

# Research into Australian emergency services personnel mental health and wellbeing: An evidence map

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## Abstract

**Background:** Evidence maps are a method of systematically characterising the range of research activity in broad topic areas and are a tool for guiding research priorities.

**Aims:** ‘Evidence-mapping’ methodology was used to quantify the nature and distribution of recent peer-reviewed research into the mental health and wellbeing of Australian emergency services personnel.

**Methods:** A search of the PsycINFO, EMBASE and Cochrane Library databases was performed for primary research articles that were published between January 2011 and July 2016.

**Results:** In all, 43 studies of primary research were identified and mapped. The majority of the research focused on organisational and individual/social factors and how they relate to mental health problems/wellbeing. There were several areas of research where very few studies were detected through the mapping process, including suicide, personality, stigma and pre-employment factors that may contribute to mental health outcomes and the use of e-health. No studies were detected which examined the prevalence of self-harm and/or harm to others, bullying, alcohol/substance use, barriers to care or experience of families of emergency services personnel. In addition, there was no comprehensive national study that had investigated all sectors of emergency services personnel.

**Conclusion:** This evidence map highlights the need for future research to address the current gaps in mental health and wellbeing research among Australian emergency services personnel. Improved understanding of the mental health and wellbeing of emergency services personnel, and the factors that contribute, should guide organisations’ wellbeing policies and procedures.

## Keywords

Emergency services, mental health, evidence mapping, wellbeing, literature review

## Introduction

There are currently over 80,000 paid Australian emergency services personnel comprising paramedics, firefighters, police officers and state emergency services workers (Black Dog Institute, 2015). These personnel work alongside approximately 420,000 emergency volunteers (Australian Bureau of Statistics, 2010). For these emergency services personnel, exposure to traumatic events and other stressors is an integral part of the role (McFarlane et al., 2009). Recent changes to Criterion A, the stressor criteria for post-traumatic stress disorder (PTSD) in *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5;

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American Psychiatric Association, 2013), are of particular relevance for emergency services personnel. Criterion A was broadened to include repeated or extreme exposure to aversive details of traumatic events. This includes, for example, attending the aftermath of accidents or disasters and repeated viewing of objectionable material such as child pornography and terrorism-related images. In addition, the requirement for the individual to respond at the time of the trauma with intense fear, helplessness or horror has been dropped from Criterion A. These changes reflect an increase in our understanding of how trauma is experienced in the workplace and affects employees, particularly emergency service personnel (Levin et al., 2014). Not only do emergency services personnel experience a range of different types of trauma, they may also experience different trauma reactions compared to members of the general population who are exposed to single, unexpected trauma. Specifically, reactions such as anger and guilt are often reported, rather than the typical reactions of fear or horror (Black Dog Institute 2015).

It is important to note that in most instances, as with other trauma-exposed populations, the majority of emergency services personnel are expected to react to traumatic experiences with mild, transient distress that ultimately results in return to normal function (Benedek et al., 2007). However, the risk of developing PTSD increases with the number of exposures to traumatic events (Brewin et al., 2000). Emergency services personnel rarely develop PTSD following initial exposure to a single traumatic incident. More commonly, in those who develop PTSD, it follows repeated exposures over many years. This can be understood as a process of sensitisation and kindling, whereby repeated experiences of traumatic incidents result in progressively more severe reactions over time such that events that would not previously have affected the individual begin to trigger adverse psychological reactions (McFarlane, 2010). As the risk of PTSD increases with cumulative trauma, the rates of disorder may be expected to be higher among long-term emergency services employees than new recruits (Phoenix Australia, 2013). This was borne out in a recent study of the mental health of current and retired firefighters (Harvey et al., 2016).

Importantly, the mental health challenges that can face emergency services personnel go beyond PTSD. Depression rates after experiencing a traumatic event in Japanese and US emergency services personnel are thought to be between 16% and 26% (Kleim and Westphal, 2011). The Australian media in recent years has described Australian emergency services personnel in a state of crisis, with annualised suicide rates increasing by between 450% and 800% over the past few years, in contrast to more stable rates of suicide in other Australian samples (Koubaridis, 2015; May, 2016). Furthermore, the full range of mental health problems experienced by emergency services personnel is not necessarily trauma related. Factors such as working conditions and employment-related stressors have been linked to wellbeing

(Hart and Cotton, 2003). For example, several studies have found that police officers consider general organisational experiences—for example, management practices, career opportunities, decision-making, clarity of role and performance feedback—to be more stressful than operational pressures such as danger, threats and attending the aftermath of incidents with fatalities (Hart et al. 1994). Similarly, low morale has been found to be a stronger determinant of withdrawal behaviours (e.g. stress-related absenteeism and intention to submit a stress-related workers' compensation claim) in police than overt psychological distress (Cotton and Hart, 2003). Research has also shown that beyond the context of traumatic events, other mental health disorders are highly prevalent in emergency services personnel. For example, alcohol use disorders were present in 30–36% of US firefighters (Murphy et al., 1999) and 37% of Australian police officers (Davey et al., 2001). There is, however, an absence in the literature of reported prevalence rates of other mental health problems such as PTSD, depression and anxiety in Australian emergency services personnel.

Evidence maps are a relatively new method for identifying, organising and summarising scientific evidence on a broad topic (Bragge et al., 2011; Miake-Lye et al., 2016). Although systematic reviews are more methodologically sound and comprehensive, they are highly targeted and less well suited to heterogeneous groups (Callahan et al., 2012). Maps are designed to collate and summarise studies rather than provide synthesis or aggregate data, and quality appraisal is not always included (Callahan et al., 2012). The capacity for breadth in evidence mapping allows it to identify evidence gaps in order to guide future research efforts. Evidence maps are based on an explicit research question in relation to the field of enquiry, which may vary in depth, but should be informed by end users (Callahan et al., 2012). The end user may be researchers or research funding bodies who can identify gaps in the evidence, which in turn will create opportunities for new research. The research question drives the search for, and collection of, appropriate studies using explicit and reproducible methods at each stage (Arksey and O'Malley, 2005; Katz et al., 2003). Because the scope of this research question is so broad, it is well suited to an evidence map.

This paper presents the results of an evidence map that we conducted on recent mental health and wellbeing research in Australian emergency services personnel. It is the first synthesis of research into emergency services personnel health and wellbeing. To date, there has been no collation or summary of the current literature on Australian emergency services personnel, in relation to mental health and wellbeing. The extent, range and nature of peer-reviewed research is summarised in the current paper. This process of taking stock of the evidence is an essential first step in obtaining an overview of the breadth of research activities related to the mental health and wellbeing of Australian emergency services personnel.

## Method

The Australian emergency services personnel mental health and wellbeing evidence mapping project was undertaken by the researchers as part of a larger project being conducted by *beyondblue*, a national organisation that provides information and support to help Australians affected by depression, anxiety and suicide. After consulting with experts in the area of emergency services personnel mental health and wellbeing, the questions and scope of the evidence map were defined. This process revealed two areas of focus for the map, namely

1. What current evidence exists regarding the mental health and wellbeing of Australian emergency services personnel?
2. What areas are, and are not, well researched?

### Search strategy

To identify relevant literature, a broad search of relevant databases was conducted: the PsycINFO, EMBASE and the Cochrane Library databases were searched for relevant peer-reviewed literature. The search was not constrained by methodology, outcome, intervention or topic of investigation, in order to make the search broad and inclusive. In order to capture current literature and keep pace with the changing landscape of research in this area, the search period was constrained from January 2011 to July 2016. The search terms were determined after consultations with experts in the area of the mental health and wellbeing of Australian emergency services personnel. The following search terms were used: 'police officer' OR 'police' OR 'policem\*n' OR 'policewom\*n' OR 'law enforcement' OR 'fire\*fighter\*' OR 'fire service personnel' OR 'firem\*n' OR 'firewom\*n' OR 'fire officer' OR 'first\*responder\*' OR 'response worker' OR 'emergency worker' OR 'emergency service\* worker' OR 'emergency service\* personnel' OR 'emergency response service personnel' OR 'emergency service\*' OR 'paramedic\*' OR 'emergency medical service\*' OR 'ambulance worker' OR 'ambulance service worker' OR 'ambulance personnel' OR 'ambulance officer' OR 'ambulance' OR 'ambulance service\*' OR 'disaster worker\*' OR 'post-disaster worker' OR 'rescue worker' OR 'rescuer\*' OR 'high\*risk occupation' OR 'high\*risk job\*' OR 'state emergency service' OR 'SES' OR 'search and rescue' AND Australia or Australian or NSW or 'New South Wales' or Victorian or Queensland or QLD or 'Northern Territory' or 'South Australia' or 'Western Australia'.

### Inclusion and exclusion criteria

Studies were eligible for inclusion if the population of interest was Australian emergency services personnel, the

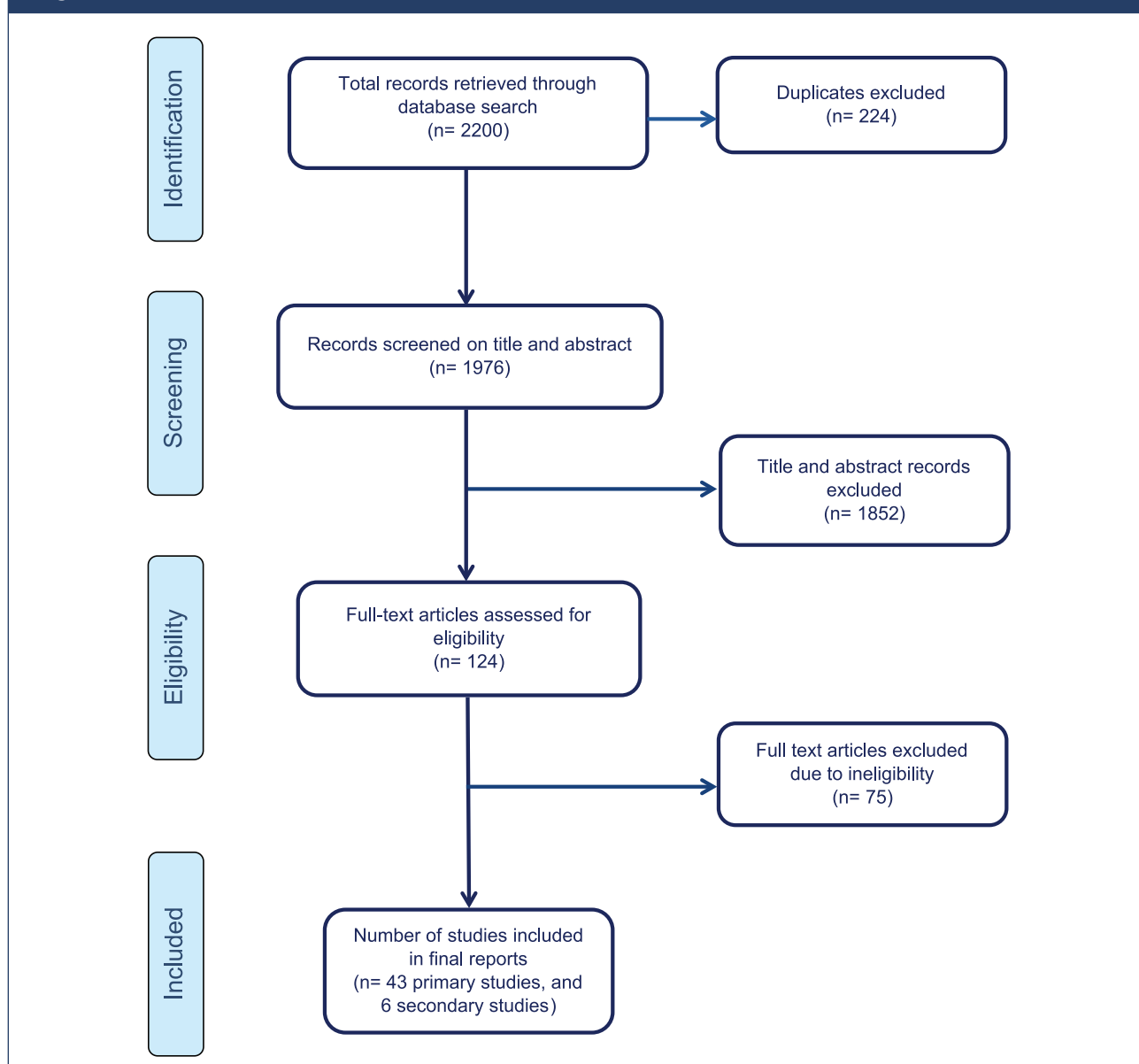
focus of the study was mental health or wellbeing, the study presented original research (i.e. the study was not solely an opinion piece, review or editorial), the study had been published since 2011 in a peer-reviewed journal and the study was published in English. Studies were excluded if the area of mental health related solely to the emergency services personnel's interactions with the public (e.g. police restraints of mentally ill individuals; empathy levels in paramedics for their patients) rather than the emergency services personnel's own mental health. Studies were also excluded if they solely investigated aspects of emergency services personnel as they relate to the operation of the organisation (e.g. factors that contribute to retention of volunteer firefighters; preparedness of paramedic personnel based on quality of clinical placement). A single study can often have multiple publications and as such, the primary reference for each study was established. This process prevented counting one study multiple times and misrepresenting the number of studies in a particular area. The authors took a conservative approach and unless the study clearly indicated it was a secondary study, it was considered unique in order to avoid under-representing the research field.

### Screening and positioning the relevant evidence in the map (i.e. charting)

The titles and abstracts of all potentially relevant papers identified by the searches of the databases were collated. Where a title or abstract reported a trial that appeared to be eligible for inclusion, the full article was obtained. The full text was then assessed against the inclusion and exclusion criteria. Information extracted from the studies included sample size and participants, data sources/methodology, aims/objectives and key findings. Given that the purpose of the evidence map is to simply provide an overview of the extent, range and nature of the research activity, it is not necessary to appraise or describe research findings in detail (Hetrick et al., 2010). An evidence map is not meant to drill into the detail of individual articles to the same extent as systematic reviews.

Studies that met the inclusion criteria were then categorised according to the focus of the research described at the abstract level. Seven research foci were identified: (1) interventions related to mental health and/or wellbeing; (2) potentially traumatic event (PTE)/PTSD-related; (3) prevalence/incidence of mental health and/or wellbeing; (4) psychological factors relating to work-related injury; (5) sleep and fatigue; (6) organisational factors relating to mental health and/or wellbeing and (7) social/individual factors relating to mental health and/or wellbeing. Studies were also categorised by the location that the sample was obtained from, in terms of what Australian state(s) or territory, and by the service participants worked in (e.g. Police, State Emergency Service, Paramedic, etc.)

Figure 1. Flowchart of search for studies.



## Results

The initial searches identified 2200 potentially relevant studies. After deleting 224 duplicates, 1976 studies were retained to be screened on the title and abstract. Based on the title and abstract screening, full texts were retrieved for 124 studies. Based on the information provided by the full text of the retrieved publications, 43 studies were deemed eligible for inclusion in the final map, and a further 6 studies were secondary publications (a flowchart of the search is presented in Figure 1). A map of recent research examining the mental health and wellbeing of Australian emergency services personnel was produced (see Table 1). In Table 2, an overview of the characteristics of these studies

is provided. Please note that a study can have more than one outcome and therefore can be counted more than once in the table count. A list of citations for all studies included in the map is available on request.

## Service

The emergency services populations with the largest number of studies were paramedics (45% of the studies), followed by police (33% of the studies) and firefighters (21%). No studies were conducted with a multi-service population (i.e. more than one service in the one study). On the basis of the study title, a number of other studies appeared to have involved a multi-service population, but at the full-text

Table 1. Evidence map of number of publications examining the mental health and wellbeing of Australian emergency services workers.

Location service	Research focus						Social/individual factors relating to MH/wellbeing
	Interventions	PTE/PTSD	Prevalence/incidence	Psychological factors of work-related injury	Sleep and fatigue	Organisational factors relating to MH/wellbeing	
<b>Multi state</b>							
Firefighters					1		
Paramedics				1		2	2
Police	1		2			2	2
SES							
<b>ACT</b>							
Firefighters							
Paramedics							
Police							
SES							
<b>NSW</b>							
Firefighters		1					
Paramedics							
Police					1		
SES							
<b>NT</b>							
Firefighters							
Paramedics							
Police							
SES							
<b>QLD</b>							
Firefighters							
Paramedics						1	2
Police	2						
SES							

(Continued)

Table 1. (Continued)

Location service	Research focus							
	Interventions	PTE/PTSD	Prevalence/ incidence	Psychological factors of work-related injury	Sleep and fatigue	Organisational factors relating to MH/wellbeing	Social/individual factors relating to MH/wellbeing	
<b>SA</b>								
Firefighters	1	1				2	1	
Paramedics				1				
Police				1				
SES								
<b>TAS</b>								
Firefighters								
Paramedics								
Police								
SES								
<b>VIC</b>								
Firefighters								
Paramedics			2	1	2	2		
Police	1							
SES								
<b>WA</b>								
Firefighters	1	1						
Paramedics								
Police							1	
SES								
<b>Unknown</b>								
Firefighters		1			1			
Paramedics			1		1	2		
Police			2	1		2		2
SES								

MH: mental health; SES: state emergency service.

Table 2. Characteristics of studies included in the evidence map.

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
<b>Paramedics</b>					
Adams et al. (2015)	An interpretative phenomenological analysis of stress and wellbeing in emergency medical dispatchers	Explore stress and wellbeing among emergency medical dispatchers	16 emergency medical dispatchers (unknown location)	<b>Data sources:</b> Qualitative interviews <b>Methodology:</b> Cross-sectional	(1) Despite the physical distances from the scene, emergency medical dispatchers experienced vicarious trauma; (2) organisational factors impacted on the traumatic reaction and (3) this experience can be related to post-traumatic growth.
Broniecki et al. (2011)	Pre-employment risk factors for back, neck and shoulder musculoskeletal injuries and claims in ambulance officers	Determine whether pre-employment medical, physical or psychological assessments can predict future back, new and shoulder musculoskeletal injuries and claims	42–256 ambulance officers from SA	<i>Data sources:</i> Various data sets containing claims information <i>Methodology:</i> Retrospective observational study based on linked data sets	(1) Anxious personality types, as opposed to stable personality types and (2) conceptual rather than practical personality types were at greater risk of an injury or submitting a claim.
Brunetto et al. (2012)	Emotional intelligence (EI), job satisfaction, wellbeing and engagement: explaining organisational commitment and turnover intentions in policing	Explore how EI affect job satisfaction, wellbeing and engagement and in turn, perceptions of organisational commitment and turnover intentions	193 police officers (unknown location)	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional	Overall EI was found to predict police officers' perceptions of wellbeing and job satisfaction. Females had higher EI than males. The authors highlight the importance of police officers being emotionally aware in addition to having physical fitness and knowledge.
Courtney et al. (2010)	Caring for the carers: fatigue, sleep and mental health in Australian paramedic shift workers	Investigate fatigue, sleep quality, mental health and physical activity	342 paramedic shift workers from the Melbourne Ambulance Service	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional comparison to previous data of community samples	Participants had significantly higher levels of fatigue, depression, anxiety, stress and significantly poorer sleep quality than reference samples.
Courtney et al. (2013)	Caring for the country: fatigue, sleep and mental health in Australian rural paramedic shift workers	Explore the mental and physical health of rural paramedic shift workers	150 paramedic shift workers from Rural Ambulance Victoria	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional comparison to previous data of metropolitan-based samples	Rural paramedic shift workers reported increased levels of fatigue and depression, anxiety and stress (regardless of age or gender) and poor quality sleep in comparison to reference groups. The sample also reported less physical activity.

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Gayton and Lovell (2012)	Resilience in ambulance service paramedics and its relationships with wellbeing and general health	(1) Assess if time in paramedic service is associated with increased resilience or if the profession attracts individuals with high resilience; (2) Evaluate the relationship between resilience, general health and wellbeing	146 QLD paramedics and 73 first- and second-year students	Data sources: Self-report questionnaire Methodology: Cross-sectional	Experienced paramedics displayed significantly higher levels of resilience than paramedical students. Furthermore, that resilience was significantly correlated with general health and wellbeing.
Kirby et al. (2011)	Adaptive and maladaptive coping strategies predict post-trauma outcomes in ambulance personnel	Explore adaptive and/or maladaptive coping strategies in relation to work-related post-trauma outcomes	125 QLD paramedics who had experienced a traumatic event	Data sources: Self-report survey questionnaires Methodology: Cross-sectional	Specific adaptive and maladaptive coping strategies were differentially associated with post-trauma outcomes: adaptive coping strategies are associated with promoting specific positive changes after trauma and lower levels of intrusion, with maladaptive coping linked to greater risk of negative symptoms.
Maguire et al. (2014)	Occupational injury risk among Australian paramedics: an analysis of national data	Identify the occupational risks for Australian paramedics, by describing the rate of injuries and fatalities and comparing those rates with other reports	6725 paramedics who reported to Safe Work Australia for a serious work injury between 2000 and 2010	Data sources: Data set on occupational injury claims provided by officials from Safe Work Australia Methodology: Retrospective	The risk of serious injury among Australian paramedics was found to be more than seven times higher than the Australian national average. The fatality rate for paramedics was about six times higher than the national average. Every 2 years, one paramedic died and 30 were seriously injured in vehicle crashes; 10 Australian paramedics were seriously injured each year as a result of an assault. The injury rate for paramedics was more than two times higher than the rate for police officers. 1% of paramedics made claims for injury resulting from exposure to traumatic events.
McManamy et al. (2013)	Occupational risks in undergraduate student paramedic clinical placements	Investigate paramedic students' experiences of occupational risks during clinical placements	122 paramedic students currently enrolled in a prehospital Bachelor degree at Australian universities	Data sources: Self-report questionnaires and focus group interviews Methodology: Cross-sectional	11% reported verbal abuse, 4% reported physical assault and 5% reported exposure to sexualised behaviour. 12% reported experiencing significant distress and 4% reported incurring an injury or illness.

(Continued)



Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Pyper and Paterson (2016)	Fatigue and mental health in Australian rural and regional ambulance personnel	Investigate levels of fatigue, stress and emotional trauma in rural and regional ambulance personnel	134 rural and regional ambulance personnel (unknown location)	<i>Data sources:</i> Qualitative survey and self-report questionnaires <i>Methodology:</i> Cross-sectional	(1) Rural and regional ambulance personnel experience high levels of fatigue and emotional trauma at work; (2) there are unique stressors associated with rural and regional ambulance work including treating personally known patients, working alone and long response times and (3) treating personally known patients may also have positive impacts on rural and regional ambulance personnel.
Roberts et al. (2015)	Occupational injury risk among ambulance officers and paramedics compared with other healthcare workers in Victoria, Australia: analysis of workers' compensation claims from 2003 to 2012	Investigate occupational risk of musculoskeletal and mental injury among ambulance officers and paramedics and compare with nurse professionals, social and welfare professionals and carers and aides in Victoria, Australia	Victorian healthcare workers who put in claims received between 2003 and 2012 (214,355 Work Cover claims)	<i>Data sources:</i> The Victorian Compensation Research Database <i>Methodology:</i> Retrospective	Ambulance officers and paramedics had significantly higher rates of mental injury compared to all other healthcare professions.
Shakespeare-Finch et al. (2015)	Social support, self-efficacy, trauma and wellbeing in emergency medical dispatchers	Determine the predictors of psychological wellbeing and post-trauma responses in emergency medical dispatchers	60 QLD emergency medical dispatchers	<i>Data sources:</i> Online self-report questionnaires <i>Methodology:</i> Cross-sectional	(1) Self-efficacy and receiving social support were found to be significant predictors of psychological wellbeing; (2) receiving social support was also found to be a significant predictor of PTSD and of post-traumatic growth, but not giving social support and (3) shift work emerged as a significant negative predictor of PTSD but not of wellbeing.
Shakespeare-Finch and Daley (2016)	Workplace belongingness, distress and resilience in emergency service workers	Investigate whether workplace belongingness predicted psychological distress and resilience	740 QLD ambulance officers	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional	Workplace belongingness was significantly associated with reduced distress levels and enhanced resilience levels after controlling for severity of trauma exposure and length of service. The variables examined in this study explained 25% of variance in psychological distress and nearly 16% of resilience variance demonstrating that additional factors are associated with the distress and resilience constructs.

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Smith et al. (2011)	Fear, familiarity and the perception of risk: a quantitative analysis of disaster-specific concerns of paramedics	Explored paramedics' perception of risk and willingness to work, with a specific focus on identifying which type of disasters that paramedics associate with greater levels of fear, familiarity and risk.	175 Australian paramedics	Data sources: Self-report level of fear and familiarity across 40 disaster scenarios. Methodology: Cross-sectional	Paramedics ranked nuclear and radiological events and outbreaks of new and highly infectious disasters highest for fear and unfamiliarity.
Sofianopoulos et al. (2011) <i>Second study authored by Paterson et al. (2014)</i>	The exploration of physical fatigue, sleep and depression in paramedics: a pilot study Note. A second peer-reviewed publication was produced using a sub-set of this data set. <i>Title: What paramedics think about when they think about fatigue: Contributing factors</i>	Investigate the impact of shift work on physical fatigue, sleep and psychological factors among paramedics	60 paramedics (unknown location)	Data sources: Self-report questionnaires Methodology: Cross-sectional convenience sample	(1) 92% of paramedics reported recent fatigue and 88% said it affected their work; (2) 27% had mild depression and 10% had moderate depression and (3) almost 60% of paramedics received enough sleep, whereas 30% and 10% reported being excessively sleepy and dangerously sleep, respectively.
Williams et al. (2012)	Paramedic empathy levels: results from seven Australian Universities	Assess the extent of empathy in paramedic students across seven Australian universities	783 paramedic first-, second- and third-year undergraduate paramedic students from seven Australian universities	Data sources: Self-report questionnaires Methodology: Cross-sectional	Females had greater mean empathy scores than males.
Williams et al. (2013)	Measurement of empathy levels in undergraduate paramedic students	Assess paramedics' empathy and attitudes towards patients with specific conditions. Second, to explore impact of year of study and gender on empathy levels	94 first-, second- and third-year Australian undergraduate paramedic students from one university	Data sources: Self-report questionnaires Methodology: Cross-sectional	Males had significantly higher empathy scores than females. Empathy scores did not significantly differ across year of study
Williams et al. (2015)	Undergraduate paramedic students' empathy levels: a 2-year longitudinal study	Assess both the level of empathy over 2-year period from six Australian universities	1719 first-, second- and third-year paramedic undergraduate students across 2011 and 2012).	Data sources: Self-report questionnaires Methodology: Longitudinal (first-, second- and third-year students across 2011 and 2012).	(1) Females had greater mean empathy scores than males and (2) empathy scores did not decline as the students progressed through their degree

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Williams et al. (2016)	Empathy levels in undergraduate paramedic students: a 3-year longitudinal study	Assess both the level of empathy and changes in empathy in paramedic students over a 3-year period from one university.	552 first-, second- and third-year paramedic undergraduate paramedic students	Data sources: Self-report questionnaires Methodology: Longitudinal (first-, second- and third-year students across 2008, 2009 and 2010).	(1) Females had slightly higher empathy scores than males; (2) paramedic students display lower empathy than those reported by fellow students who completed other healthcare professional studies reported within the literature and (3) no clinically significant decline in empathy was found.
<b>Firefighters</b>					
Armstrong et al. (2014) <i>Second study was authored by Armstrong et al. (2016)</i>	Predicting post-traumatic growth and post-traumatic stress in firefighters Note. A second peer-reviewed publication was produced using a sub-set of this data set: Title: Organizational belongingness mediates the relationship between sources of stress and post-trauma outcomes in firefighters	Investigate the predictive ability of work context variables, social support and coping on post-traumatic growth (PTG) and PTSD symptoms.	218 firefighters who reported experiencing a work-related traumatic event (unknown location)	Data sources: Self-report questionnaires Methodology: Cross-sectional	Factors predicting PTSD symptoms included experiencing multiple sources of trauma, higher levels of organisational and operational stress and utilising cognitive reappraisal coping. Increases in PTG were predicted by experiencing trauma from multiple sources and use of self-care coping.
Dawson et al. (2015)	Fatigue risk management by volunteer firefighters: use of informal strategies to augment formal policy	Identify informal strategies used in volunteer fire-fighting and examine how these strategies are transmitted across the workforce	30 volunteer firefighters with minimum 5 years of experience (unknown location)	Data sources: Qualitative interviews Methodology: Cross-sectional	Informal fatigue-management behaviours at the individual, team and brigade levels were employed. Informal strategies were often prioritised over more traditional methods which frequently resulted in firefighters choosing between personal safety and service delivery. However, informal fatigue-management behaviours are not seen as an integral part of the safety management system for fatigue.
Harvey et al. (2015)	The mental health of firefighters: an examination of the impact of repeated trauma exposure	Assess the prevalence of post-traumatic stress disorder, depression and alcohol misuse in a sample of current and retired firefighters and examine their relationship with cumulative trauma exposure	488 current and 265 retired firefighters from NSW	Data sources: Self-report questionnaires Methodology: Cross-sectional	(1) Current firefighter rates of PTSD and depression were 8% and 5%, respectively, while 4% reported heavy drinking; (2) retired firefighters reported significantly greater levels of symptomatology, with the prevalence estimates of PTSD and depression at 18% depression and heavy drinking at 7% and (3) cumulative trauma had an effect on PTSD, depression and heavy drinking

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Huynh et al. (2014) <i>Second study was authored by Huynh et al. (2013)</i>	The job demands resources model in emergency service volunteers: examining the mediating roles of exhaustion, work engagement and organisational connectedness <i>Note. A second peer-reviewed publication was produced using a sub-set of this data set. Title: Social support moderates the impact of demands on burnout and organisational connectedness: a two-wave study of volunteer firefighters</i>	Examine the roles of three mediators in the relationship between job characteristics and volunteer wellbeing	887 volunteer firefighters for the Country Fire Service	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional	Job demands were positively related to exhaustion, which, in turn, was linked to health and turnover intentions. Job resources were positively related to work engagement and organisational connectedness, which were, in turn, negatively related to turnover intentions.
Paterson et al. (2016)	Sound the alarm: health and safety risks associated with alarm response for salaried and retained metropolitan firefighters	Investigate the alarm response procedure for Australian metropolitan firefighters, identifying common and divergent sources of risk for salaried and retained staff (alarm response refers to the procedure by which firefighters are alerted to a situation requiring their action)	46 metropolitan firefighters from two Australian states (unknown location)	<i>Data sources:</i> Qualitative interviews <i>Methodology:</i> Cross-sectional	Sleep and fatigue, actual response to the alarm stimulus, work-life balance and trauma emerged as sources of risk experienced differently by salaried and retained firefighters. Key findings included reports of fatigue in both groups, but particularly in the case of retained firefighters who manage primary employment as well as their retained position. This also translated into a poor sense of work-life balance.
Skeffington et al. (2016)	Trauma exposure and post-traumatic stress disorder within fire and emergency services in Western Australia	Explore the relationship between trauma exposure and mental health outcomes, including the role of social support and coping style	210 Western Australian career firefighters	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Cross-sectional (self-selection and random sampling)	(1) 97% endorsed the personal experience of at least one potentially traumatic event (PTE) over the past 5 years with 83% reporting exposure to two or more; (2) 91% scored over the cut-off for PTSD and (3) trauma exposure, social support and coping style significantly contributed to levels of PTSD symptomatology.

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Skeffington et al. (2016)	The primary prevention of PTSD in firefighters: preliminary results of an RCT with 12-month follow-up	Develop and evaluate an evidence-based and theory-driven programme for the primary prevention of PTSD	45 career recruits firefighters in Western Australia	Data sources: Self-report questionnaires Methodology: Clustered RCT with 12-month follow-up	There was no evidence that the intervention was effective in the primary prevention of mental health issues nor any significant impact on social support or coping strategies. A significant difference across conditions in trauma knowledge was found.
Tuckey and Hayward (2011)	Global and occupation-specific emotional resources as buffers against the emotional demands of firefighting	Examine global (general) emotional resources and an occupation-specific emotional resource (camaraderie) as potential buffers against the deleterious effects of emotional demands on firefighters	547 SA Country Fire Service volunteer firefighters	Data sources: Self-report questionnaire Methodology: Cross-sectional	Through path analysis, camaraderie was identified as having the most consistent protective effects against poor psychological health. The effects of global emotional resources were not as consistent
Tuckey and Scott (2014)	Group Critical Incident Stress Debriefing (CSID) with emergency services personnel: a randomised controlled trial	Evaluate the efficacy of Group CSID in the prevention of post-traumatic stress and the promotion of return to normal functioning	67 SA volunteer firefighters who experienced a PTE	Data sources: Self-report questionnaires Methodology: RCT comparing (1) CSID with (2) stress management education and (3) screening	CISD was associated with significantly less alcohol use post-intervention relative to screening only and significantly greater post-intervention quality of life relative to education. There were no significant effects on post-traumatic stress or psychological distress.
Police					
Balmer et al. (2014)	Psychological resilience of Western Australian police officers: relationship between resilience, coping style, psychological functioning and demographics	Examine the relationship between resilience, coping styles, psychological functioning and demographic variables	285 WA police officers	Data sources: Self-report questionnaires Methodology: Cross-sectional	(1) Greater use of rational coping and less use of emotional coping was predictive of resilience; (2) psychological functioning did not predict resilience and resilience decreased with age and years of service; (3) there were no gender differences for resilience and (4) demographic variables influenced coping styles in that while both genders preferred rational coping, females used emotional coping strategies more, while males used detached coping more

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Burke and Shakespear-Finch (2011)	Markers of resilience in new police officers: appraisal of potentially traumatising events <i>Note:</i> A second peer-reviewed publication was produced based on the protocol for this study. <i>Title:</i> The development and implementation of the promoting resilient officers (PRO) programme	Test the efficacy of a new programme designed to promote mental health	78 newly recruited police officers in the QLD Police Service	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Longitudinal cohort	The experience of a traumatic event prior to joining the police may facilitate positive emotional outcomes from exposure to adverse events on the job
Dollard et al. (2012)	Psychosocial safety climate moderates the job demand–resource interaction in predicting workgroup distress <i>Note:</i> A second peer-reviewed publication was produced using this data set. <i>Title:</i> Organization–environment adaptation: A macro-level shift in modeling work distress and morale	Test the contextual effects of psychosocial safety climate on work stress theories of job demands, job resources and psychological distress	319 police officers (constables in front line activities only) from 23 stations in an Australian state (unknown location)	<i>Data sources:</i> Self-report questionnaires <i>Methodology:</i> Longitudinal with two time points 14 months apart	High emotional resources moderated the positive relationship between emotional demands and change in workgroup distress but only when there were high levels of unit psychosocial safety climate. The authors emphasise the importance of strengthening psychosocial safety climate as a means to reduce the health harming effects of emotional demands via the improved uptake of emotional resources by employees.
Elliott and Lal (2016)	Blood pressure, sleep quality and fatigue in shift-working police officers: effects of a 12-hour roster system on cardiovascular and sleep health	Investigate whether shift work has a direct effect upon blood pressure regulation	206 general-duty NSW police officers	<i>Data sources:</i> Blood pressure and self-report questionnaires <i>Methodology:</i> Cross-sectional	Poor sleep quality and fatigue were predominate in the sample (69% and 51%, respectively). There was a significant increase in systolic blood pressure for females after shift work. Blood pressure and fatigue were strongly related for all police officers.
Kelty and Gordon (2015)	No burnout at this coal face: managing occupational stress in forensic personnel and the implications for forensic and criminal justice agencies	Determine how crime scene investigators manage their stressful occupation	19 crime scene investigators from around Australia	<i>Data sources:</i> Psychometric and qualitative psychological profiles of top-performing crime scene investigators <i>Methodology:</i> Cross-sectional	The crime scene investigators were aware of the potential stress of their occupation and actively engaged in self-stress management strategies.

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Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
LaMontagne et al. (2016)	An integrated workplace mental health intervention in a policing context: protocol for a cluster-randomised control trial	Develop the protocol for a cluster-randomised trial to evaluate the effectiveness of a workplace mental health intervention	All police officers from 24 stations located in inner and outer Eastern and Northwest police districts in Victoria	Data sources: Self-report questionnaires Methodology: Two-arm cluster-randomised trial with 12 police stations receiving the intervention and 12 receiving wait-list control	N/A
Larsen et al. (2016)	The injury profile of an Australian specialist policing unit	To investigate the injuries sustained by an Australian specialist police division	138 police officers (unknown location)	Data sources: Injury records spanning 4 years (2010–2014) Methodology: Cross-sectional	138 reported injuries, 58 on multiple occasions. 229 injuries and 76 claims raised. Physical injuries were the most common. 11 injuries were categorised as workplace stress. Injuries associated with workplace stress arose from a mix of stimuli, including acute or chronic exposure to critical incidents (e.g. shooting, homicide), office stress and bullying
Lewis et al. (2014)	Organisational implementation of psychological first aid (PFA): training for managers and peers	Evaluate the effectiveness of PFA training (including psychoeducation on PTEs) to individuals from the Queensland Police Service	321 managers and 261 peer supporters from the QLD Police Service	Data sources: Self-report questionnaires Methodology: Pre-post	Training led to increases in three key domains: knowledge related to PTEs and PFA, self-reported skills required to respond appropriately to a PTE and confidence to respond to PTEs.
Lawson et al. (2012)	Mental health of a police force: estimating prevalence of work-related depression in Australia without a direct national measure	Aimed to estimate the risk of work-related depression in Australian workers by extrapolating from the prevalence of depression in police officers.	631 police officers (unknown location)	Data sources: Self-report questionnaires Methodology: Cross-sectional	Depression prevalence in police officers ranged from 37% to 66%.
Noblet et al. (2012)	Using job strain and organisational justice models to predict multiple forms of employee performance behaviours among Australian policing personnel	Examine the relationship between stress-related working conditions and three forms of employee performance behaviours in role behaviours, citizenship behaviours directed at other individuals and citizenship behaviours directed at the organisation.	640 police officers (unknown location)	Data sources: Self-report questionnaires Methodology: Cross-sectional	Overall results indicated that a significant proportion of the variance in all three outcome measures was attributed to the additive effects of demand, control and support.

(Continued)

Table 2. (Continued)

Author (year)	Title of the study	Aims/objectives	Participants	Data sources/ Methodology	Main findings
Powell and Tomyn (2011)	Life satisfaction among police officers working in the area of child-abuse investigation	Investigate the role of life satisfaction in Police officers working in child-abuse investigation	214 police officers working in child-abuse investigation from four states in Australia	<i>Data sources:</i> A single question <i>Methodology:</i> Cross-sectional	(1) Overall life satisfaction for child-abuse investigators was low but it was similar to that of the general population; (2) there was no differences in life satisfaction between gender and (3) degree of exposure to trauma material and associated workplace stressors was not associated with life satisfaction.
Powell et al. (2013)	Workplace stressors for investigative interviewers of child-abuse victims	Identify the nature and prevalence of workplace stressors faced by interviewers of child sexual assault victims	68 professionals, of which 41 were police (Australia wide)	<i>Data sources:</i> Internet discussion forum <i>Methodology:</i> Cross-sectional	(1) Three stressors were identified: inadequate recognition of specialised skills, high-workload demands and interagency tensions and (2) exposure to child-abuse reports was not raised as a stressor.
Powell et al. (2014)	Police officers' strategies for coping with the stress of investigating internet child exploitation (ICE). <i>Note:</i> A second peer-reviewed publication was produced using this data set. <i>Title:</i> Police officers' perceptions of their reactions to viewing ICE material	To examine the coping strategies of ICE investigators	32 ICE investigators (Australia wide)	<i>Data sources:</i> Qualitative interviews <i>Methodology:</i> Cross-sectional	Overall, the participants coped with the job well and employed several productive coping strategies.
Tomyn et al. (2015)	Examination of the subjective wellbeing of Australian ICE investigators	Investigate the wellbeing of police officers working in child-abuse investigation	139 police officers working in child-abuse investigation (unknown location) compared to 55,697 Australians adults	<i>Data sources:</i> The Australian Unity Wellbeing Index data set from 2001 to 2012 <i>Methodology:</i> Cross-sectional cohort	Australian police officers who work in the confronting area of ICE investigation have a higher than normative level of subjective wellbeing.
Tuckey et al. (2012)	Psychosocial culture and pathways to psychological injury within policing	Explore the evolution of work-related psychological injury in policing, focusing on the role of police psychosocial culture	25 South Australian police officers	<i>Data sources:</i> Semi-structured interview, focus groups and written submissions <i>Methodology:</i> Cross-sectional	The psychosocial context surrounding operational policing played a critical role in psychological injury development and progression

CISSD: Critical Incident Stress Debriefing; EI: emotional intelligence; ICE: Internet child exploitation; NSW: New South Wales; PFA: psychological first aid; PTE: potentially traumatic event; PTSD: post-traumatic stress disorder; QLD: Queensland; RCT: randomised controlled trial; SA: South Australia; WA: Western Australia.



assessment stage, it was found the majority included a single-service population. Of interest, there was a significant amount of research on sub-groups of emergency services personnel, such as volunteer firefighters, police investigators of child abuse and emergency medical dispatchers.

### Location

Studies were conducted with emergency services personnel from Queensland (14%), South Australia (12%), Victoria (10%), Western Australia (7%) and New South Wales (5%). No studies were conducted with samples that were predominately from the ACT, NT or Tasmania, although personnel from these states may have been included in some of the multi-state studies (this was not specified). Around 35% of studies did not list the state(s) that their sample was recruited from. While 17% of the studies were multi-state, there were no studies that representatively sampled all Australian emergency services personnel populations at the national level. The few multi-state studies were narrow in their scope, with one study investigating injured paramedics who reported to Safe Work Australia (Maguire et al., 2014), three studies investigating paramedic students enrolled in degrees at Australian universities (McManamny et al., 2013; Williams et al., 2012, 2015), two studies investigating Internet child exploitation investigators (Powell et al., 2013, 2014) and a final study investigating crime scene investigators from around Australia (Kelty and Gordon, 2015). No studies were both multi-service and national in focus.

### Research focus

As can be seen from the map (Table 1), the most commonly investigated area of research was organisational factors as they relate to mental health problems and/or wellbeing (13 studies: Adams et al., 2015; Armstrong et al., 2014; Dollard et al., 2012; Gayton and Lovell, 2012; Huynh et al., 2014; McManamny et al., 2013; Noblet et al., 2012; Powell et al., 2013; Powell and Tomy, 2011; Shakespeare-Finch and Daley, 2016; Smith et al., 2011; Tuckey et al., 2012; Tuckey and Hayward, 2011). This includes factors such as operational aspects (e.g. shift work, potential occupational risks, job demands); aspects of the individual's career (e.g. student compared to later career workers) and aspects related to emotional resources, or lack thereof, within the workplace (feelings of workplace belongingness; perceived workplace support and sense of camaraderie and bullying). The least researched areas were psychological factors relating to work injury (five studies: Broniecki et al., 2011; Larsen et al., 2016; Maguire et al., 2014; Roberts et al., 2015; Tuckey et al., 2012) and intervention studies targeting mental health or wellbeing (five studies: Burke and Shakespeare-Finch, 2011; LaMontagne et al., 2016; Lewis et al., 2014; Skeffington et al., 2016; Tuckey and Scott, 2014).

Overwhelmingly, the research investigated the impact of mental health on the individual emergency services personnel. Only one study included both current serving and retired personnel, while six studies involved student paramedic samples. Similarly, few studies involved non-operational personnel. Two studies involved emergency medical dispatchers, and one study involved fire and emergency services personnel and support personnel.

There were several areas of research where very few studies were detected through the mapping process. These include suicide, personality, stigma, pre-employment factors that may contribute to mental health outcomes and the use of e-health. No studies were detected which examined the prevalence of self-harm and/or harm to others, bullying, substance use and barriers to care.

### Discussion

This investigation set out to answer two questions: how much research has been undertaken into the mental health and wellbeing of emergency services personnel and what areas are well-researched or conversely under-researched? The resulting evidence map is the first to summarise and describe the characteristics of primary research studies examining the mental health and wellbeing of Australian emergency services personnel, allowing us to identify priorities for future research.

The evidence map shows that a substantial amount of research into the mental health and wellbeing of Australian emergency services personnel has been undertaken in the past 5 years. Specifically, a number of studies have investigated the organisational factors that impact emergency services workers' mental health and wellbeing, as well as individual and social factors that impact mental health and wellbeing. However, there are several gaps within this broad area of research. In particular, there was little investigation of suicide/self-harm or alcohol or substance use disorders. Both of these domains are critical to our understanding of mental health and wellbeing among emergency services personnel and warrant further research. With respect to suicidality in particular, the findings of higher rates of suicidal ideation than the Australian average among military personnel (McFarlane and Hodson, 2011), a population that shares repeated exposure to PTEs, highlight the need for further research into suicidality among emergency services personnel.

No studies focused on the experiences of families of emergency services personnel and the potential for 'spillover' or how emergency services personnel work both positively or negatively affects the lives of Australian families and loved ones. Again, drawing from military populations, there is evidence that a military career can dramatically impact the lives of family members and loved ones (Australian Centre for Posttraumatic Mental Health, 2012), and early research (Alexander and Walker, 1998; Cowlshaw

et al., 2010; Murphy et al., 1999; Thompson et al., 2001) suggests that the same may be true in emergency services families.

Unfortunately, the sum of research to date does not permit a comprehensive understanding of the mental health and wellbeing of emergency services personnel. Systematic study with consistency in design and measurement across each sector of the emergency services and a broad focus on the full range of mental health and wellbeing outcomes would provide an important population-based estimate of the prevalence of mental health disorders across each of the Australian emergency services, as well as critical information on risk and protective factors. This information is required in order to develop evidence-based strategies to promote the wellbeing of emergency services personnel through prevention and early intervention at the individual and organisational levels and targeted strategies for high-risk sub-groups.

### Limitations

Evidence mapping is a means of systematically identifying, organising and summarising the evidence pertaining to a broad topic. Defining the boundaries of this or any other evidence map is a somewhat subjective step. However, in this instance, we were guided by expert advice and by the end users, *beyondblue*. Evidence maps differ from other types of systematic reviews in that they provide a snapshot of the existing literature without quality assessment or extensive data synthesis. As such, no assessment of the quality of the studies, or bias in their methodologies was made for the current study, meaning that it is not possible to make judgments about the quality of research that has been conducted within this area. Given that the primary question of interest was what current evidence exists regarding the mental health and wellbeing of Australian emergency services personnel, the search period was constrained to the past 5 years.

### Conclusion

The mental health of Australian emergency services personnel is in the spotlight with the increasing recognition of the potential impact of repeated workplace trauma and the stressors associated with these occupations. Although research has been conducted in Australian emergency services personnel in the past 5 years, it has been uncoordinated and piecemeal. Significantly less is known about the mental health and wellbeing of emergency services personnel compared to other trauma-exposed populations in Australia. In the first instance, systematic study with consistency in design and measurement across each sector of the emergency services that addresses prevalence of mental health disorders is needed. This research is critical to establish the nature and size of the problem as well as allow comparisons between service types. On the basis of this research, a host of other research questions follow,

including attitudes towards help-seeking and barriers to care, the availability and uptake of mental health supports, the provision of evidence-based care and the effectiveness of return-to-work rehabilitation programmes.

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