Foundation

Protecting the Mental Health of Disaster and First Responders: A Systematic Review

Protocol

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Summary

This protocol outlines a comprehensive systematic review examining evidence on how the mental health and wellbeing of disaster and first responders can be protected in order to maintain their occupational functioning and safeguard their mental health. The review will synthesise global evidence on the effectiveness, acceptability, and feasibility of psychological and occupational interventions designed for these populations

A systematic search will be conducted across six bibliographic databases (Web of Science, Scopus, Embase, PsycINFO, MEDLINE, PTSDpubs, PubMed) and three trial registries (ClinicalTrials.gov, CENTRAL, the ISRCTN registry), supplemented by forward and backward citation searching and author contact. Studies published in English will be eligible. Included populations will encompass a wide range of disaster and emergency responders (e.g., police, firefighters, paramedics, search and rescue workers, humanitarian and relief workers, healthcare, military, and community responders). All peer-reviewed empirical study designs (qualitative, quantitative, mixed-methods) and grey literature resources will be considered.

Two reviewers will independently screen studies, extract data, and conduct quality and risk-of-bias assessments using appropriate tools (CASP checklists, RoB-2, and ROBINS-I), with inter-rater agreement assessed using Cohen's kappa. Data will primarily be synthesised narratively following established guidance, with reflexive thematic analysis. Where sufficient homogeneity exists, random-effects meta-analyses will be undertaken for prevalence estimates and intervention effects, alongside heterogeneity assessment and potential meta-regression or subgroup analyses.

Findings will generate actionable, policy-relevant insights regarding best practices, implementation barriers and enablers, and responder perspectives, ultimately informing the development of effective, equitable strategies to protect the mental health, wellbeing, and workforce sustainability of disaster and first responders globally.

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Introduction

Background and overview

Disaster was defined as a severe disruption to a community's functioning, causing widespread human, material, economic, or environmental losses that exceed the affected community's ability to cope using its own resources (World Health Organisation [WHO], 2021). Disasters and emergencies constitute major global challenges with far-reaching and systemic impacts, encompassing climate- and environmental-related hazards (e.g., earthquakes, floods, wildfires) and human-made crises (e.g., terrorism, armed conflict), and affecting multiple domains including physical health, mental wellbeing, social structures, the environment, and economic stability (United Nations Office for Disaster Risk Reduction [UNDRR], 2020). Such events can lead to substantial mortality, injury, displacement, and social disruption, while placing significant strain on emergency and healthcare systems (WHO, 2013).

Recent global evidence further underscored the increasing frequency and impact of disasters and the persistent challenges related to safety. Findings from the Lloyd's Register Foundation World Risk Poll, synthesised in Resilience in a Changing World, showed that exposure to hazards and perceptions of risk remain widespread, with disasters continuing to pose significant threats to both community and occupational safety worldwide (Lloyd's Register Foundation, 2023). These findings highlight the growing need to strengthen resilience and safety systems, particularly for those working on the front line of disaster and emergency response.

Disaster and emergency responders play a critical role in managing crises (UNDRR, 2015); however, the nature of their workplaces, or local communities, often places them at increased risk of adverse mental health and wellbeing outcomes. Responders are frequently exposed to potentially traumatic events, high levels of operational stress, and prolonged or repeated deployments, all of which may contribute to psychological distress (Greenberg et al., 2015). Evidence from systematic reviews and meta-analyses indicates elevated prevalence rates of mental health difficulties among these groups. For example, pooled estimates of probable post-traumatic stress disorder (PTSD) have been reported at 14.3% among first responders across 138 studies (Arena et al., 2025), approximately 9.8% among rescue workers globally across 149 studies (Martinez & Blanch, 2023). A prevalence of 16.37% has also been reported among medical personnel involved in earthquake response (Tahernejad et al., 2023). Similarly, during the COVID-19 pandemic, a systematic review of 17 studies (n = 8,096) reported prevalence rates of 31% for probable depression, 32% for anxiety disorders, and 17% for stress among responders to medical emergencies (Huang et al., 2023).

In parallel, the Lloyd's Register Foundation Global Safety Evidence Centre has highlighted disaster and emergency responders as a priority population within the broader context of occupational safety. Its recent scoping review on climate change and safety at work highlights that responders are increasingly exposed to complex, prolonged, and high-risk operational environments, with emerging evidence pointing to significant psychological and safety-related risks in this group (Lloyd's Register Foundation, 2024). Notably, the scoping review emphasised substantial gaps in the evidence base regarding effective strategies to mitigate these risks and to support the health, safety, and wellbeing of responders in changing and increasingly hazardous conditions.

In response to these risks, a range of interventions and programmes have been developed to protect and promote the mental health and wellbeing of disaster and emergency responders. These interventions vary widely in their theoretical underpinnings, timing, and delivery formats, and may include preventative approaches (e.g., resilience training, psychoeducation), early interventions (e.g., peer support, psychological first aid), and treatment-focused strategies (e.g., trauma-focused therapies) (Benedek et al., 2007; Everly & Mitchell, 2008; Moran et al., 2024). Intervention programmes may be delivered at individual, team, or organisational levels and are often adapted to specific occupational contexts (WHO, 2013). While such interventions are increasingly implemented across emergency and disaster settings, their content, structure, and intended outcomes differ substantially (Brooks et al., 2019; Haugen et al., 2017).

Despite the growing implementation of interventions to support disaster and emergency responders, the current evidence base remains relatively fragmented and inconclusive. Existing studies vary considerably in terms of intervention type, study design, outcome measures, and populations, making it difficult to determine which approaches are most effective and under what conditions (Haugen et al., 2017; Brooks et al., 2019). Moreover, there is limited synthesis of the specific components or features that contribute to intervention effectiveness, as well as the contextual factors that influence successful implementation. As a result, important questions remain regarding the types of interventions available, their effectiveness across different responder groups, and the mechanisms through which they achieve their outcomes, particularly in relation to improving both psychological wellbeing and operational safety outcomes. This gap has also been explicitly identified by the Lloyd's Register Foundation.

Rationale and review aims/objectives

Given the essential role of disaster and emergency responders in protecting public safety, safeguarding their mental health and wellbeing is a moral, clinical, safety and operational priority. Poor mental health among responders is associated with reduced work performance,

increased presenteeism, sickness absence, and workforce attrition, all of which carry substantial organisational and societal costs (Brooks et al., 2019; Joyce et al., 2016). In high-risk occupations such as emergency and disaster response, even small reductions in workforce effectiveness can have disproportionate consequences for service delivery and public safety, as mental health difficulties are linked to impaired concentration, reduced decision-making capacity, and increased likelihood of errors and safety incidents, alongside measurable productivity losses of up to 35% among affected workers (World Health Organisation, 2022; OECD, 2023). At a system level, mental health-related presenteeism contributes substantially to economic burden, forming a major component of the estimated £80 billion annual cost of poor workforce health in the UK (Deloitte, 2022; Health and Safety Executive, 2023). This burden is also reflected globally, with poor mental health estimated to cost the world economy approximately $1 trillion per year in lost productivity, largely driven by presenteeism and absenteeism (WHO, 2022).

There is growing evidence that preventative and early interventions for mental health are both clinically effective and cost-efficient. Workplace programmes, in particular, have been shown to yield returns of approximately £4.70–£5 for every £1 invested, alongside reductions in healthcare costs, improvements in productivity, and mitigation of risks associated with reduced workforce effectiveness (Deloitte, 2024). Consistent with this, emerging evidence from high-risk occupational groups, including emergency responders, indicates that such interventions are associated with reductions in psychological symptoms, sickness absence, and workforce attrition, as well as improvements in productivity and operational performance (Haugen et al., 2017; Brooks et al., 2019; Joyce et al., 2023).

Despite increasing investment in programmes to support responder wellbeing, there remains limited clarity regarding which interventions are most effective, for whom, and under what conditions. A comprehensive synthesis of the effectiveness, characteristics, and implementation of such interventions is therefore required to inform evidence-based practice and policy decision-making, optimise resource allocation, and support the development of sustainable and scalable approaches. Therefore, this systematic review aims to address these gaps by examining the effectiveness, characteristics, and implementation of interventions designed to support the mental health and wellbeing of disaster and emergency responders. The review also aims to identify how best to implement effective interventions.

This review directly responds to priorities identified by the Lloyd's Register Foundation. By synthesising evidence on the effectiveness, characteristics, and implementation of interventions for disaster and emergency responders, this review seeks to inform policies and practices that enhance both psychological wellbeing and safety outcomes in high-risk occupational settings.

Research questions

1. What is the effectiveness of interventions/programmes to support the mental health and/or well-being of disaster and first responders?

1.1. What are the different types of interventions/programmes targeted at disaster and first responders?

1.2. What is the effectiveness of the different types of interventions targeted at disaster and first responders?

1.3. What are the demographics and characteristics of disaster and first responders served by these interventions?

2. What are the common features or components of effective interventions?
3. What are the enablers and barriers to the successful implementation of effective interventions for disaster and first responders?
4. What are the views and perspectives of disaster and first responders about the usefulness and acceptability of different interventions aimed at supporting their mental health and/or wellbeing?

Methodology

Search strategy

Searched for unpublished studies: Peer-reviewed studies and relevant grey literature will be sought.

Main bibliographic databases that will be searched: Web of Science, Scopus, Embase, PsychInfo, MEDLINE, PTSDpubs, PubMed.

Other important or specialist databases that will be searched: ClinicalTrials.gov, ISRCTN, CENTRAL

Potential databases for Grey literature search: EThOS, Google Scholar, APA PsycExtra, The Disaster and Emergency Management Authority (AFAD; Turkish Organisation), World Health Organisation, International Labour Organisation, AKUT Search and Rescue Association (Turkey), International Federation of Red Cross and Red Crescent Societies, United Nations Office for Disaster Risk Reduction, Health and Safety Executive, National Institute for Occupational Safety and Health.

Other methods of identifying studies: Other studies will be identified by:

- Contacting authors
- Looking through all the articles that cite the papers included in the review (forward citation) and reference list checking (backward citation).
- Furthermore, we aim to contact relevant stakeholders, charities, and organisations to identify any additional unpublished or ongoing work, in line with recommended approaches for grey literature identification.

Search terms

The search terms were developed in line with the research questions and inclusion/exclusion criteria, informed by established frameworks such as PICO/PECO and SPIDER. An initial set of keywords and subject headings was identified through scoping of the literature, including reviewing search strategies used in similar systematic reviews and the research team's previous work. These terms were iteratively refined through discussion within the research team and in consultation with an experienced university librarian (15 years' experience in mental health literature searching). The final search strategy combines controlled vocabulary (e.g., MeSH terms) and free-text terms using Boolean operators (AND/OR) to capture studies relating to the population, interventions, etc.

The search terms and eligibility criteria were developed using multiple frameworks to align with the different research questions. Specifically, PICO was applied to research questions focused on intervention effectiveness (e.g., RQ 1), PECO was used for exposure-based questions (e.g. RQ2 and RQ3) examining associations between disaster exposure and mental health outcomes, and SPIDER informed questions relating to qualitative and mixed-methods evidence (e.g., RQs 3 and 4). Concept 1 (Population) aligns with the Population component of PICO and PECO, and the Sample component of SPIDER. Concept 2 (Disaster) reflects the contextual or exposure component, corresponding to the Exposure element in PECO and the Phenomenon of Interest in SPIDER. Concept 3 (Mental health and wellbeing) represents the Outcome in PICO & PECO, and the Phenomenon of Interest in SPIDER. Concept 4 (Intervention) aligns with the Intervention component in PICO, while Concept 5 (Effectiveness) corresponds to the Outcome in PICO and PECO (Please see "Inclusion and Exclusion Criteria" for more details).

MEDLINE- Preliminary Search:

The current MEDLINE search strategy has been developed at a preliminary level for the purposes of the protocol. In the full review, this will be refined into a comprehensive, advanced search strategy, including the use of MeSH terms (with the explode function where appropriate) and a structured, line-by-line approach for each search term to maximise sensitivity and precision. For this reason, following the implementation of the advanced search strategy, we anticipate identifying a larger volume of records for screening.

A single, comprehensive search strategy will be employed to capture all relevant studies across the different research questions, rather than conducting separate searches.

Ovid MEDLINE(R) ALL <1946 to March 17, 2026>		
1 (Concept 2-Disaster)	(Disaster* or Anthrax or avalanche or avian influenza or bioterrorism* or bird flu or blizzard or bomb* or	4323762

	chemical spill or Chernobyl or cyclone or drought or earthquake* or Ebola or emergenc* or explosion or flood or fire* or Fukushima or H1N1 or H5N1 or hurricane* or industrial accident* or landslide or massacre or mass killing* or mass shooting* or MERs or Middle East respiratory syndrome or oil spill* or pandemic or nuclear radiation or radiological or SARs or severe acute respiratory syndrome or September 11th or shooting* or storm* or swine or flu* or terroris* or Three Mile Island or tidal wave or tornado* or tsunami or typhoon or tropical storm or volcanic eruption* or volcano* or wildfire* or World Trade Center).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	
2 (Concept 3- MH & Wellbeing Outcomes)	(anxiety* or panic* or posttraumatic stress or post-traumatic stress or PTSD or mental health or depress* or adjustment disorder* or suicid* or alcoholism or drug abuse or substance abuse or resilience or coping* or mental disorder* or posttraumatic growth).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	1682152
3 (Concept-4 Intervention Programmes)	((((((((((("prevention program*" or "preventive intervention*" or "preventive measure*" or "early intervention*" or "occupational health intervention*" or "occupational safety program*" or "public health intervention*" or "occupational health promotion" or "occupational health and safety" or "workplace intervention*" or "organi*ational intervention*" or "workplace policy" or "workplace well-being program*" or "employee assistance program*" or "health education program*" or "workplace health initiative*" or	4628945

	"workplace well-being" or "mental health intervention*" or "psychosocial intervention*" or "stress management program*" or "psychological resilience training" or "peer support program*" or "mental well-being program*" or "mindfulness-based intervention*" or "cognitive behavioural intervention*" or "CBT-based intervention*" or "crisis intervention*" or "post-traumatic stress prevention" or "suicide prevention program*" or "workplace mental health initiative*" or "coping strategy training" or "emotional resilience training" or "trauma-informed intervention*" or "critical incident stress management" or "CISM" or "post-incident support program*" or "occupational trauma intervention*" or "psychological first aid" or "workplace stress reduction program*" or "mental resilience training" or "post-trauma support program*" or "PTSD prevention program*" or "workplace counselling service*" or "trauma recovery program*" or "emergency responder stress intervention*" or "debriefing intervention*" or "exposure therapy*" or Occupational health services or Crisis intervention or Organi*ational support or TRiM or trauma risk management or Debrief* or CISD or critical incident stress debrief* or Mental health first aid or Psychological first aid).mp. or exp cognitive behavio*ral therapy/ or Compassion focused therap*.mp. or Brief eclectic psychotherap*.mp. or Cognitive processing therap*.mp. or EMDR.mp. or eye movement desensiti*ation.mp.) and reprocessing.mp.) or Expressive writing.mp. or Reflective.mp.) adj1 (practice or group*).mp.) or Group.mp.) adj1 reflect*.mp.) or Schwartz round*.mp. or Balint group*.mp. or Psychoeducation.mp. or Psych*.mp.) adj1 intervention*.mp.) or Psych*.mp.) adj1 "support behavioural intervention*".mp.) or "behavio*ral intervention".mp. or "health behaviour change intervention*".mp. or "health behavio*r change intervention*".mp. or "lifestyle intervention*".mp. or "substance abuse prevention".mp. or "alcohol abuse prevention".mp. or "addiction recovery support".mp. or "workplace wellness program*".mp. or "healthy lifestyle promotion".mp. or "resilience training".mp. or "psychological resilience intervention*".mp. or "coping strategy training".mp. or "adaptive coping skills	

	program*".mp. or "stress adaptation program*".mp. or "emotional self-regulation intervention*".mp. or "peer mentoring program*".mp. or "self-care education program*".mp. or "positive psychology intervention*".mp. or "social support intervention*".mp. or "team-based resilience training".mp. or "prevent*".mp. or "intervention*".mp. or "leadership resilience training".mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	
4 (Concept 5-Efficacy/Effectiveness)	("efficacy" or "effectiveness" or "impact" or "program evaluation" or "evidence-based intervention*" or "evidence-based practice" or "intervention effectiveness" or "program* assessment" or "service evaluation" or "clinical effectiveness" or "preventive effectiveness" or "real-world effectiveness" or "cost-effectiveness" or "program feasibility" or "intervention feasibility" or "practical application" or "real-world impact" or "mental health outcome*" or "psychological outcome*" or "stress reduction" or "stress management outcome*" or "burnout prevention" or "emotional well-being" or "psychological distress" or "anxiety reduction" or "depression reduction" or "suicidal ideation prevention" or "PTSD symptom reduction" or "trauma recovery" or "emotional resilience" or "psychological resilience" or "mental well-being" or "cognitive function improvement" or "post-traumatic growth" or "job performance improvement" or "workplace performance" or "employee productivity" or "workplace engagement" or "workplace satisfaction" or "job satisfaction" or "absenteeism reduction" or "presenteeism reduction" or "workplace retention" or "turnover reduction" or "employee morale" or "team effectiveness" or "workplace cohesion" or "occupational performance" or "workplace efficiency" or "organisational effectiveness behavio*r change" or "health behavio*r improvement" or "lifestyle change outcome*" or "life satisfaction" or "substance use	3889453

	reduction" or "alcohol consumption reduction" or "healthy coping strategies" or "adaptive coping mechanisms").mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	
5 (Concep 1- Population: disaster/emergency response related search terms)	(first responder* or frontline* or emergency responder* or emergency personnel* or emergency staff*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	25217
6 (Concep 1- Population: Professionals and local community related search terms)	(police* or fire fighter* or firefighter* or paramedic* or Rescue worker* Mortuary staff or Mortuary worker* or Relief work or Humanitarian aid worker* or Social worker* or seafarer* or construction worker* or miner* or combat medic* or government worker* or government employee* or government staff or The Foreign, Commonwealth, and Development Office staff or Disaster Victim Identification* or DVI Team* volunteer* or citizen responder* or lay responder* or community search* and community rescue* or civilian search* and civilian rescue* or bystander rescue* or community responder* or community first responder* or citizen first responder* or volunteer responder* or volunteer first responder*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	221
7 (Concept 1- population-excluding	5 or 6	25296

HCWs and military personnel)		
8 (will be included in screening)	1 and 2 and 3 and 4 and 7	739
9 (Concep 1- population: HCWs and military personnel related search terms)	(healthcare staff* or healthcare worker* or health professional* or doctor* or Nurse* or midwives or midwife or ambulance driver* or military personnel or armed forces or soldier*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	775020
10 (Concept 1- HCWs and military personnel who were directly involved in disaster response)	5 and 9	5686
11 (will be included in screening)	1 and 2 and 3 and 4 and 10	377

Inclusion and exclusion criteria

For RQ1 and RQ2 (PICO/PECO)

Population

This review will include occupational groups involved in disaster/emergency response, which may include:

- Professionals who are involved in emergency/disaster responders (e.g. police officers, firefighters, paramedics, search and rescue workers, construction workers, humanitarian aid workers, relief workers, and emergency service personnel)
- Local community members directly involved in disaster/emergency response
- Healthcare workers whose roles involved direct participation in disaster/emergency response,
- Military personnel whose roles involve direct participation in disaster/emergency response

Populations that do not meet the above inclusion criteria will be excluded from the study.

Intervention (s) or Exposure

In line with the framework outlined in Public Health Scotland (2024), interventions are conceptualised within a public health approach, including prevention and risk management, and promotion.

For the purposes of this review, a mental health or wellbeing intervention is defined as any structured programme, strategy, or activity explicitly designed to prevent or mitigate common mental health disorders among disaster and first responders. Eligible interventions may include, for example, psychological training programmes, peer-support initiatives, organisational or system-level approaches (e.g., workload management, shift design, leadership interventions), and early support approaches.

To be included, interventions should:

- Have a clear mental health or wellbeing focus;
- Be targeted at disaster and/or first responders (including formal and volunteer responders);
- Include a defined structure, component(s), or delivery mechanism (i.e., not purely descriptive accounts of exposure or experience); and
- Report outcomes related to mental health, wellbeing, or psychological functioning.

Occupational experience of responding to any type of disaster (e.g. man-made, weather-related, etc.) will be included in this review. For example, earthquakes, floods, wildfires, hurricanes, terrorist attacks, industrial accidents, mass killing, storms, volcanic eruptions, tsunamis, etc.

Comparator (s) or control (s)

Studies without a comparator (e.g., qualitative studies, within-group/single-armed pre-test & post-test design, etc.) will be eligible for inclusion in the systematic review.

Where sufficient methodological and clinical homogeneity exists, we will conduct meta-analyses to estimate the effectiveness/efficacy of interventions (RQ1 and RQ2). For this purpose, only studies including a control group will be eligible for inclusion in the meta-analysis. Eligible comparators may include: (i) no intervention or usual practice, where participants did not receive any mental health or wellbeing intervention during the study period; (ii) an active or placebo control condition (e.g., participation in an alternative programme not specifically designed to target mental health outcomes); or (iii) a waitlist control group.

All eligible studies, regardless of the presence of a comparator, will be included in the systematic review. However, only studies including a comparator will be considered for meta-analysis, subject to sufficient methodological and clinical homogeneity.

Outcomes

Outcomes relating to common mental health disorders (depression, anxiety disorders, post-traumatic stress disorder, substance/alcohol use disorders), resilience, coping skills, and post-traumatic growth and any consequential impact on behaviour or function. We will also consider the acceptability, feasibility, fidelity, and effectiveness of psychological interventions for disaster/first responders.

For RQ3 and RQ4 (SPIDER)

Sample

This review will include occupational groups involved in disaster/emergency response, which may include:

- Professionals who are involved in emergency/disaster responders (e.g. police officers, firefighters, paramedics, search and rescue workers, construction workers, humanitarian aid workers, relief workers, and emergency service personnel)
- Local community members directly involved in disaster/emergency response
- Healthcare workers whose roles involved direct participation in disaster/emergency response,
- Military personnel whose roles involve direct participation in disaster/emergency response

Populations that do not meet the above inclusion criteria will be excluded from the study.

Phenomenon of Interest

Eligible studies will examine both (i) factors influencing the implementation of interventions designed to support mental health and/or wellbeing, including barriers, facilitators, enablers, feasibility, adoption, fidelity, and acceptability, and (ii) participants' views, perceptions, experiences, and perspectives regarding the usefulness, acceptability, and perceived value of such interventions.

Design

Qualitative study designs, including interviews, focus groups, and ethnographic approaches, will be included. Mixed-methods studies will be eligible where a qualitative component is clearly reported. Process evaluations and implementation studies incorporating qualitative data will also be considered.

Evaluation

Studies must report qualitative findings relating to implementation processes (e.g., barriers and facilitators) and/or participants' perspectives, including perceived usefulness, acceptability, satisfaction, or experiential accounts of interventions.

Research Type

Only primary empirical studies employing qualitative or mixed-methods approaches will be included.

Search language restrictions: We will consider literature which is written in English that considers disaster responders working in any environment, including those who are deployed to other nations to provide a disaster response.

Literature search and study selection process

The searches conducted in the databases will be imported into reference management software (EndNote). Deduplication and screening will be conducted using EndNote.

Title and abstract screening will be conducted independently by two reviewers to identify studies that meet the inclusion and exclusion criteria. This will be followed by full-text screening of potentially eligible studies, again conducted independently by two reviewers. Any disagreements will be resolved through discussion and consensus, with involvement of the wider research team where necessary.

Cohen's kappa will be used to check whether reviewers agree on study inclusion beyond chance; high values (>0.8) will confirm clear criteria, while low values (<0.6) will indicate the need to refine inclusion and exclusion criteria before continuing (Hanegraaf et al., 2024).

Data extraction

Relevant data will be extracted from each included qualitative, quantitative, and mixed-methods study into a pre-designed Microsoft Excel spreadsheet.

Column headings in this spreadsheet will be: Authors; Year of publication; Country; Study design; Number of participants; Participant characteristics (mean age, gender %s, ethnicity %s); Occupation of participants; Type of disaster(s); Details of psychological intervention(s) (if applicable); Time-points of data collection; Method of data collection (e.g. interview, survey); Variables measured; Measures used (e.g. name of survey for quantitative studies; topics covered by interview questions for qualitative studies); Key outcomes.

Data will be extracted from all included studies by at least two independent researchers. To ensure accuracy, a proportion of the extracted data—determined in accordance with the total number of included studies—will be cross-checked by an additional researcher.

Quality assessment

We plan for the quality of cohort studies to be assessed using the Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I; Sterne et al., 2016). The quality of qualitative studies will be assessed using the Critical Appraisal Skills Programme Qualitative Checklist (CASP, 2018). Mixed-methods studies will be appraised by assessing their quantitative components using RoB 2 or ROBINS-I (according to study design), and their qualitative components using the CASP Qualitative Checklist.

While addressing the efficacy/effectiveness of intervention programmes, we plan to use the revised Cochrane Risk of Bias Tool for Randomised Trials (RoB-2; Sterne et al., 2019) for the randomised controlled trials, and Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I) for non-randomised controlled trials.

For the qualitative grey literature, we will use the CASP Qualitative Checklist (CASP, 2018), and we will use ROB-2 and ROBINS-I for the grey literature using relevant quantitative methods.

Two independent reviewers will complete the risk of bias/quality assessment check for at least 50% of the included studies, independently, by using the proper assessment tools as listed above. Any disagreements will be resolved by consensus following discussions with the wider research team.

Equity considerations

We aim to design and conduct this review using an explicit equity, diversity and inclusion (EDI) lens to ensure that the experiences of diverse disaster and first responder populations are adequately represented, interpreted, and reported.

1. **Review design and question formulation**
   The review questions have been developed to encompass a broad range of responder roles, sectors, and disaster contexts, recognising that psychological risks, resources, and intervention needs may differ by gender, ethnicity, socioeconomic position, geographic location, and employment status (e.g., volunteer vs paid). Where possible, analyses will consider differential impacts across these characteristics to avoid treating responders as a homogeneous group.
2. **Development of search strategies**
   Search strategies were constructed to maximise inclusivity by using wide-ranging population terms that capture diverse responder groups (e.g., community responders, volunteers, humanitarian workers, healthcare workers, military personnel, police officers, firefighters, paramedics) and multiple disaster types across global contexts. Although searches will be limited to English-language publications, the review team will record the geographical distribution of included studies and acknowledge potential language and publication biases.
3. **Data extraction and coding**
   Data extraction forms will include fields informed by the PROGRESS-Plus framework,

capturing participant characteristics (e.g., occupation, gender/sex, age, ethnicity, socioeconomic indicators, job role, employment status, and country/region) and contextual features (e.g., resource setting, organisational context, and structure of the intervention). Where reported, these data will be systematically extracted to enable assessment of representativeness and equity-relevant patterns across studies.

4. **Data synthesis and interpretation**
   Findings will be examined for differences and commonalities across demographic and occupational subgroups, disaster types, and geographic regions. Where sufficient data are available, subgroup analyses or narrative comparisons will explore whether intervention effectiveness, acceptability, or implementation barriers vary across equity-relevant characteristics. Particular attention will be paid to identifying populations that appear under-represented in the literature or underserved by existing interventions.
5. **Reporting of findings**
   Results will be reported transparently with respect to who is represented in the evidence base and who is not. Gaps in evidence relating to marginalised or under-studied groups will be explicitly highlighted. Language used throughout reporting will be person-centred, non-stigmatising, and sensitive to cultural and contextual differences. Implications for policy and practice will emphasise the need for inclusive, adaptable, and contextually appropriate interventions.

Data synthesis

Narrative synthesis/Qualitative synthesis: Data will be narratively synthesised using Popay and colleagues' guidance (Popay et al., 2006). There is no minimum number of studies required for synthesis. We will discuss each included study in detail, narratively describing all findings relevant to the review questions. We will consider the certainty of evidence by commenting on the methodological quality of the studies, based on the results of the quality appraisal. In order for the results section to be easy to read and understand, we will group results together by theme through analysis of the extracted data informed by Braun and Clarke's (2019) thematic analysis framework.

Meta-analysis: If sufficient homogeneity can be identified among the findings of the included studies related to intervention programmes for disaster/emergency responders, random effects meta-analyses will be conducted to address those questions. Heterogeneity will be tested by using I^2, and a score over 50% will mean "heterogeneity". We will also calculate the effect sizes of the included studies, as well as their weighted means (when the same measurements are used along with 95% confidence intervals) and their precisions. If enough data is available, we might consider doing meta-regressions (or subgroup analyses). We will consider study characteristics (e.g., year of publication, continent), sample characteristics (e.g.,

age, ethnicity, job role of responder, type of disaster, and duration of exposure) and outcome characteristics (e.g., measures used) when running the meta-regressions/subgroup analyses. Then, summary effects will be calculated, and forest plots will be generated.

The following guidelines will be used throughout the review process:

- ✓ For synthesising qualitative literature: Lachal et al. (2017)
- ✓ PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses):

(Page et al., 2021)

- ✓ Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2019)

Additionally, we will use GRADE (Schünemann et al., 2008) to assess the certainty of evidence for quantitative findings and GRADE-CERQual (Wainwright et al., 2023) for qualitative evidence, where applicable.

Consultation Group

A consultation group comprising methodological and subject-matter experts has been established to support the conduct of the review. The group will include experts in systematic review methodology, occupational and disaster mental health, and relevant applied settings.

The consultation group will provide input at key stages of the review, including refinement of the research questions, interpretation of findings, and contextualisation of results for policy and practice. The group also provided feedback on the search strategy, eligibility criteria, and data synthesis approach.

This process is intended to enhance the methodological rigour, relevance, and applicability of the review findings.

Protocol registration

This protocol has been registered on Open Science Framework (Registration DOI: 10.17605/OSF.IO/JTD5V) and PROSPERO (registration number: CRD420261375353).

Research team

Review Team Members

- Dr Sahra Tekin, Society of Occupational Medicine & University College London & Social Sciences University of Ankara
- Research Assistant, Society of Occupational Medicine
- Rose Wood, Society of Occupational Medicine
- Professor Neil Greenberg, Society of Occupational Medicine & King's College London

Responsibilities of the Team Members

Author contributions are reported below in line with the CRediT taxonomy, including roles such as conceptualisation, methodology, search strategy development, screening, data extraction, risk of bias/quality assessment, formal analysis, and writing.

Professor Neil Greenberg: Conceptualisation (Development of the research idea, aims, and research questions), Design of the review (frameworks, inclusion/exclusion criteria, analysis plan), Search strategy development (determining search terms, selection of the databases, designing search strategies for databases and grey literature), Interpretation of the Findings, Writing- review & editing

Dr Sahra Tekin: Design of the review (frameworks, inclusion/exclusion criteria, analysis plan), Search strategy development (determining search terms, selection of the databases, designing search strategies for databases and grey literature), Data curation (managing references, databases, and extracting resources), Screening (title/abstract and full-text), Data Extraction (extracting study characteristics and outcomes), Risk of bias/quality assessments, Analysis (narrative analysis, meta-synthesis, meta-analysis), Visualisation (forest plots, tables and figures, including PRISMA flowchart), Writing-original draft, Writing-editing, Reporting and transparency (PRISMA compliance, protocol registration)

Research Assistant: Data curation (managing references, databases, and extracting resources), Screening (title/abstract and full-text), Data Extraction (extracting study characteristics and outcomes), Risk of bias/quality assessments, Analysis (narrative analysis), Visualisation (forest plots, tables and figures, including PRISMA flowchart), Writing-original draft, Writing-editing, Reporting and transparency (PRISMA compliance, protocol registration)

Rose Wood: Screening (title/abstract and full-text), Risk of bias/quality assessments, and administrative activities to support the study

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