have.

Income

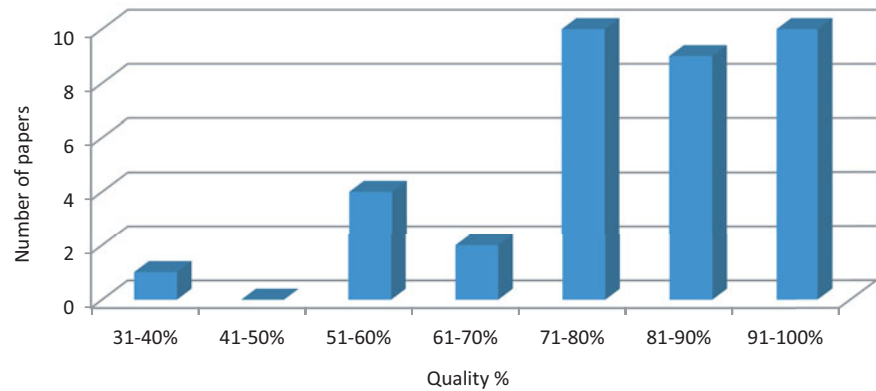
In two studies, of office workers following the September 11th terrorist attacks (DiGrande et al., 2011) and university employees following Hurricane Katrina (Leon et al., 2007) an inverse dose response was found between income and PTSD symptoms and perceived stress, whereby the likelihood of such outcomes reduced with higher earnings.

Life events and health

There were mixed results regarding whether previous life events were associated with poor outcomes. Nasky et al. (2009) found that Naval Officers who reported significant life events prior to the disaster were more likely to suffer from depression, while Grieger et al. (2003) found no significant relationship between PTSD symptoms and previous trauma in Pentagon employees following the September 11th attack. Jordan et al. (2004) found that, for Pentagon employees, childhood trauma increased the likelihood of depression and panic attacks post-disaster, while having experienced both adult and childhood trauma increased the likelihood of symptoms of PTSD, depression and general anxiety – however, experiencing prior trauma as an adult only had no significant effect on results. Finally, a study of transit employees following the September 11th disaster (Tapp et al., 2005) found that previous trauma exposure had no effect on the relationship between depression and participating in Ground Zero activities or being caught in the dust cloud, but it did affect the relationship between depression and both knowing a victim and witnessing the disaster.

In a study of Pentagon staff following the September 11th attack, Jordan et al. (2004) found that those with pre-disaster psychiatric diagnoses were more likely to experience alcohol abuse, depression and general anxiety following the incident. Similarly, in a study of World Trade Center staff following the same disaster, North et al. (2011) found that 80% of staff who met PTSD criteria despite not actually witnessing the disaster had a previous psychiatric diagnosis. Pre-existing illnesses

Figure 1. Overall % scores for quality appraisal.



were also associated with PTSD symptoms in Fukushima workers following the nuclear power plant disaster (Shigemura et al., 2014); however, the authors did not collect specific diagnostic information thus it is unclear whether this refers to psychiatric or physical conditions.

Perception of work

In two studies, general perceptions of one's workplace appeared to be important in influencing wellbeing outcomes post-disaster. Satisfaction with work-related factors including personal expertise, interest in the job, learning opportunities, job security, wages and promotional prospects tended to generate positive outcomes and were negatively correlated with post-disaster stress (Xu & Wu, 2014). Kitamura et al. (2013) found that governmental employees who rated their working conditions as poor and reported feeling fatigued with work were more likely to feel traumatised following an earthquake.

Peri-disaster

Exposure

Unsurprisingly, much of the research explored the effects of disaster exposure on wellbeing; that is, the effects of simply being involved in the incident and witnessing traumatic scenes. Many studies assessed the severity of exposure, including amount and type of exposure (i.e. length of time spent at disaster site and the types of traumatic scenes witnessed) as well as proximity to the epicentre of the disaster. Studies showed that greater extent of exposure predicted PTSD symptoms (Bland et al., 2005; DiGrande et al., 2011; Grieger et al., 2005; North et al., 2011; Osinubi et al., 2008; Piotrkowski & Brannen, 2002; Van der Velden et al., 2014; Weisæth, 1989); depression (Grieger et al., 2005); peri-traumatic distress (Shigemura et al., 2014); general psychiatric symptoms (Holen, 1991; Koscheyev et al., 1993; Weidmann et al., 2008); distress (Grieger et al., 2005); agoraphobia (Van der Velden et al., 2014); and greater sick leave (Holen, 1991). However, higher levels of traumatic exposure were also associated with increased post-traumatic growth in one study of employees of the Norwegian ministries following a bombing (Blix et al., 2013).

Closer proximity to the disaster was associated with increased symptoms of PTSD and depression in Pentagon staff following September 11th (Grieger et al., 2004); PTSD

symptoms in governmental employees following a bombing (Hansen et al., 2013); alcohol abuse, PTSD symptoms, panic attacks and anxiety in Pentagon staff following September 11th (Jordan et al., 2004); and depression and PTSD symptoms in transit employees following September 11th (Tapp et al., 2005).

A small number of studies showed no significant relationship between exposure and wellbeing outcomes (Grieger et al., 2003) or between proximity and wellbeing (North et al., 2011; Osinubi et al., 2008). North et al. (2009) found that US government workers staff exposed to the Anthrax attacks in 2001 were no more likely to report feeling "stressed" than non-exposed staff, although those exposed were more likely to report "feeling upset" about the incident in the immediate aftermath, take sick leave and report a negative change in job satisfaction.

Exposure in terms of witnessing "horror" – e.g. seeing dead or injured people – was associated with PTSD symptoms (DiGrande et al., 2011; Jordan et al., 2004) and alcohol abuse, depression, panic attacks and general anxiety (Jordan et al., 2004). Governmental employees who were exposed to dead bodies or acted as lay counsellors to families of the deceased following the September 11th attack were more likely to suffer symptoms of PTSD, depression and chronic distress than those who did not (Grieger et al., 2005). Hansen et al. (2013) found an increased likelihood of PTSD in governmental employees who witnessed others killed or injured, but not to a statistically significant level.

Peri-traumatic experiences

In this section, we summarise the literature on "peri-traumatic experiences", that is, situations experienced *during* the disaster (e.g. peri-traumatic dissociation or strain; experiencing various specific situations during the incident). Peri-traumatic dissociation during an incident increased the likelihood of acute stress disorder, PTSD symptoms and alcohol problems (Birmes et al., 2005; Grieger et al., 2003). Peri-traumatic strain was associated with greater sick leave in employed university students following the September 11th attacks (Byron & Peterson, 2002). A study of bank employees who had experienced a robbery (Miller-Burke et al., 1999) suggested that many peri-traumatic features – i.e. specific situations experienced during the incident – were predictive of poor outcomes: having customers present during the robbery was associated with

higher stress and worse productivity, while being in close proximity to the assailant, feeling a greater threat to safety, and use of a weapon by the assailant were all associated with symptoms of posttraumatic stress, perceived stress, physical health, and work productivity.

Having to perform certain roles during the disaster could also be predictive of outcomes. Having leadership responsibility was associated with lower risk of PTSD symptoms in governmental employees following a bombing (Hansen et al., 2013). Suzuki et al. (2014) showed greater mental distress in public servants who were specifically involved in disaster-related work, particularly handling residents' complaints, following an earthquake. Elklit (1997) found that having to perform first aid was associated with feelings of distress and guilt about not being able to help more in super-tanker engineering workers.

Perceptions of safety, threat and risk

Employees' beliefs about whether they were safe, and perceived threats to their safety during the disaster, appeared to influence wellbeing. For example, Miller-Burke et al.'s (1999) study of bank employees who experienced a robbery found that feeling a greater threat to personal safety during the incident was associated with PTSD symptoms, perceived stress, and poorer physical health and work productivity following the event. Perceived threat to safety was the only feature of the robbery which was significantly associated with health and work distress. It appeared that employees felt their safety was particularly threatened if they were in close proximity to the assailant or if the assailant used a weapon.

In a study of school staff following the September 11th attacks (Piotrkowski & Brannen, 2002), appraised threat was uniquely associated with symptoms of PTSD – those who appraised the threat of future attacks as greater tended to report more PTSD symptoms.

Injury or near-death experiences. Sustaining an injury during the incident predicted PTSD symptoms (DiGrande et al., 2011; Grieger et al., 2005; Jordan et al., 2004); depression (Grieger et al., 2005; Jordan et al., 2004); panic attacks (Jordan et al., 2004); peri-traumatic distress (Shigemura et al., 2014); general anxiety (Jordan et al., 2004); hyperarousal (Nasky et al., 2009); and distress (Grieger et al., 2005). Having a near-death experience predicted peri-traumatic distress (Shigemura et al., 2014). However, Hansen et al. (2013) found that being injured increased the likelihood of PTSD symptoms in governmental employees after a bombing, but not to a statistically significant level, while VanDevanter et al. (2014) found that injury had no impact on stress in nurses following a hurricane.

Injury or death of close others

Death of colleagues was associated with PTSD symptoms (DiGrande et al., 2011) and with the "intrusion" aspect of PTSD (Lindal & Stefansson, 2011). Having colleagues either killed or injured predicted more social coping strategies, greater use of a psychologist and greater feelings of guilt (Elklit, 1997). Having any close other who was killed or injured predicted depression, panic attacks and anxiety

(Jordan et al., 2004), post-traumatic stress symptoms (Tapp et al., 2005) and general stress (Leon et al., 2007). Having family members killed or missing was associated with distress in public servants following an earthquake (Suzuki et al., 2014).

Nasky et al. (2009) found that hyperarousal and intrusion scores were higher for those who had a good friend injured or die as opposed to a less close acquaintance, and that avoidance, intrusion, hyperarousal and depression scores were all higher for those whose best friend was injured or killed.

Social factors

Work relationships

Satisfaction with management and leadership was associated with general job satisfaction in super tanker engineering workers (Elklit, 1997), whereas satisfaction with workplace communication was associated with less mental distress in public servants (Suzuki et al., 2014). Van der Velden et al. (2014) found that employees who felt they had "problems with colleagues" were more likely to experience anxiety, depression, hostility, and reporting having had at least two mental health disturbances following a disaster. Xu & Wu (2014) found that "external satisfaction" (a composite measure of satisfaction with management, the work environment and interpersonal relationships with colleagues) was predictive of stress, but not post-traumatic growth.

One study of various different organisations which had experienced workplace fires (McKimmie et al., 2009) compared the effects of different types of social support (workplace peers, supervisors, the organisation as a whole, and friends/family), as well as workgroup identification, on ability to cope. No type of social support emerged as predictive of coping effectiveness, but group identification did – employees who felt more connected to their work group were more likely to cope better after the fire. While peer support and managerial support did not independently predict coping effectiveness, the interaction between them did – when supervisor support was high, increases in peer support were associated with better coping. Finally, when workgroup identification was low, then greater family support increased coping effectiveness.

The two studies of military personnel found mixed results. In one study "unit cohesion", i.e. the bonds between unit members, had no impact on symptoms of distress in Navy sailors following a shipwreck (Eid et al., 2001), whereas in the other (Nasky et al., 2009) those who rated separation from shipmates as "difficult" were more likely to report symptoms of depression.

One study (Byron & Peterson, 2002) found that employees whose organisations provided more disaster-related social support reported greater work satisfaction, but also greater stress symptoms and event-related strain than those in companies providing less disaster-specific support.

Social relationships

Several studies looked at social support generally, often without specifying whether this came from friends, family or colleagues. Trout et al. (2002) found that federal employees who reported having two or fewer confidants were

significantly more likely to show symptoms of both depression and PTSD than those with more than two. Tapp et al. (2005) found that social support mediated the relationship between post-traumatic stress symptoms and both witnessing the disaster and knowing a victim; post-traumatic stress symptoms were higher in these circumstances when social support was low. Sanchez et al. (1995) found that social support affected psychological symptoms, and that for individuals who had suffered severe losses, high-quality support resulted in lower levels of work tension.

In a study of journalists, Weidmann et al. (2008) found that social acknowledgement (positive reactions from people outside of one's closest social network, such as local authorities, the media and the general public) was related to post-traumatic stress symptoms, but workplace and friends support, family support and "trauma peers support" (support from colleagues who had also reported on the same or similar traumatic incidents) were not. Social acknowledgement and support from colleagues who had also reported on disasters were correlated with depression, though only social acknowledgement remained significant in multivariate analysis.

Finally, two studies specifically considered negative social relationships: Shigemura et al. (2014) found that experiencing discrimination or slurs was associated with both peri-traumatic distress and PTSD symptoms, while Richman et al. (2004) found that experiencing sexual harassment or workplace abuse interacted with disaster exposure in relation to alcohol misuse.

Post-disaster

Impact on life

When employees' lives were affected substantially post-disaster – in terms of their finances, confidence, employment or living situation – this appeared to impact their psychological wellbeing. Financial loss was associated with psychological distress in factory workers following earthquakes (Bland et al., 2005). Losing confidence in oneself (which was most strongly predicted by lower household income) was associated with PTSD symptoms in staff members of after-school programs (Piotrkowski & Brannen, 2002). Having one's work impacted by the disaster was associated with post-traumatic stress symptoms in ministerial employees (Blix et al., 2013). Nurses who experienced personal storm-related loss/damage were more likely to report stress (VanDevanter et al., 2014).

Those whose living conditions were affected by the disaster tended to have poorer wellbeing: for example, Bland et al. (2005) found that those evacuated far away from their families were significantly more likely to experience PTSD symptoms, and Shigemura et al. (2014) found that property loss was associated with peri-traumatic distress. Suzuki et al. (2014) found that those living in a shelter following the disaster were more likely to experience distress. Similarly, Leon et al. (2007) found that university employees displaced to temporary living accommodation were at greater risk for stress than those with the same living circumstances as before the disaster; those displaced for greater than 3 months also had greater stress than those displaced for less than a month. Those who were displaced further away

with a long commute to work were also more likely to be stressed.

Discussion

Our review aimed to identify social and occupational factors predicting psychological outcomes among trauma-exposed employees, in order to identify recommendations for potential interventions. Analysis of the literature showed evidence of several factors affecting the wellbeing of employees who have been exposed to a disaster.

Unsurprisingly the only studies considering previous experience involved those groups who may expect to deal with crises, such as military personnel and nurses. There was no evidence that having prior experience of working during a crisis had any impact on post-disaster outcomes. Only one study (Nasky et al., 2009) found that senior officers were less likely to suffer PTSD symptoms than non-commissioned officers, but this may not necessarily be due to the greater training and experience that senior officers are likely to have – other variables may be involved such as education and childhood experiences, and age may well be mediating factors. Of the two studies, which considered pre-disaster income, both found that lower income was associated with greater post-disaster PTSD symptoms and stress. DiGrande et al. (2011) suggested that this may be because those with lower incomes are less likely to seek or receive mental health treatment; it may also be the case that different resources are available to those with higher incomes. There were mixed results on the effect of previous traumatic life events: while several studies showed no relationship between prior trauma and post-disaster outcomes, others indicated that it was an important factor. It may be that the type and extent of the trauma, as well as when it was experienced, affects whether prior trauma is associated with post-disaster outcomes. A small number of studies suggested that prior psychiatric history and poor job satisfaction pre-disaster were both predictive of poorer post-disaster outcomes.

Although four studies showed no association between traumatic exposure and outcomes, many more demonstrated a significant effect, with both severity and amount of exposure being influential, and longer or more traumatic exposure generally associated with poor outcomes. Proximity to the disaster also appeared to be important, with those working in locations directly affected by the disaster more likely to experience distress than those farther away.

Specific peri-traumatic experiences may also affect wellbeing. Individual papers showed the effects of peri-traumatic dissociation and strain, features of the incident for example customers being present during the disaster, and having to perform certain roles during the crisis such as dealing with complaints from the public or performing first aid. However, different papers tended to consider different peri-traumatic experiences, and so there is little support from the literature regarding the importance of these features.

Two papers found a significant relationship between perceived lack of safety and wellbeing. The majority of studies which looked at personal injury as a predictor of wellbeing found that sustaining an injury or having a near-death experience were associated with poorer outcomes.

There was also strong evidence that employees may suffer poor mental health post-disaster if someone they know is injured or killed. The literature suggested that death or injury of someone close were particularly associated with poor wellbeing. This finding fits well with the DSM-5 criteria for PTSD, which includes actual or threatened death to a family member or close friend (American Psychiatric Association, 2013).

Social support appeared to be important, particularly organisational support from colleagues. There was however one study which showed that an organisation providing specific disaster-related support led to greater stress, which may imply that while support from the workplace in general is beneficial, specific training in evidence-based interventions (e.g. in Psychological First Aid – PFA) may be required before disaster-related support can be offered. Social support outside of the workplace also appeared to be important, with high levels of support or a greater number of confidants beneficial to employees and negative social relationships such as harassment leading to poorer outcomes. Social acknowledgement was also found to be important, with a lack of positive acknowledgement from others associated with poorer outcomes. This supports previous research on disaster responders, which has suggested lack of social acknowledgement is associated with PTSD symptoms (Thormar et al., 2016).

Finally, the long-term impact of disasters may have an effect on psychological wellbeing. For example, those whose personal or professional lives were affected appeared to be more at risk of mental health problems. Spending time away from the home or family, needing food or clothing aid, and particularly “losses” – personal, property, work-related or financial - were frequently associated with poor outcomes.

The themes uncovered in this review support those found in our previous reviews of humanitarian relief workers and disaster responders (Brooks et al., 2015, 2016). Pre-disaster experiences, job satisfaction, traumatic exposure, perception of safety, harm to self/close others, social support and post-disaster impact on life were found to be important among all occupational groups. It is an important finding that similar factors are important in both groups – those involved in disasters as part of their day-to-day jobs and those unexpectedly caught up in traumatic incidents. Organisations not routinely exposed to trauma may be able to learn from those who are, and interventions which have proved successful with responders may also be useful for other organisations.

Limitations

It must be noted that there were several inconsistencies in the literature, and several of the themes discussed in this review were only explored in a small number of papers. It is also important to note that the levels of disaster exposure differed from paper to paper, with some participants directly caught up in incidents while others simply happened to be in the vicinity, therefore direct comparisons between papers are not easy and it may be that some of the factors discussed are more likely to affect those directly involved. Although the quality of included studies was high overall, most studies were cross-sectional thus imply only associations rather than causality. Therefore, we recommend that further research should consider

employing prospective or longitudinal studies, and should explore a wide variety of potential predictors of outcomes.

Implications

Although more evidence from trials is needed before a proper model of factors affecting the wellbeing of trauma-exposed employees can be developed, we can use the results of this review to develop provisional recommendations for organisations to protect the wellbeing of their employees should they be affected by a disaster.

The presented evidence suggests organisations should have a clear policy framework for protecting staff in the case of a traumatic event (e.g. Riddle et al., 2015). We suggest that in addition to training and safety manuals, there should be short disaster-related workshops, perhaps incorporated into existing emergency training. This could involve simulated disasters and provision of information to develop coping skills. Managers could mitigate the potential negative effects of having to perform certain tasks during a disaster by ensuring clarity in training and ensuring employees feel prepared and supported. Educational programmes designed to equip employees with specific knowledge of what to do during a disaster have been shown to improve preparedness and confidence in abilities (Gershon et al., 2004; Reid et al., 2005).

Our results highlighted the importance of social support in maintaining wellbeing. Organisations should consider the wellbeing of their employees on an ongoing basis to ensure they feel supported as this is likely to increase the likelihood of them wanting to, and being psychologically able to, return to work post-disaster. Managers should themselves be approachable and encourage a supportive, non-discriminatory environment at work. This might be achieved by providing training workshops aimed at building team cohesion, or encouraging teamwork through team-building exercises.

Should a disaster occur, organisations should be aware of those who may be particularly vulnerable to distress so they can monitor them closely. Our review suggests that those particularly vulnerable would be employees who: have prior psychiatric history; have poor job satisfaction; are injured or know someone injured during the disaster; experience losses during the disaster; and those most highly exposed to trauma. It would be useful for organisations to be aware of the guidelines for treating traumatic stress (NICE, 2005; UKPTS, 2014) and ensure that support is available for those who need it; leaders should ensure that employees know what normal stress reactions after such an event may be and where to seek help. Provision of information about coping mechanisms post-incident is likely to be good practice although at present it is not wholly clear what the impact of this is upon longer-term mental health (Adler et al., 2008; Turpin et al., 2005). Of note is that there is also evidence suggesting that provision of support to families of those affected may also be supportive of the employee’s mental health (Mulligan et al., 2012).

It would be useful for employees to be trained to support each other appropriately and recognise symptoms of distress in colleagues. PFA may be useful for organisations to consider as it provides a framework for supporting peers in sensitive, practical ways following trauma. Training covers

aspects such as learning how to assess needs, supportive listening, and helping others connect to appropriate information or support, and has been shown to improve confidence in being able to support others who are distressed (Chandra et al., 2014). An alternative is Trauma Risk Management (TRiM; Greenberg et al., 2010), which has been used within the military (Gould et al., 2007) and other high-risk organisations (Whybrow et al., 2015) to train front-line staff to assist trauma-exposed colleagues in accessing support. TRiM training has been shown to improve attitudes towards mental health (Gould et al., 2007) and feeling able to recognise distress in colleagues and support them (Sage et al., 2016). PFA and TRiM could help build psychologically resilient workforces by improving knowledge and attitudes towards mental health and encouraging a supportive workplace atmosphere. If a disaster were to occur, a workplace with this kind of psychological training would be well-equipped to support its staff.

Conclusion

Evidence strongly suggests that it is important that organisations build a resilient workforce, outside of a disaster or crisis, to ensure that they will be able to cope if an event were to happen. This could be achieved through appropriate training on emotional and psychological wellbeing to equip staff with knowledge and coping strategies, from how to manage stress in general to what they might experience after an incident. Organisations which have the foresight to prepare their staff to deal with trauma might consider using interventions such as PFA or TRiM. Pre-disaster training on what to do in an emergency, provision of social support, and being able to recognise those who may be most vulnerable to poor wellbeing post-disaster are also important. However, currently it is not clear what sort of approach might be appropriate post-incident for organisations that have not prepared employees and we suggest this is an area worthy of further study.

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Declaration of interest

NG runs a psychological health consultancy which provides among other services Trauma Risk Management (TRiM) training.

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Appendix 1. Search strategy.

Search: EMBASE 1980–2015; EMBASE 1974–1979; EMBASE Classic 1947–1973; Ovid Medline 1946–2015; PsycINFO 1806–2015; Web of Science.

Search 1 (psychological wellbeing);

Well-being; anxiety; panic; post-traumatic stress; PTSD; stress; ‘‘mental health’’; depress*; neurosis; adjustment disorder*; distress; psychological; resilience; coping; ‘‘mental disorder*’’; ‘‘positive psychology’’; ‘‘satisfactory life’’; mindfulness; flourish; pleasure; flow; growth =COMBINE WITH OR

Search 2 (disasters);

Anthrax; avalanche; avian influenza; bioterrorism; bird flu; blizzard; bomb*; chemical spill; Chernobyl; cyclone; drought; disaster*; earthquake; Ebola; emergency*; explosion; fire; Fukushima; H1N1; H5N1; hurricane; industrial accident; landslide; massacre; mass killing; MERS;

Middle East respiratory syndrome; pandemic; nuclear radiation; radiological; SARs; severe acute respiratory syndrome; September 11th; shooting*; storm; swine flu; terrorist*; Three Mile Island; tidal wave; tornado; tsunami; typhoon; volcanic eruption; volcano; World Trade Center.

=COMBINE WITH OR

Search 3 (occupational search terms);

Organisation*; organization*; occupation*; employee*; employer*; workforce*; worker*; business; team; emergency response; healthcare provider*; healthcare worker*; construction work*; fire-fighter*; fire officer*; paramedic*; doctor*; nurse*; police; first aid responder*; personnel; hospital administrator; military.

=COMBINE WITH OR

Combine Search 1 AND Search 2 AND Search 3

Appendix 2. Quality appraisal form.

All questions are answered with “yes” or “no”.

Section 1: Study design

1. Was the research question/objective clearly stated?
2. Were all subjects selected or recruited from the same or similar populations (including the same time period)?
3. Were the inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all participants?
4. Was the study population and size clearly specified and defined?

Section 2: Data collection and methodology

5. Were standardised measures used, or where measures were designed for the study, attempts to ensure reliability and validity were made?
6. Were the data collected in a way that addressed the research issue?
7. Was the participation rate stated and at least 50%?
8. Was the number of participants described at each stage of the study?
9. If the study followed participants up, were reasons for loss to follow-up explained?

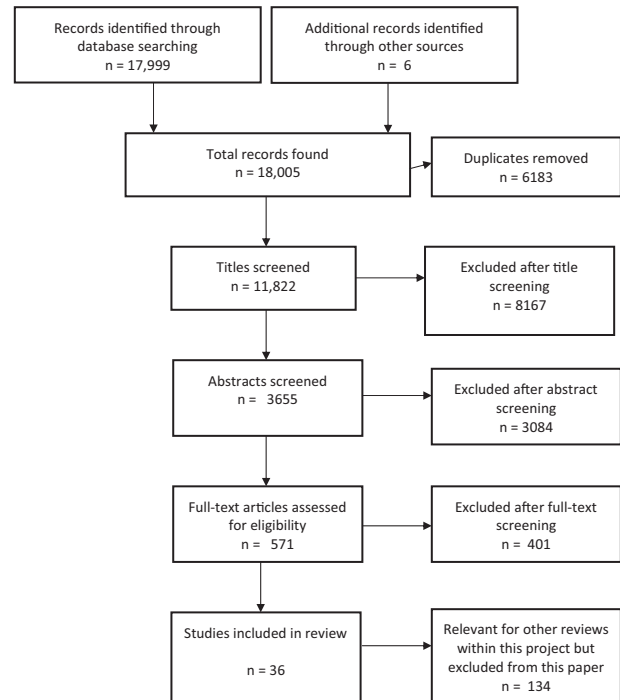
Section 3: Analysis and interpretation of results

10. Were details of statistical tests sufficiently rigorous and described?
11. Were details of confidence intervals given?
12. Were potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?
13. Was the answer to the study question provided?
14. Are the findings related back to previous research?

15. Do conclusions follow from the data reported?
16. Are conclusions accompanied by the appropriate caveats?

Appendix 3. Flow chart of screening and inclusion/exclusion.

Please note that the search strategy was designed to be as broad as possible and to cover various different reviews within part of a wider project. Since over 18 000 papers were found in the initial search, we have not been able to include every reason for exclusion. However, some of the common reasons for exclusion included a lack of quantitative wellbeing measures; no analysis of associations between outcomes and potential predictors; and measures of only physical, not psychological, health.



Supplementary material available online