Mental Health Review J

Understanding Post-Crisis Trauma Recovery for the Past Decade in Uniformed Services: A Narrative Review

Journal:	*Mental Health Review Journal*
Manuscript ID	MHRJ-11-2021-0081.R2
Manuscript Type:	Research Paper
Keywords:	trauma recovery, crisis respondents, post-disaster management, military, police

Abstract

This narrative review explores mental health difficulties, including risk and protective factors, which may impact on symptom severity post exposure to crisis situations (war, terrorism, or natural disasters), among first responders from uniformed services. Peer-reviewed journal articles published in English between January 2012 to March 2022 were searched in ProQuest, Wiley, Google Scholar, and PubMed databases. Twelve articles were obtained from an original screening of 94,058 articles. Full article texts were screened for content and quality by two reviewers, with high agreeability. Post-traumatic Stress Disorder (PTSD) and depression were the most common diagnoses. Risk factors identified were (1) *Pre-deployment factors* of overweight, low cognitive ability and social support, existing emotional difficulties, negative childhood experiences, and stressful life events; (2) *During crisis situations factors* of higher frequency and subjective severity of combat, increased rates of combat stress reaction (CSR), high levels of concerns for life and family, more stressful mission position, threat of death/severe injury, and high rate of killing the enemy, and (3) *Post-deployment factors*, such as low social support and physical health, lack of coping mechanisms and use of avoidance strategies, and social stigma. Protective factors increasing resilience and lessening symptom severity were reported as pre-deployment cognitive ability, high social support, stable physical health, effective coping, post-traumatic growth, and high levels of perceived adequacy in pre-deployment preparation and training. In addition to main findings, data about author(s), publication type, population, age, type of crisis, and evaluation measures were extracted. Key findings and related theories, gaps in literature, and recommendations are discussed.

KEYWORDS: trauma recovery; crisis respondents; post-disaster management; military; police.

Understanding Post-Crisis Trauma Recovery for the Past Decade in Uniformed Services: A Narrative Review

Independent of the type of crisis (i.e., combat and/or natural disasters) and location (Western or Eastern countries), the uniformed services are regularly required to contribute their services as frontline crisis respondents. Constant exposure to stressful crisis situations may manifest as post-crisis psychological symptoms and difficulties such as Post-Traumatic Stress Disorder (PTSD), depression, and/or anxiety (Bowler et al., 2016; Ikin et al., 2020). Due to decreased income or unemployment, substance abuse and/or other personal factors (e.g., young age and ethnicity; Bowler et al., 2016; Elbogen et al., 2012; MacManus et al., 2019), these difficulties may be aggravated. In contrast, some factors, such as social support, stable living conditions, pre-deployment preparedness, and peer support (Elbogen et al., 2012; Kline et al., 2013) may reduce the intensity of crisis experiences being developed into severe mental health difficulties. However, at present, research lacks a collated overview of these findings, as aforementioned factors are reported from single and separate studies. In particular, there is an evident lack of research regarding protective factors of uniformed personnel, which may alleviate their mental health difficulties, Therefore, the present narrative review is a timely necessity.

While several theories could contribute to this research domain, *Pluralistic Trauma Theory* (PTT: Balaev, 2018), *Self-Determination Theory* (SDT: Ryan & Deci, 2000), *Effort-Reward Imbalance model* (ERI: Siegrist, 1996), and *Job Demand-Control-Support* model (JDCS: Johnson, and Hall, 1988) represent prominent theoretical frameworks to be considered. PTT (Balaev, 2018) suggests that trauma is not only about past experiences, but also about relations among experience, language, and knowledge. This approach conceptualises trauma as an event that changes perception and identity but awakes new

knowledge about one's self and the external world. This theory relies heavily on external stressors; trauma can happen in specific bodies, times, cultures, and places, resulting in a specific representation of trauma for each person. According to this theory, the effect of trauma is an interplay between external (e.g., cultural factors) and internal factors (e.g., personality traits), which creates a link between singular vs. collective experiences of trauma. This subjective perception is important in determining, "what is viewed as salient, how it is interpreted and encoded at the time of the event, what is most important as autobiographical functions, and what is socially acceptable to speak/what must remain hidden and unacknowledged" (Balaev, 2018). In contrast to more traditional models of trauma (Freud, 1895; Caruth, 1996), which attributes more to unobserved neurobiological functions, PTT suggests that what remains hidden and unacknowledged is due to the influence of cultural values (Balaev, 2018). An earlier complementary theory that is also worth noting is Self-Determination Theory (SDT; Ryan & Deci, 2000). Emphasis here is placed on the notion that human functionality depends on the social context; the interplay between intrinsic and extrinsic motivational factors determines an individual's response to different social situations and further influences social, cognitive and personality development. It is suggested here that exposure to a traumatic event could serve as a social event that impacts on individual functionality, impacting on development, although this has not been applied to trauma per se but rather to symptoms that could be secondary to this, such as depression and anxiety. However, what it does note is how optimal levels of development comprise of competence (confidence to perform), relatedness (need to perform), and autonomy (independence to perform), and that once these are met, functionality is raised (Legault, 2017). How exposure to traumatic events impacts on these areas is not yet known.

Alongside these more general models of understanding human reactions are those specific to the work environment, since focus here is on trauma exposure as a result of

exposure through work. The Effort-Reward Imbalance model (ERI: Siegrist, 1996), for example, captured the negative effects of occupational stress and work conditions in developed/rapidly-developing countries, due to an imbalance between high cost spent and low gain received in return. This repeated imbalance could arguably frustrate related circuits of the brain's reward system and increase the risk for developing stress-related disorders, such as depression (Siegrist, 2016). This suggests that occupations where there is a high cost but a low gain could be particularly vulnerable to this. Arguably working in an occupation such as the uniformed services, where there is a potential high cost to employees, raises the risk for stress-related disorders, of which trauma could be a core example. Alongside this is the need to capture the Job Demand-Control-Support (JDCS) model (Johnson & Hall, 1988), which outlines how employees are primarily stressed when there is a high demand (due to work overload, time pressure, and role conflict), low control (lack of autonomy), and inadequate social support. This builds on what is referred to as the 'strain' hypothesis and has parallels to the ERI 'high risk' components. The competing 'buffer' hypothesis views 'social support' as a protective factor, which moderates the negative impact of high demand—low control (Van der Doef & Maes, 1999). This raises the importance of capturing social support as a variable of potential significant interest in understanding the impacts of exposure to trauma within occupational settings.

As yet, however, research into the factors that could serve as risk and/or protective factors are not clearly indicated in terms of post-crisis recovery. The *types* of impact are researched to a greater degree but not the factors that could serve as 'strain' and/or 'buffers' to the demands that crisis responders are exposed to. Clearly, available theory can suggest possible factors of importance, but the empirical basis remains less clear. In consideration of this, the narrative review presented here aims to identify and assess the existing research literature, evidenced in the last decade, to capture the following aims: 1.) To understand what

mental health difficulties may manifest in a crisis responder, from uniformed services, when exposed to crisis situations; 2.) To capture the risk factors aggravating mental health difficulties; and 3.) To identify what factors protect crisis respondents from mental health difficulties.

Method

This narrative review was conducted in accordance with recommended guidelines of the Synthesis Without Meta-analysis Reporting Items (SWiM; Campbell et al., 2020) checklist (e.g. Grouping studies, describing methods, identify key study characteristics).

Data Sources and Search

Databases such as ProQuest, Wiley, Google Scholar, and PubMed were searched for peer-reviewed full text journal articles published in English between January 2012 and March 2022. This specific timeline is therefore able to provide an overview of findings for the period from the first emerging publications using the DSM-5 to the current date. The keywords used for the search strategy are: “Crisis respondents*” OR “Post-disaster management*” AND “Mental health difficulties*” OR “Mental health symptoms*” OR “*Trauma” OR “Trauma recovery*” AND “Risk factors*” OR “Protective factors*” AND “War*” OR “Terrorism*” OR “Natural disasters*” OR “Emergency*” OR “Rescue*” OR “Violence*” AND “Military*” OR “Police*”. Articles were excluded if they were duplicates, not relevant, not a primary research study, had weak methodology (i.e., high risk of sampling bias with convenience and snowball sampling, low sampling size, imprecise outcome measures, and limited generalisability due to over/under emphasis on multiple demographic factors), and if the publication language was not English (See Figure 1).

Data Extraction and Quality Appraisal

Titles and abstracts of the articles were initially evaluated by Reviewer 1 (RS). Thereafter, articles eligible for full-text screening were assessed by two reviewers (RS and MA) who reached high agreement (78%) on the final decision. Each paper was independently assessed for its quality (i.e., the overall appraisal is presented as, "Include", "Exclude" or "Seek further info") using the Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Joanna Briggs Institute; 2017) by two reviewers (RS and MA), who reported high agreement (82%). Data were extracted under following domains: author(s), publication type, population, age, and type of crisis (Table 1), in addition to key findings, which were tabulated as mental health difficulties, and risk and protective factors (Table 2).

Results

Literature Search

The initial search resulted in 94,058 articles. After 564 duplicates were removed, 93,494 article titles and abstracts were screened as either "Relevant" or "Not relevant". Thereafter, 93,309 articles were excluded in total because they were: "Not relevant" (*n*=91,344), "Not a primary research study" (*n*=1,948), and "Publication language is not English" (*n*=17). This resulted in 185 articles to be screened for full text; out of which, 175 articles were excluded ("Not relevant"; *n*=136, "Not a primary research study"; *n*=28, and "Weak methodology"; *n*=11). Additionally, 32 articles were screened as a result of hand searching full-text references. Only two articles were assessed [from the hand-searched lists] for eligibility, with 30 articles excluded because they were, "Not relevant" (*n*=21), "Not a primary research study" (*n*=7), or presented with "Weak methodology" (*n*=2). This results in 12 articles meeting the inclusion criteria for the narrative review.

<Insert Figure 1 here>

Study Characteristics

The majority of the active duty or retired crisis respondents (*n*=37,267) were exposed to combat during deployment to Iraq and/or Afghanistan. Other occupation roles included first responders from the police, fire department, and coastguards. All studies were from Western countries, such as the United States of America, Sweden, and Denmark. The mean age ranged between 24 years and 64 years. Validated measures were utilised in each study to assess mental health difficulties and risk/protective factors. Detailed information is collated and presented as Table 1.

<Insert Table 1 here>

Main Findings

This narrative review identified core themes and sub themes through the Thematic Narrative Analysis, described below. Main findings are presented in Table 2.

Pre-deployment Factors

Only one study (Sørensen et al., 2016) had assessed the presence of mental health difficulties prior to deployment. When Danish soldiers (*n*=42) were screened for PTSD, six weeks prior deployment, an inverse relationship (0.97) was revealed between PTSD (PCL ≥ 44; moderate to severe) and cognitive abilities.

The impact of pre-deployment cognitive abilities on the risk of developing PTSD symptoms was analysed in this study (Sørensen et al., 2016). The resilient categories exhibited low distress levels across six assessments before, during, and after deployment.

However, they did not have higher mean pre-deployment cognitive ability scores compared with the mild distress trajectory, which exhibited moderate symptoms that decreased after deployment. PTSD symptoms measured as a PCL score revealed an inverse association with pre-deployment cognitive ability (Sørensen et al., 2016). This association remained significant when adjusted for perceived war zone stress, pre-deployment symptoms levels, pre-deployment traumatic life events, and education. Further affirming these findings, an association was revealed between lower pre-deployment cognitive ability scores and the relieved-worsening trajectory (i.e., a subgroup with PTSD symptoms). This subgroup reported the highest level of pre-deployment emotional problems and the lowest level of perceived social support (Sørensen et al., 2016).

During-deployment Factors

As the only study that had assessed the veterans during deployment, Sørensen et al., (2016) reported an association between the higher mean score of pre-deployment cognitive ability and lower reports of PTSD symptoms — participants from the most resilient subgroup (i.e., exhibiting low levels of distress) stated the highest level of danger/injury score during the mission, a higher proportion of soldiers being wounded or injured during the mission, and a higher proportion of having killed an enemy.

Post-deployment Factors

The following sub themes were identified for post-deployment factors: mental health difficulties, and risk and protective factors for difficulties.

Mental Health Difficulties

The following mental health symptoms were noted in uniformed personnel exposed to crisis situations.

PTSD and Depression. According to Chapman et al. (2014), between deployed and non-deployed combat medics, medics who have been deployed were found to seek out assistance with their mental health than their peers. The rate of depression was high in deployed medics than those who have never been deployed. However, no significant difference was found at three to 12 months post-deployment with controlled demographic variables (Chapman et al. 2014). Hierarchical regression reveals that PTSD was still present in combat medics, three months post-deployment. However, it was not significant in comparison with the peer group. Amongst a group of combat medics, those who screened positive for a mental health problem reported higher concerns regarding stigma and barriers to care, where stigma was perceived as a more prominent issue than barriers of care. Additionally, those who required the highest level of assistance perceived more barriers to mental health care and stigma for seeking treatment (Chapman et al. 2014).

Sørensen et al., (2016) conducted a similar study with a special emphasis on symptoms of PTSD. Results revealed its presence in both studies as a post-combat mental health difficulty. These findings were further supported by Shea et al., (2013) in which it was reported that 12.6% of the veterans fulfilled the full criteria for PTSD within first six months of post deployment. Adding to aforementioned research findings, Shea et al., (2017) presented that veterans who endorsed danger to themselves, or exposure to death/serious injury of others, revealed increased levels of depression, anxiety, avoidance, re-experiencing, and hyperarousal symptoms; whilst killing someone else had not significantly associated with any symptom measures or guilt.

Albeit previous findings, Presseau et al., (2019), investigated the prevalence of trauma types, prevalence of PTSD within these trauma types, and the association among trauma types, mental health, and behavioural outcomes in an epidemiological sample of service members. It was revealed that Life Threat to Self (LTS; 51%) and Life Threat to Others

(LTO; 31%) were the most endorsed events. Moral Injury – Self (MIS) and Aftermath of Violence (AV) were the least endorsed events. Nearly 40% of the participants endorsed multiple events. These complex traumas were not associated with more severe symptoms of mental health difficulties (Presseau et al., 2019). There were also no differences in the PTSD prevalence by the trauma type. Only 10% of those exposed to Criterion A events (i.e., "exposure to actual or threatened death, serious injury, or sexual violence") were diagnosed of PTSD. Although the majority of participants who endorsed Criterion A events reported high use of alcohol, anxiety, depression, suicide ideation, PTSD symptom severity, and combat exposure, 90% of them were not diagnosed with PTSD. Aftermath of Violence (AV) was positively correlated with the number of PTSD symptoms (Presseau et al., 2019). LTO and LTS did not report arousal or anxiety, but LTS was related to depression. Participants who endorsed LTS and AV events in Criterion A trauma types reported severe suicidal ideation and their deployment experience to be more distressing (Presseau et al., 2019).

Aggression and Increased Psychiatric Symptoms. Worthen et al., (2021) reported an association between post-deployment [perceived] difficulties in controlling violent behaviours, and deployment related traumas and PTSD symptom severity. With each additional deployment, violent behaviours, post-deployment traumas, and PTSD symptom severity worsened. This prevalence was not impacted by the use of alcohol, age, gender, and/or marital status. However, findings should be interpreted cautiously as only 3% of the respondents reported [perceived] difficulties in controlling violent behaviours.

In addition Worthen et al., (2021) only assessed violent behaviours in a general manner, whereas Litz et al., (2018) researched about the frequency of different trauma types in a population of service members seeking treatment for PTSD. They note how "moral injury – self" and "traumatic loss trauma" types reported more severe re-experiencing, guilt, and sadness, compared to the "life threat – self" type. Compared to the "life threat – self"

type, the "violence trauma" type reported more peri- and post traumatic sadness. The "Moral injury – others" type reported greater betrayal/humiliation and more frequent aggressive behaviours. Participants reported 'non-threat' events to be a more distressing war zone experience than 'threat' events. 'Life threat-self' events were mostly endorsed by young participants, who had a low number of service years and exposure to war stressors (Litz et al., 2018).

Risk Factors Aggravating Mental Health Difficulties of First Respondents, Post Exposure.

These were collapsed into personal circumstances and situational circumstances, as follows.

Personal Circumstances. A sample of National Guards and Reserve units were screened for PTSD, utilising the Clinician Administered PTSD Scale (CAPS). A few pre-deployment risk factors for the development of PTSD were hypothesised: negative temperament, prior history of stressful life events, and perceived inadequacy of training. Out of 238 participants, 12.6% met full criteria of PTSD within the first six months post-deployment (Shea et al., 2013). Participants with PTSD scored differently in all aspects of the aforementioned risk factors compared to those without PTSD, except on unit support and perceived preparation and training. Demographic factors, such as gender, ethnicity, and age were not significant predictors of PTSD. Negative temperament and pre-deployment life events independently predicted PTSD, while deployment-related variables, such as combat experience, and life and family concerns, were found to be significant predictors of PTSD (Shea et al., 2013).

Arble & Arnetz (2016) identified that participants who have been exposed to stressful experiences practiced more avoidant strategies, received low social support, and exhibited a lack of positive coping mechanisms (i.e., substance use). In conclusion, it was discovered that

post-traumatic growth, physical health, social support, and positive coping mechanisms positively impacted the participants' well-being. Substance use and avoidant coping had, conversely, negatively impacted participants' well-being.

Adding to Arble & Arnetz (2016), Chapman et al., (2014) revealed that well-being of combat medics who screened positive for mental health difficulties were affected by their reluctance to seek professional intervention due to concerns about stigma associated with mental health and barriers to care. A positive correlation was revealed where higher the level of assistance needed, the perceived barriers to their care and stigmas were greater.

Further adding to Arble & Arnetz (2016), Blakey et al., (2022) reported that veterans diagnosed with substance use disorder (SUD) and comorbid PTSD-SUD revealed higher rates of risk in lifetime homelessness, violent behaviour, suicidal ideation and attempts, and poorer quality in vocational, financial, and social well-being. However, there was no difference in vocational and financial well-being compared to veterans diagnosed with PTSD only. In contrast to findings of Arble & Arnetz (2016) and Blakey et al., (2022), no significant association was reported by Worthen et al., (2021) for the relationship between post-deployment violent behaviour and alcohol abuse.

In a sample of veterans who were screened for risk factors for cardiovascular disease and/or diabetes, the "Low Treatment Need" (LTN) group screened less likely for the four main risk factors: obesity/overweight, smoking, at-risk for alcohol use, and PTSD or depression symptoms (Funderburk et al, 2014). The "Moderate Treatment Need" (MTN) group had a relatively higher probability to screen positively for smoking and at-risk alcohol use. The "High Treatment Need" (HTN) group reported the highest probability to screen for all four risks. This indicates that a high prevalence of PTSD or depression symptoms could be a risk factor for cardiovascular disease and/or diabetes among veterans (Funderburk et al, 2014).

Affirming Funderburk et al., (2014) findings, Groer et al., (2014) reported that from the 68% of active duty enlisted and reservist soldiers who had experienced previous combat, half were smokers and reported depression (14%), headaches (14%), anxiety (17%), and tinnitus (25%). When screened for PTSD, 21% of the sample reported moderate to severe on the PCL-M scale with 11 veterans with no PTSD symptoms. It was important to note that these 11 veterans had no combat exposure. In the overall sample, infectious illnesses, chronic inflammation, autoimmune processes, or cardiovascular disease was indicated through high levels of C-reactive Protein (CRP). Depression, PTSD, and CRP levels were highly correlated with hair cortisol levels; a marker of chronic stress. However, these factors had a low correlation with Combat Exposure Scale (CES) scores. High depression scores and combat exposure were found to be significant contributors to high scores of PTSD. However, hair cortisol and CRP levels could not predict high scores of PTSD when depression and combat experience were added to the regression model.

Gender differences in risk factors that may aggravate mental health difficulties in veterans were revealed by Adams et al., (2021): the majority of female veterans reported to be younger, unmarried, college graduates, and had less combat exposure but were more likely to have lifetime mental health difficulties (e.g., PTSD, depression, and suicidal ideation). They also reported low psychological resilience but were more likely to use mental health services and psychotropic medications. No differences were reported for childhood abuse/neglect, stressful events in the past year or lifetime traumas, social support, alcohol misuse, and/or self-esteem, between female and male veterans. However, it should be noted that these findings were derived by analysing a small number of female respondents (5%; n = 85) from the total sample.

Situational Circumstances. Exposure to combat is a widely regarded risk factor of PTSD. Amongst a sample of recently deployed, returned National Guards, and reserve

members (Shea et al., 2017), over 50% of the exposure types reported were: being attacked or ambushed, receiving small arms fire, exposure to improvised explosive devices, seeing dead bodies/remains, and/or knowing someone seriously injured or killed. The less commonly reported was: having killed the enemy (11%) and the killing of non-combatants (1.3%), where "having killed" was not significantly associated with guilt and/or other symptom measures. Hyperarousal symptoms, depression, re-experiencing, avoidance, and anxiety were uniquely and significantly associated with "danger to oneself" and "exposure to death or serious injury of others". Both "danger to oneself" and "exposure to death or serious injury of others" were significantly associated with the total Clinician-Administered PTSD Scale for DSM–IV (CAPS-IV) score.

These findings by Shea et al., (2017) study was further supported by Litz et al., (2018), which revealed that among participants receiving treatment for PTSD, more severe symptoms were reported by veterans who endorsed traumatic loss trauma, moral injury-others, moral injury-self, and violence trauma type than those who endorsed life threat-self. Life threat-self events were mostly reported by young participants with a short service duration and low exposure to combat. In contrast to the other findings of Shea et al., (2017), participants from Litz et al., (2018) reported non-threatening events (i.e., concern about family), to be more distressing than threatening experiences in the war zone. Furthermore, Presseau et al., (2019) reported that Life Threat to Self (LTS; 51%) and Life Threat to Other (LTO; 31%) were more commonly endorsed by participants, even though there was no association of these events with symptoms of mental health difficulties.

Protective Factors Supporting Positive Management/Emergence of Mental Health Difficulties.

According to Arble & Arnetz (2016), the well-being of veterans who have been exposed to combat has been positively influenced by stable physical health, high social support, approach to coping mechanisms, and post-traumatic growth. Adding to Arble & Arnetz (2016), Worthen et al., (2021) revealed that post-deployment violent behaviours were comparatively lower for Caucasian veterans who reported higher levels of education qualifications and who received social support.

Furthermore, Shea et al., (2013) revealed that participants with high levels of perceived adequacy of training and low exposure to combat did not report PTSD, meaning pre-deployment preparation and training, and low severity of exposure during deployment have contributed as protective factors against developing mental health difficulties amongst first respondents.

<Insert Table 2 here>

Discussion

Population Characteristics

The majority of study participants were middle-aged Caucasian and non-Hispanic men from the United States of America, whose responses were recorded in English. The exceptions were studies with non-English speaking participants from Denmark (Sørensen et al., 2016) and Sweden (Arble & Arnetz, 2016). Female participants were analysed in seven studies (Adams et al., 2021; Chapman et al., 2014; Groer et al., 2014; Litz et al., 2018; Shea et al.; 2013; Shea et al., 2017; and Worthen et al., 2021), yet the number of female participants were disproportionately small in comparison to men. Therefore, applicability of the review findings primarily applies to male population. Nine studies (Adams et al., 2021; Blakey et al., 2022; Chapman et al., 2014; Groer et al., 2014; Litz et al., 2018; Presseau et al.,

2019; Shea et al., 2013; Shea et al., 2017; and Worthen et al., 2021) collected information on the marital status of participants, which was analysed as "social support" when considering its impact on trauma recovery. Chapman et al., (2014) excluded veterans with severe physical injuries requiring overnight hospitalisation, due to the high correlation between physical injury and mental health difficulties.

Most Prevalent Psychological Difficulties and Related Risk Factors

PTSD and depression are the most common diagnoses, followed by anxiety (Chapman et al., 2014; Groer et al., 2014). These mental health difficulties are prone to be aggravated by specific risk factors, which can be broadly categorised as personal and situational. Identified personal factors were decreased physical health (e.g., obesity), low cognitive abilities, existing mental health difficulties, job position, threat to self, peers and family, and use of avoidant strategies (e.g., substance abuse; Arble & Arnetz, 2016; Blakey et al., 2022; Litz et al., 2018; Shea et al., 2013; Sørensen et al., 2016). Situational factors were identified such as lack of social support, past stressful experiences, combat frequency and severity, and social stigma (Arble & Arnetz, 2016; Blakey et al., 2022; Chapman et al., 2014; Worthen et al., 2021). In contrast, post-crisis mental health difficulties could be minimised with the influence of protective factors, such as high cognitive ability, social support, effective coping strategies, pre-deployment preparedness, and/or robust physical health (Arble & Arnetz, 2016; Elbogen et al., 2012; Kline et al., 2013; Sørensen et al., 2016).

PTSD and depression symptoms in some cases were reported even six months post deployment and sustained for 12-months post deployment (Chapman et al., 2014; Shea et al., 2013). This implies a short onset yet lasting effects of the combat exposure on an individual's mental health state. The relationship between PTSD and combat exposure can be clearly stated, independent of any confounding variables, as service personnel who have not been

exposed to crisis situations, or have a short period of exposure to combat report less or no symptoms of PTSD (Chapman et al., 2014; Groer et al., 2014).

Contrary to the common assumption that an individual may be more distressed by having to kill someone due to a sense of morality, the review findings revealed that veterans who reported a higher number of mental health symptoms expressed more concern about their personal safety and apprehension for fellow veterans (Shea et al., 2017). A strong sense of self and solidarity are demonstrated here, over the effects of moral injury. This arguably aligns with both Self-Determination Theory (SDT; Ryan & Deci, 2000) and the Pluralistic Trauma Theory (PTT; Balaev, 2018), namely that individuals are more affected by their subjective perception of what is considered to be socially acceptable (e.g., eradicating terrorism is essential), rather than by the objective outcome (e.g., death) of a crisis situation—especially during militarised tasks where individual autonomy could be compromised but the need and confidence to perform are boosted.

As discussed, several research findings have continually revealed that exposure to crisis situations may manifest as mental health difficulties in veterans. However, in some research where multiple types of trauma (life and/or moral threat to self and/or others) are analysed, findings indicated no significant relationship between the exposure to crisis situations and mental health difficulties (Presseau et al., 2019). This differential finding cannot seemingly be attributed to the status of the sample or geographical location (i.e., American veterans in active duty), as other research had analysed samples of American veterans in active duty (Groer et al., 2014; Litz et al., 2018). Therefore, further analysis of the sample, measures, and methodology is warranted to determine the possibility of veterans not significantly affected by exposure to crisis situations. However, this differential finding may be somewhat explained by Litz et al., (2018), who reported that effects of life threat-self events were mostly endorsed by participants of young age with low exposure to combat and

service period, which is supported by the Job Demand-Control-Support (JDCS) model (Johnson & Hall, 1988), which states that individuals may be stressed by their tasks *only* if there is high demand, low control and social support. Alternatively, it is plausible, as per the Effort-Reward Imbalance model (Siegrist, 1996), that uniformed services were not affected by the exposure to crisis situations, as they found their experience to be highly rewarding (e.g., safeguarding civilians). Additionally, the PTT also states that the impact of trauma comes to fruition *as a result* of the interactions between external (i.e., situation) and internal (i.e., personality) factors. Therefore, due to their subjective perception and diminished exposure to crisis situations, the trauma response may not have manifested as mental health difficulties.

Key personal and situational risk factors that were discussed earlier in this section are supported by both PTT and SDT theories, which focus on the influence of internal/external stressors and intrinsic/extrinsic motivational factors, which contributes to an individual's social, cognitive and personality development, including the specific manifestation of trauma. All aforementioned risk factors are domains that will aggravate mental health issues, post-deployment upon return. Addressing these factors require treatment and intervention strategies over a preventive approach.

In order to lessen the effect of combat exposure manifesting as mental health difficulties, the aforementioned intrinsic/extrinsic risk factors should be a focal point to be identified and assessed *pre-deployment*. This will contribute to a more effective recruitment and training within uniformed forces, and improved trauma recovery post deployment. Even though Shea et al., (2013) and Worthen et al., (2021) reported that demographic factors (e.g., age/gender) and pre-deployment variables (e.g., negative temperament) could not predict PTSD; low cognitive ability, overweight/obesity, pre-deployment emotional problems, [perceived] low social support, negative childhood experiences, and stressful experiences

during a participant's lifetime were reported by other research studies as pre-deployment factors that may increase the vulnerability of a veteran to be effected by combat exposure (Sørensen et al., 2016).

Crisis respondents and their respective organisations have low control regarding factors during deployment that may enhance the risk to develop and worsen mental health difficulties. However, it is useful to be mindful of the intrinsic/extrinsic risk factors for post-deployment assessment, treatment, and intervention, as their importance is emphasised by PTT and SDT theories. Higher frequency and subjective severity of combat exposure, holding a more stressful position during the mission, increased rates of combat stress reaction (CSR), non-threatening events such as high levels of concerns for life and family, danger/injury during combat to self and/or others, exposure to death, and a higher kill rate of the enemy were the most prominent risk factors revealed by this narrative review (Litz et al., 2018; Shea et al., 2013; Shea et al., 2017; Sørensen et al., 2016; Shea et al., 2013). Even though Shea et al., (2017) reported that "having killed" an enemy did not contribute to mental health difficulties, this can be explained by the low number of "having killed" item endorsed by study participants as an event experienced during combat. Contrary to aforementioned research studies, Presseau et al., (2019) reported that even though Life Threat to Self (LTS) and Life Threat to Other (LTO) were more commonly endorsed by the participants, these events did not contribute to the mental health difficulties of the participants. As previously noted, these findings align with PTT (i.e., the impact of subjective perception and societal acceptance of trauma experience and response), SDT (i.e., the encouragement of need, confidence and freedom to perform) theories and the Effort-Reward Imbalance model (i.e., high gain over cost). Additionally, more in-depth analysis of methodology and populations in study of Presseau et al (2019) is required in order to determine if it is an exception to existing research findings.

Helpful Protective Factors in Trauma Recovery for First Respondents

Despite its vital role in trauma recovery, there appears to be less reporting of factors that could lessen the severity of mental health difficulties of crisis respondents post exposure to traumatic events. This may be either due to lack of such factors or the low interest of researchers in investigating the existence and influence of protective factors. The impact of combat exposure on mental health was arguably lessened by factors such as post-traumatic growth, high social support, physical health, effective strategies of coping, and high levels of [perceived adequacy in] pre-deployment preparation and training (Arble & Arnetz., 2016; Shea et al., 2013; Worthen et al., 2021). Even though the most stable subgroup did not report a higher mean score of pre-deployment cognitive ability compared to the subgroup of participants with symptoms with moderate severity, Sørensen et al., (2016) revealed an inverse relationship between pre-deployment cognitive ability and PTSD symptom severity.

Limitations of the Present Narrative Review

The majority of articles included in the narrative review assessed English speaking middle-aged Caucasian and non-Hispanic male crisis respondents from Western countries. Therefore, this review lacks insight into mental health difficulties, and risk/protective factors post exposure to crisis situations across populations with different socioeconomic status, age, ethnicity, religion, gender, cultures, and geographical locations. Additionally, the majority of the crisis situations were combat exposure, where uniformed forces have been deployed to foreign countries. The effect of other crisis situations, such as natural disasters and the response of service personnel in attending to crisis situations in their home country, has not been explored. The findings can also not be generalised, as the search strategy was limited to English publications in the past decade.

Evidently, all articles except one (Sørensen et al., 2016) had focused on post-deployment phase of the soldiers. Therefore, the current research domain is greatly

disadvantaged due to the lack of insight during pre- and during deployment stages. As a result, it would be difficult for practitioners to encourage prevention, in addition to treatment. As noted, it was also difficult to determine the impact of gender, mainly due to the nature of recruitment and deployment in uniformed forces; females have a comparatively lower opportunity to serve as first respondents. This is a major limitation as current research is unaware of the influential nature of gender, such as whether it serves as a risk or protective factor against mental health difficulties, in combination with other contributing variables post exposure to crisis situations.

Except for Shea et al. (2017), which conducted CAPS-IV structured interviews (Blake et al., 1995), other studies used questionnaires to gather information. This arguably limits the responses of participants. Moreover, it is recommended that future research verify the responses of self-report measures with collateral information obtained from independent third parties. Future research should, overall, seek to address the gaps in the literature revealed by this narrative review and expand inquiry beyond Western understandings. In doing so it should adopt a wider application of method to this important area of study. Future research could also consider application of a meta-analysis, using a wider sampling of studies as the area continues to develop following continued embedding of DSM-5. Such analysis could account more thoroughly for estimates of effect and heterogeneity between study results, allowing for an enhanced objective appraisal of evidence.

Implications for Practice, Policy, and Future Research

As noted by the current review, there is an evident relationship between mental health difficulties and an influence of personal and/or situational characteristics for first respondents. Therefore, they can be assessed and treated for these identified vulnerabilities, and trained to improve resilience prior to deployment. This pre-deployment screening process could provide insights to organisations to implement changes to their need-based training

processes and recruit individuals who are considered the best fit for deployment. However, more inclusive research is needed to understand the impact of diverse demographic factors across multiple geographical locations for different types of crises and deployment.

It is also important to assess the specific mental health difficulties and related risk/protective factors identified by this review. This should occur during deployment in order to enhance the well-being of first respondents in the course of active service. Such efforts will not only contribute to deployed mission objectives overall and support optimal individual performance, but could also minimise the risk of imminent and/or post-deployed mental health difficulties. Despite logistical difficulties likely to arise in conducting research during deployment, it is highly encouraged as an area future research could explore, and one that could identify potential means preventing the aggravation of future trauma.

Ultimately, this review provides scholarly support to researchers and practitioners in identifying the most common mental health difficulties of first respondents, post exposure to crisis situations. The reported personal and situational risk and/or protective factors may be helpful in future recruitment, training, and/or trauma recovery interventions. It could also help to direct the specific factors that should be identified and follow-up as part of longitudinal research.

Conclusion

This narrative review reveals that there is a clear indication of mental health difficulties, post exposure to crisis situations among first responders, which are enhanced or minimised by various risk and/or protective factors. Post-traumatic Stress Disorder and depression were the most common diagnoses, followed by the impact of risk and protective factors that could be considered for effective pre-deployment recruitment and training, and post-deployment trauma recovery.

References

Adams, R., Hu, Y., Figley, C., Urosevich, T., Hoffman, S., Kirchner, H., Dugan, R., Boscarino, J., Withey, C. and Boscarino, J., (2021). Risk and Protective Factors Associated with Mental Health Among Female Military Veterans: Results from the Veterans' Health Study. *BMC Women's Health*, 21(1). https://doi.org/10.1186/s12905-021-01181-z

Arble, E., & Arnetz, B. (2016). A Model of First-responder Coping: An Approach/Avoidance Bifurcation. *Stress and Health*, *33*(3), 223-232. https://doi.org/10.1002/smi.2692

Balaev, M. (2018). Trauma Studies. In D. Richter, *A Companion to Literary Theory* (pp. 360-373). Wiley-Blackwell.

Blakey, S., Dillon, K., Wagner, H., Simpson, T., Beckham, J., Calhoun, P. and Elbogen, E., (2022). Psychosocial Well-Being Among Veterans with Posttraumatic Stress Disorder and Substance Use Disorder. *Psychological Trauma: Theory, Research, Practice, and Policy*, 14(3), pp.421-430. https://doi.org/10.1037/tra0001018

Bowler, R., Kornblith, E., Li, J., Adams, S., Gocheva, V., Schwarzer, R., & Cone, J. (2016). Police Officers Who Responded to 9/11: Comorbidity of PTSD, Depression, and Anxiety 10-11 Years Later. *American Journal of Industrial Medicine*, *59*(6), 425-436. https://doi.org/10.1002/ajim.22588

Campbell M, McKenzie JE, Sowden A, Katikireddi SV, Brennan SE, Ellis S, Hartmann-Boyce J, Ryan R, Shepperd S, Thomas J, Welch V, Thomson H. (2020) Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline BMJ 2020;368:l6890 http://dx.doi.org/10.1136/bmj.l6890

Chapman, P., Elnitsky, C., Pitts, B., Figley, C., Thurman, R., & Unwin, B. (2014). Mental Health, Help Seeking, and Stigma and Barriers to Care Among 3- and 12-Month

Postdeployed and Never Deployed U.S. Army Combat Medics. *Military Medicine*, *179*(8S), 55-62. https://doi.org/10.7205/milmed-d-12-00367

Elbogen, E., Johnson, S., Wagner, H., Newton, V., Timko, C., Vasterling, J., & Beckham, J. (2012). Protective Factors and Risk Modification of Violence in Iraq and Afghanistan War Veterans. *The Journal of Clinical Psychiatry*, *73*(06), e767-e773. https://doi.org/10.4088/jcp.11m07593

Funderburk, J., Kenneson, A., & Maisto, S. (2014). Identifying Classes of Veterans with Multiple Risk Factors. *Military Medicine*, *179*(10), 1119-1126. https://doi.org/10.7205/milmed-d-14-00119

Groer, M., Kane, B., Williams, S., & Duffy, A. (2014). Relationship of PTSD Symptoms with Combat Exposure, Stress, and Inflammation in American Soldiers. *Biological Research for Nursing*, *17*(3), 303-310. https://doi.org/10.1177/1099800414544949

Ikin, J., McKenzie, D., Gwini, S., Kelsall, H., Creamer, M., & McFarlane, A. et al. (2020). *Major Depression and Depressive Symptoms in Australian Gulf War Veterans 20 Years after the Gulf War*. https://doi.org/10.1016/j.jad.2015.09.016

Joanna Briggs Institute. (2017). Checklist for Systematic Reviews and Research Syntheses. https://joannabriggs.org/ebp/critical_appraisal_tools

Kline, A., Ciccone, D., Weiner, M., Interian, A., Hill, L., & Falca-Dodson, M. et al. (2013). Gender Differences in the Risk and Protective Factors Associated With PTSD: A Prospective Study of National Guard Troops Deployed to Iraq. *Psychiatry Interpersonal & Biological Processes*, *76*(3), 256-72. https://doi.org/10.1521/psyc.2013.76.3.256

Legault, L. (2017). Self-Determination Theory. *Encyclopedia of Personality and Individual Differences*, 1-9. https://doi.org/10.1007/978-3-319-28099-8_1162-1

Litz, B., Contractor, A., Rhodes, C., Dondanville, K., Jordan, A., & Resick, P. et al. (2018).

Distinct Trauma Types in Military Service Members Seeking Treatment for Posttraumatic Stress Disorder. Journal of Traumatic Stress, 31(2), 286-295. https://doi.org/10.1002/jts.22276

MacManus, D., Dickson, H., Short, R., Burdett, H., Kwan, J., & Jones, M. et al. (2019). Risk and Protective Factors for Offending among UK Armed Forces Personnel after They Leave Service: A Data Linkage Study. *Psychological Medicine*, 1-8. https://doi.org/10.1017/S0033291719003131

Presseau, C., Litz, B., Kline, N., Elsayed, N., Maurer, D., & Kelly, K. et al. (2019). An Epidemiological Evaluation of Trauma Types in a Cohort of Deployed Service Members. *Psychological Trauma: Theory, Research, Practice, And Policy*, *11*(8), 877-885. https://doi.org/10.1037/tra0000465

Shah, R., Shah, A., & Links, P. (2012). Post-traumatic Stress Disorder and Depression Comorbidity: Severity Across Different Populations. *Neuropsychiatry*, *2*(6), 521-529. https://doi.org/10.2217/npy.12.56

Shea, M., Reddy, M., Tyrka, A., & Sevin, E. (2013). Risk Factors for Post-deployment Posttraumatic Stress Disorder in National Guard/Reserve Service Members. *Psychiatry Research*, *210*(3), 1042-1048. https://doi.org/10.1016/j.psychres.2013.08.039

Shea, M., Presseau, C., Finley, S., Reddy, M., & Spofford, C. (2017). Different Types of Combat Experiences and Associated Symptoms in OEF and OIF National Guard and Reserve Veterans. *Psychological Trauma: Theory, Research, Practice, And Policy*, *9*(Suppl 1), 19-24. https://doi.org/10.1037/tra0000240

Siegrist, J. (2016). Effort-Reward Imbalance Model. *Stress: Concepts, Cognition, Emotion, and Behavior*, 81-86. https://doi.org/10.1016/b978-0-12-800951-2.00009-1

Sørensen, H., Andersen, S., Karstoft, K., & Madsen, T. (2016). The Influence of Pre-deployment Cognitive Ability on Post-traumatic Stress Disorder Symptoms and

Trajectories: The Danish USPER Follow-up Study of Afghanistan Veterans. *Journal of Affective Disorders*, *196*, 148-153. https://doi.org/10.1016/j.jad.2016.02.037

Van der Doef, M., & Maes, S. (1999). The Job Demand-Control (-Support) Model and psychological well-being: A review of 20 years of empirical research. *Work & Stress*, *13*(2), 87-114. https://doi.org/10.1080/026783799296084

Wang, H., Jin, H., Nunnink, S., Guo, W., Sun, J., & Shi, J. et al. (2011). Identification of Post-Traumatic Stress Disorder and Risk Factors in Military First Responders 6 Months after Wen Chuan Earthquake in China. *Journal of Affective Disorders*, *130*(1-2), 213-219.https://doi.org/10.1016/j.jad.2010.09.026

Worthen, M., Rathod, S., Cohen, G., Sampson, L., Ursano, R., Gifford, R., Fullerton, C., Galea, S. and Ahern, J., (2021). Risk and Protective Factors for Difficulty Controlling Violent Behavior in National Guard and Reserve Service Members. *Journal of Interpersonal Violence*, 36(3-4), pp.1049-1067. https://doi.org/10.1177/0886260517737552

Figure 1. Extraction of Articles

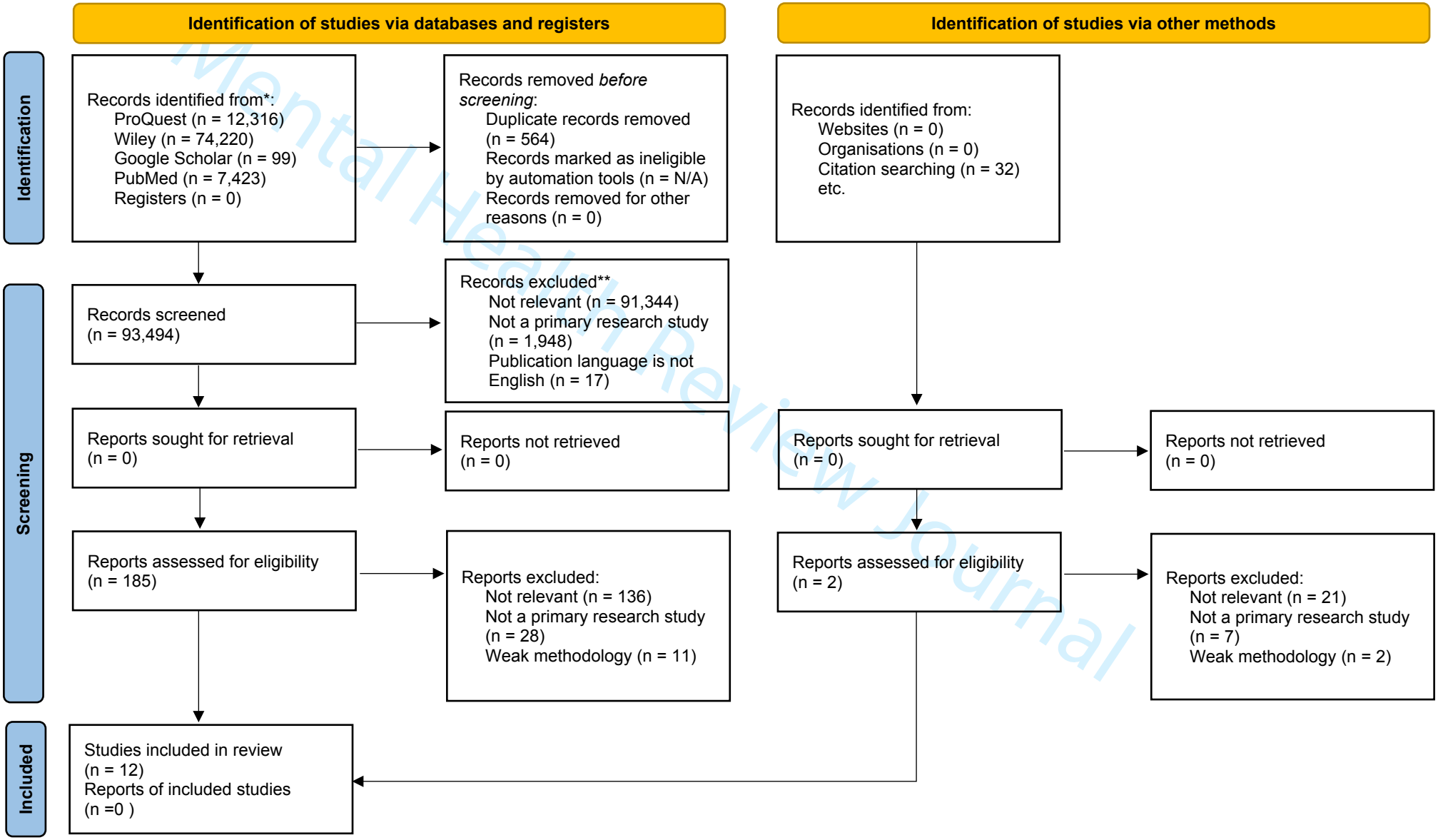

Table 1: Study Characteristics

Author	Sample	Age (M, SD)	Type of Crisis
Adams et al., 2021	Community-based military veterans from an outpatient clinic, USA (N=1,730)	*M*=59 (*SD*=12)	Combat
Arble & Arnetz, 2016	First responders: coast guard, customs control, military, emergency medical services, fire department and police services, Sweden (N = 3,656)	67% in the age range was between 30 -55 years	Not available
Blakey et al., 2022	Military veterans who served on or after September 11, 2001, in Operation Iraqi Freedom (OIF) or Operation Enduring Freedom (OEF); active duty or serving in the National Guard or Reserves, USA (*N*=1,102; SUD only, N= 207, 18.81%; PTSD only, N = 127, 11.47%; PTSD/SUD, N = 96, 8.75%; and neither disorder, N= 672, 60.97%)	Neither (*M*=38.16, *SD*=9.27); SUD only (*M*=32.81, *SD*=8.85); PTSD only (*M*=35.70, *SD*=8.06); PTSD-SUD (M=32.81, SD=8.20)	Combat
Chapman et al., 2014	Army combat medics served both as a soldier and medic, USA (N=799)	Never deployed (M=25.86, SD=6.01); 3 months post-deployment (M=27.97, SD=6.16); 12 months post-deployment (M=31.32, SD=6.36)	Combat
Funderburk et al., 2014	Veterans, USA (N=28,578)	Exploratory (M=63.96, SD=13.41); Confirmatory (M=63.88, SD=13.53)	Not available
Groer et al., 2014	Active-duty Army and National Guard soldiers (enlisted and reservists) in Bold Quest at Camp Atterbury, USA (N=52)	Mean age of 25 years and a range between 19 and 42 years.	Combat
Litz et al., 2018	Active-duty military service members and recently retired veterans, USA (N=999)	Life threat-self (M=32.06, SD=7.28); Life threat-others (M=33.67, SD=6.87); Aftermath of violence (M=34.28, SD=7.97); Traumatic loss (M=32.14, SD=7.47); Moral self-injury	Combat

		(M=32.68, SD=6.66); Moral injury-others (M=32.99, SD=7.33)	
Presseau et al., 2019	Active-duty military service members, USA (N=789)	Initial sample (M=26.57, SD=6.08); post-deployment sample (M=26.57, SD=6.08); Final sample (M=27.47, SD=6.5)	Combat
Shea et al., 2013	Returnees of the National Guard and Reserve units from Iraq and Afganistan, USA (N=238)	M=33.5 (SD=9.5)	Combat
Shea et al., 2017	Returnees of the National Guard and Reserve units from Iraq and Afganistan, USA (N=238)	M=33.79 (SD=9.65)	Combat
Sørensen et al., 2016	Danish soldiers deployed to Afganistan, Denmark (T1:N=743; T6: N=429)	M=24	Combat
Worthen et al., 2021	National Guard and Reserve veterans, USA (N=1,293)	Not available	Combat

Table 2: Critical Findings

Author	Critical Findings
Adams et al., 2021	From the total sample, only 5% were female (n = 85). Compared to male veterans, female veterans were younger (<65 years; 95%), unmarried (49.4% vs 21.2%), college graduates (47% vs. 24%), had less combat exposure (2% vs. 25%), but were more likely to have lifetime PTSD (29% vs. 12%.), depression (46% vs. 21%), suicidal ideation (27% vs. 11%), and lifetime use of mental health services (67% vs. 47%). Female veterans reported low psychological resilience, but more likelihood to use psychological services and psychotropic medications. No sex differences were reported for childhood abuse/neglect, stressful events in the past year or lifetime traumas, social support, alcohol misuse, and/or self-esteem.
Arble & Arnetz, 2016	This study identified that participants who have been exposed to stressful experiences practiced more avoidant strategies, received low social support, and exhibited a lack of positive coping mechanisms. It was noted that the reported lack of appropriate coping strategies, social support, and increased avoidance strategies contributed to post-traumatic growth. Exposure to stress and avoidant coping strategies have contributed to increased substance use. In conclusion, it was discovered that post-traumatic growth, physical health, social support, and positive coping mechanisms positively impacted the participants' wellbeing. Substance use and avoidance coping were found to negatively impact participants' wellbeing.
Blakey et al., 2022	Veterans screening positive for any disorder (SUD-only/PTSD-only/comorbid PTSD-SUD) reported significantly higher risk for rates of lifetime homelessness (15.30% vs 2.05%), violent behaviour (63.16% vs 8.47%), suicidal ideation (43.84% vs 6.51%), and suicide attempts (9.21% vs 0.97%), compared with veterans with neither PTSD nor SUD. Furthermore, veterans in the comorbid PTSD/SUD group reported poorer quality in vocational, financial, and social well-being than veterans with SUD only or with neither disorder, but the PTSD-SUD group did not significantly differ from the PTSD-only group on vocational and financial well-being.
Chapman et al., 2014	Between deployed and undeployed combat medics, medics who have been deployed were found to seek out assistance with their mental health than their peers. The rate of depression was high in deployed medics than those who have never been deployed. However, no significant difference was found at three to 12 months post-deployment with controlled demographic variables. Hierarchical regression reveals that PTSD was still present in combat medics three months post-deployment however, it was not significant in comparison with the peer group. Amongst a group of combat medics, those who screened positive for a mental health problem reported higher concerns regarding stigma and barriers to care, where stigma was perceived as a more prominent issue than barriers of care. Additionally, those who required the highest level of assistance perceived more barriers to mental health care and stigma for seeking treatment.
Funderburk et al., 2014	In a sample of veterans who were primary care patients who were screened for risk factors for cardiovascular disease and/or diabetes, the "Low Treatment Need" (LTN) group screened less likely for the four main risk factors: obesity/overweight, smoking, at-risk for alcohol use, and PTSD or depression symptoms. The "Moderate Treatment Need" (MTN) group had a relatively higher probability to screen positively for smoking and at-risk alcohol use. The "High Treatment Need" (HTN) group reported the highest probability to screen for all four risks. This indicates that a high prevalence of PTSD or depression symptoms could be a risk factor for cardiovascular disease and/or diabetes among veterans.
Groer et al., 2014	Amongst a population of active duty enlisted and reservist soldiers, 68% of the participants have experienced previous combat exposure. Out of the 68%, half were smokers and reported depression (14%), headaches (14%), anxiety (17%), and tinnitus (25%). When screened for PTSD, 21% of the sample reported moderate to severe on the PCL-M scale with 11 veterans with no PTSD symptoms. It was important to note that these 11 veterans have had no combat exposure. In the overall sample, infectious illnesses, chronic inflammation, autoimmune processes, or cardiovascular disease was indicated through high levels of C-reactive Protein (CRP). Depression, PTSD, and CRP levels were highly correlated with hair cortisol levels; a marker of chronic stress. However, these factors had a low correlation with Combat Exposure Scale (CES) scores. High depression scores and combat exposure were found to be significant contributors to high scores for PTSD. However, hair cortisol and CRP levels could not predict high PTSD scores when depression and combat experience were added to the regression model.
Litz et al., 2018	In a study of the frequency of trauma types reported in a population of service members seeking treatment for PTSD, the "moral injury – self" and "traumatic loss trauma" types reported more severe re-experiencing, guilt, and sadness, compared to the "life threat – self" type. Compared to the "life threat – self" type, the "violence trauma" type reported more peri and post traumatic sadness. The "Moral injury – others" type reported greater betrayal/humiliation and more frequent aggressive behaviours. Participants reported 'non-threat' events to be a more distressing war zone experience than 'threat' events. 'Life threat-self' events were mostly endorsed by participants who were young in age and had low number of service years and exposure to war stressors.
Presseau et al., 2019	Prevalence of trauma types, prevalence of PTSD within these trauma types, and the association between trauma types and mental health and behavioural outcomes in an epidemiological sample of service members was investigated. It was revealed that Life Threat to Self (LTS; 51%) and Life Threat to Others (LTO; 31%) were the most commonly endorsed events. Moral Injury – Self (MIS) and Aftermath of Violence (AV) were the least endorsed events. Nearly 40% of the participants endorsed multiple events. These complex traumas were not associated with more severe symptoms of mental health difficulties. There were also no differences in the PTSD prevalence by the trauma type. Only 10% of those

	exposed to Criterion A events – defined as "exposure to actual or threatened death, serious injury, or sexual violence," experienced personally, witnessed, or learned about – were diagnosed of PTSD. Although majority of these participants who endorsed Criterion A events reported high use of alcohol, anxiety, depression, suicide ideation, PTSD symptom severity, and combat exposure, 90% were not diagnosed with PTSD. AV was positively correlated with the number of PTSD symptoms. LTO and LTS did not report arousal or anxiety, but LTS was related to depression. Participants who endorsed LTS and AV events in Criterion A trauma types reported severe suicidal ideation and their deployment experience to be more distressing.
Shea et al., 2013	With the recognition of the impact post-deployment risk factors on early intervention and prevention of PTSD, a sample of National Guards and Reserve units were screened for PTSD utilising the Clinician Administered PTSD Scale (CAPS). A few pre-deployment risk factors for the development of PTSD were hypothesised: negative temperament, prior history of stressful life events, and perceived inadequacy of training. Out of a sample of 238 participants, 12.6% met full criteria of PTSD within the first six months post-deployment. Participants with PTSD scored differently in all aspects of the aforementioned risk factors compared to those without PTSD, except on unit support and perceived preparation and training. Demographic factors such as gender, ethnicity, and age were not significant predictors of PTSD. Negative temperament and pre-deployment life events independently predicted PTSD while deployment-related variables such as combat experience, and life and family concerns were found to be significant predictors of PTSD. The final model included post deployment variables such as 'support' and 'life events'. Lower levels of post-deployment support significantly predicted beyond the effects of pre- deployment and deployment variables (i.e., post-deployment life stress was marginally significant). Combat experiences and life and family concerns still remained significant predictors of PTSD in the final model, but pre-deployment variables were not. Perceived adequacy of pre-deployment preparation and training, and life and family concerns during deployment revealed a significant interaction with the severity of combat experience. Full criteria of PTSD were fulfilled by 26.6% participants who endorsed higher levels of life and family concerns, and increased levels of combat exposure, but only 2.4% were diagnosed with PTSD when they endorsed higher levels of combat exposure with lower levels of life and family stress. When a low level of combat experience was endorsed by the participants, the interaction with perceived adequacy of pre-deployment training revealed a higher level of perceived adequacy of training. Participants with high levels of combat exposure reported a similar proportion of PTSD (17%; 9/53 and 9/52), independent of the perceived adequacy of training level. Seven percent of the participants with low exposure and perceived adequacy of training reported PTSD whilst participants with low exposure and high perceived adequacy of training did not report PTSD.
Shea et al., 2017	Exposure to combat is a widely regarded risk factor of PTSD. Amongst a sample of recently deployed and returned National Guards and reserve members, over 50% of the exposure were: being attacked or ambushed, receiving small arms fire, exposure to improvised explosive devices, seeing dead bodies/remains, and/or knowing someone seriously injured or killed. The less commonly reported was: having killed the enemy (11%) and endorse the killing of non-combatants (1.3%) where "having killed" was not significantly associated with guilt and/or other symptom measures. Hyperarousal symptoms, depression, re-experiencing, avoidance, and anxiety were uniquely and significantly associated with "danger to oneself" and "exposure to death or serious injury of others". Both "danger to oneself" and "exposure to death or serious injury of others" were significantly associated with the total CAPS score.
Sørensen et al., 2016	The impact of pre-deployment cognitive abilities on the risk of developing PTSD symptoms or non-resilient PTSD trajectories. The resilient categories (low stable) exhibited low distress levels across six assessments before, during, and after deployment. However, they did not have higher mean pre-deployment cognitive ability scores compared with the mild distress trajectory which exhibited moderate symptoms that decreased after deployment. PTSD symptoms measured as a PCL score revealed an inverse association with pre-deployment cognitive ability. This association remained significant when adjusted for perceived war zone stress, pre-deployment symptoms levels, pre-deployment traumatic life events, and education. Another association was revealed between lower pre-deployment cognitive ability scores and the relieved-worsening trajectory which comprised of a subgroup with PTSD symptoms. This subgroup reported the highest level of pre-deployment emotional problems, the lowest level of perceived social support, the highest level of danger/injury score during the mission, the highest proportion of combat soldiers, a higher proportion of soldiers being wounded or injured during the mission, and a higher proportion of having killed an enemy.
Worthen et al., 2021	Perceived difficulties in controlling violent behaviour were reported by 3.0% of study participants (male; 3.3% and female; 1.7%). Adjusted prevalence ratios (aPR) reported associations between violent behaviour and deployment traumas (aPR = 1.67, 95% confidence interval [CI] = [1.34, 2.08]), PTSD (aPR = 9.95, 95% CI = [5.09, 19.48]), and PTSD symptom severity (aPR for each additional PTSD symptom = 1.07, 95% CI = [1.06, 1.09]). With each additional deployment, perceived difficulties in controlling violent behaviour were increased by 1.67% times (95% CI = [1.34, 2.08]), 80% higher (aPR = 1.80, 95% CI = [1.33, 2.43]) for additional deployment trauma, and 7% higher (aPR = 1.07, 95% CI = [1.06, 1.09]) for each additional symptom of PTSD. A 38% of lower prevalence (aPR = 0.62, 95% CI = [0.52, 0.76]) in violent behaviour was associated with social support. No significant association was reported for the relationship between violent behaviour and alcohol abuse (aPR = 1.94, 95% CI = [0.92, 4.09]). The findings did not differ by age, gender, and/or marital status either, but reported differences for educational status (high school or less: 6.0%; some college: 2.9%; college or more: 1.8%; p = .008) and race (White: 2.0%; non-White: 4.0%; decline to state: 10.6%; p < .001).

Table 3: Implications for Practice, Policy, and Research

Theme	Practical and Policy Implications	Suggestions for Future Research
Before Deployment	Due to the apparent relationship between mental health difficulties and personal and/or situational characteristics, first respondents should be evaluated for their mental health status, and risk and protective factors, prior to recruitment, preferably at multiple time points. This procedure shall then only recruit individuals who are considered to be the best fit for the task.	More inclusive research with diverse demographic factors across multiple geographical locations for different types of crisis and types of deployment should be conducted to assess the nature, severity, and influence of different personal and/ or situational characteristics that may manifest as and/or enhance mental health difficulties of first respondents, should they be exposed to crisis situations.
During Deployment	It is recommended to assess mental health difficulties, and risk and protective factors, which may diminish or enhance the said difficulties of first respondents, during deployment. In doing so, the authorities will not miss to assess any individual as they are nevertheless highly monitored during active service, and the recovery rate will also improve as symptoms may be treated at inception.	There is an apparent lack of inclusive research (as noted above) to assess mental health status, and risk and protective factors of first respondents during deployment, possibly due to circumstances of the atmosphere. However, research during this period should be highly encouraged as it is when first respondents are exposed to crisis situations at a real time and intensity.
After Deployment	Scholars and practitioners have identified the most common mental health difficulties of first respondents, post exposure to a crisis incident. Personal and situational risk and/or protective factors are listed which may be helpful in recruitment, training, and/or trauma recovery interventions.	The majority of research studies in this domain had been conducted after deployment. However, there is an evident lack of longitudinal or follow-up studies. Therefore, scholars and practitioners are uninformed of policy and/or practical implications required for prolonged periods of intervention.

Synthesis Without Meta-analysis (SWiM) reporting items

The citation for the Synthesis Without Meta-analysis explanation and elaboration article is: Campbell M, McKenzie JE, Sowden A, Katikireddi SV, Brennan SE, Ellis S, Hartmann-Boyce J, Ryan R, Shepperd S, Thomas J, Welch V, Thomson H. Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline BMJ 2020;368:l6890 http://dx.doi.org/10.1136/bmj.l6890

SWiM is intended to complement and be used as an extension to PRISMA			
SWiM reporting item	**Item description**	**Page in manuscript where item is reported**	**Other***
Methods			
1 Grouping studies for synthesis	1a) Provide a description of, and rationale for, the groups used in the synthesis (e.g., groupings of populations, interventions, outcomes, study design)	Page 5	
	1b) Detail and provide rationale for any changes made subsequent to the protocol in the groups used in the synthesis	N/A	
2 Describe the standardised metric and transformation methods used	Describe the standardised metric for each outcome. Explain why the metric(s) was chosen, and describe any methods used to transform the intervention effects, as reported in the study, to the standardised metric, citing any methodological guidance consulted	Page 4 – Page 5	
3 Describe the synthesis methods	Describe and justify the methods used to synthesise the effects for each outcome when it was not possible to undertake a meta-analysis of effect estimates	Page 7	
4 Criteria used to prioritise results for summary and synthesis	Where applicable, provide the criteria used, with supporting justification, to select the particular studies, or a particular study, for the main synthesis or to draw conclusions from the synthesis (e.g., based on study design, risk of bias assessments, directness in relation to the review question)	Page 5	

Synthesis Without Meta-analysis (SWiM) reporting items

SWiM reporting item	Item description	Page in manuscript where item is reported	Other*
5 Investigation of heterogeneity in reported effects	State the method(s) used to examine heterogeneity in reported effects when it was not possible to undertake a meta-analysis of effect estimates and its extensions to investigate heterogeneity	Page 6	
6 Certainty of evidence	Describe the methods used to assess certainty of the synthesis findings	Page 6	
7 Data presentation methods	Describe the graphical and tabular methods used to present the effects (e.g., tables, forest plots, harvest plots). Specify key study characteristics (e.g., study design, risk of bias) used to order the studies, in the text and any tables or graphs, clearly referencing the studies included	N/A Page 7	
Results			
8 Reporting results	For each comparison and outcome, provide a description of the synthesised findings, and the certainty of the findings. Describe the result in language that is consistent with the question the synthesis addresses, and indicate which studies contribute to the synthesis	Page 7 – Page 15	
Discussion			
9 Limitations of the synthesis	Report the limitations of the synthesis methods used and/or the groupings used in the synthesis, and how these affect the conclusions that can be drawn in relation to the original review question	Page 20 – Page 21	

PRISMA=Preferred Reporting Items for Systematic Reviews and Meta-Analyses.
*If the information is not provided in the systematic review, give details of where this information is available (e.g., protocol, other published papers (provide citation details), or website (provide the URL)).

Comment #	Reviewer 1 Comments	Author's Response	Tracker
1	On page 5, line 58, was the agreement between the two screening reviewers quantified?	This information has been highlighted – there was 78% agreement. We are grateful for this clarifying observation. Please check page 6, line 3 – line 4 because text placement has changed.	Page 6, line 3 - line 4
2	On page 6, was the agreement on quality ratings quantified? Also there did not appear to be any reporting on the quality ratings of the studies reviewed.	This information is indicated. Please check page 6, line 8 because text placement has changed. This information is indicated. Please check page 6, line 4 - line 8 because text placement has changed. To clarify further, quality ratings of the 'Critical Appraisal Checklist for Systematic Reviews and Research Syntheses' (Joanna Briggs Institute; 2017) is scored qualitatively as, "Include", "Exclude" or "Seek further info". There is no quantified outcome for quality ratings. Only the agreement between the two reviewers for each study can be quantified (which is indicated), depending on the overall qualitative rating (i.e., include/exclude/seek further info) for each study	Page 6, line – 8 Page 6, line 4 – line 8
3	On page 7, line 24, how was Grounded Theory utilized to summarize findings from quantitative research studies?	The Grounded Theory was not used. This information was already removed in the previous submission after clarifying as a 'Thematic Narrative Analysis'. This was in response to an earlier request from a reviewer. Please check Page 7, line 16 – line 17 because text placement has changed.	Page 7, line 16 – line 17

4	If the authors wish to include the models of understanding response to crisis situations, then the discussion section should have indicated how the overall review further supported certain models and which models were not supported by the evidence.	We are very grateful for this observation and can note that the review, helpfully, supported all the models. To assist with location, this information is indicated as follows: • Self-Determination Theory (SDT): Page 17, line 8, page 18, line 12, page 19 line 7 – line 8 & page 19, line 21 • Pluralistic Trauma Theory (PTT): Page 17, line 8; page 18, line 6, page 18, line 12, page 19 line 7 – line 8, page 19, line 20 • Job Demand-Control Support (JDCS): Page 18, line 1 • Effort-Reward Imbalance model: Page 18, line 4 & page 19, line 22	Page 17, line 7 – line 13 & Page 18, line 1 – line 14 & Page 19 line 4 – line 8 & Page 19 line 20 – line 23