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Interventions for the prevention and management of occupational stress injury in first responders: an overview of reviews

Final Report

Submitted 4/12/2019

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Acknowledgements

The SPOR Evidence Alliance is supported by the Canadian Institutes of Health Research ([CIHR](#)) under Canada's Strategy for Patient-Oriented Research ([SPOR](#)) initiative, and the generosity of partners from [41 public agencies and organizations](#) across Canada who have made cash or in-kind contributions.

Contributors

Thanks to the following Li Ka Shing Knowledge Institute staff for their contributions:
Alissa Epworth, Becky Skidmore, Jesse McGowan, Katrina Chiu and Krystle Amog.

Copyright claims/Disclaimers

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Abbreviations

AMSTAR 2	A Measurement Tool to Assess Systematic Reviews 2
BEP	Brief Eclectic Psychotherapy
CBT	Cognitive-behavioral Therapy
CI	Confidence Interval
CISD	Critical Incident Stress Debriefing
CW	Compared Clockwise
EM-DAT	Emergency Events Database
EMDR	Eye Movement Desensitization and Reprocessing
EMT	Emergency Medical Technician
EMS	Emergency Medical Services
ERS	Emergency Response Services
ETCR	Exposure-based Therapy and Cognitive Restructuring
MAPS	Mental Agility and Psychological Strength
MCSCS	Ministry of Community Safety and Correctional Services
NA	Not Applicable
NR	Not Reported
NRCT	Non-Randomised Controlled Trial
OSI	Occupational Stress Injury or Illness
PFA	Psychological First Aid
PTE	Potentially Traumatic Event
PTSD	Post-Traumatic Stress Disorder
RCT	Randomised Controlled Trial
RTW	Return to Work
SMD	Standardized Mean Difference
SD	Standard Deviation
TFCBT	Trauma-Focused Cognitive Behavioural Therapy
TRiM	Trauma Risk Management
UK	United Kingdom
USA	United States
VMBR	Visuo-motor Behavior Rehearsal
WHS	Workers' Health Surveillance

EXECUTIVE SUMMARY

BACKGROUND AND OBJECTIVES

First responder groups often experience high levels of mental stress as a result of their jobs. These mental stresses can develop into occupational stress illness or injury, which negatively affects the health of these populations. The objective of this overview of systematic reviews (or overview) was to scope the literature for existing prevention and management interventions for occupational stress illness and injury in first responder populations.

METHODS

A total of six databases were searched for systematic reviews examining prevention, resilience-building and rehabilitation strategies among first responders or frontline community safety personnel. All records were screened and abstracted in duplicate. Quality appraisal of each of the included reviews was done using the AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews version 2) tool.

RESULTS

A total of 1393 records were identified, of which 22 reviews met eligibility criteria. Within the 22 reviews, 68 unique primary studies were included for this overview. Most of the included primary studies included police populations (75%), followed by firefighters (22%). Only a small portion of the studies included correctional services (3%), and no coroner studies were found. The majority of primary studies examined prevention strategies; specifically, health promotion training, suicide and trauma prevention, stress management, as well as social support. The remainder of the studies assessed rehabilitation strategies in the form of counseling and various types of therapy.

DISCUSSION

The findings were mixed, with many favourable interventions presented targeting the well-being of first responders. This overview serves as a basis for conducting future intervention research and addressing knowledge gaps.



1. INTRODUCTION

Occupational stress illness or injury (OSI) describes a broad range of psychological conditions resulting from duties performed on the job that interfere with a person's life, including anxiety disorders, depression, and post-traumatic stress disorder (PTSD)^{1,2}. First responders are a particularly susceptible population, as they often encounter high-risk, stressful situations within their line of work. Although there is a vast amount of literature on OSI among first responders, there remains a need for the synthesis of evidence to support the development of an action plan to mitigate the risks. This report is a summary of existing evidence on interventions for the prevention and management of OSI in first responders.

This overview of reviews (hereafter called overview) includes systematic reviews targeting first responders or frontline community safety personnel with a focus on prevention and management of OSI, as well as strategies to build organizational resilience and promote rehabilitation. In addition, this overview aims to identify gaps in the literature for further investigation. The results of this study will be used to address the information needs of the Ontario Ministry of Community Safety and Correctional Services (MCSCS) in developing an evidence-based strategy to implement interventions and programs for OSI in first responders.

1.1 RESEARCH QUESTION

What interventions exist for the prevention and management of occupational stress illness and injury in first responders?

2. METHODS

An overview (i.e. a synthesis of systematic review findings) is a useful method to systematically gather, appraise and map existing evidence on a broad topic that has been well-studied, and identify any gaps in the research efforts to date into one accessible and usable document³. Our overview included systematic reviews targeting first responders or frontline community safety personnel with a focus on prevention and management of occupational stress illness or injury, as well as interventions to build organizational resilience and promote rehabilitation.

To ensure methodological rigor, we followed guidelines outlined by the Cochrane Handbook⁴ and used standard reporting checklists for transparency of our methods and reporting⁵. However, to meet the rapid, 10-week timeline, some streamlined steps were taken. For example, we limited our search strategy to English and the past 10 years and rather than appraising each review in duplicate, only one person appraised the included reviews and another person verified the appraisal for accuracy. As such, our methodology was a rapid overview.

2.1 PROTOCOL REGISTRATION

A protocol for our overview was developed *a priori* and submitted to PROSPERO on February 19th, 2019. A few minor clarifications were suggested for the data synthesis component of the protocol from the PROSPERO team. Approval is still pending as of April 12th, 2019.

2.2 ELIGIBILITY CRITERIA

The study eligibility criteria was formed using the PICOS (population, intervention, comparator, outcome, and study) approach⁶, as follows:

2.2.1 Population

Populations of interest included frontline community safety personnel (i.e. police and firefighters), coroners/forensic pathologists, and correctional services employees.

2.2.2 Interventions

The interventions of interest were prevention strategies (e.g. training and learning approaches, standards of practice, surveillance of risk factors, self-assessments, screening protocols), rehabilitation (e.g. therapeutic interventions, digital interventions, pharmaceutical interventions, psychological interventions, organizational support systems, peer support, reducing barriers to treatment, cost, crisis response, accommodation), and resilience-building strategies (e.g. shifting organizational culture, mental health promotion, organizational barriers, leadership/management, overcoming stigma) targeting OSI.

2.2.3 Comparators

Any comparison to the interventions listed above was eligible for inclusion.

2.2.4 Outcomes

The outcomes of interest were the effects of the interventions on mental health status, including but not limited to: OSI, trauma, anxiety, depression, mood, addiction/substance abuse, PTSD, stigma, suicidal ideation/behavior, time lost from work, and physiological responses to trauma such as increased pulse/heart rate or fatigue/sleepiness. Healthy and maladaptive habits and general health and job satisfaction outcomes were also considered.

2.2.5 Study design(s)

The included studies were systematic reviews, defined by the Cochrane Handbook as a systematic synthesis of empirical evidence⁷, of interventions.

2.2.6 Others

The literature search was limited to articles published in English in the last 10 years.

2.3 STUDY SELECTION

The search strategy was developed by an information specialist and peer-reviewed by another using the Peer Review of Electronic Search Strategies (PRESS) checklist⁸. The MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, and Cochrane Central Register of Controlled Trials (CENTRAL) databases were searched for relevant reviews. The search was limited to include English reviews published in the past 10 years (i.e. 2009 onwards). To further ensure that all relevant reviews were included, the reference lists of included reviews were scanned for additional citations.

Titles and abstracts (level one) and full-texts (level two) were independently screened for relevance by pairs of reviewers using the synthesi.SR tool⁹ developed by the Knowledge Translation Program, St. Michael's Hospital of Unity Health Toronto. To ensure consistency among reviewers, a pilot test was conducted prior to both levels of screening. This entailed the screening of all citations by the team and a meeting to discuss discrepancies and refine the screening criteria. Once the pilot agreement between reviewers reached >80%, two reviewers proceeded to screen the remaining articles independently at each level of screening. Any discrepancies were resolved through discussion or by a third reviewer when necessary.

2.4 DATA ABSTRACTION

A standardized data abstraction form was developed based on the predefined eligibility criteria. Data from each review were abstracted on characteristics (e.g. year of conduct, number of included studies, type of included study designs, sample size), interventions examined (e.g. type of intervention, duration, frequency) and outcomes examined (e.g. name of outcome, outcome measure/definition). The team piloted the data abstraction form on five articles. Once the agreement between reviewers was sufficient (>75%), two reviewers independently abstracted data from the included articles. Discrepancies were resolved by discussion or by a third person, if needed.

In order to supplement the review-level data and provide the MCSCS with more information on the interventions and outcomes examined, the review team took the additional step of abstracting relevant data from each of the primary studies. This data was abstracted by one reviewer.

2.5 QUALITY APPRAISAL

The AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews version 2)¹⁰ is a 16-item critical appraisal tool that was used to assess the methodological quality of all of the included reviews. An experienced reviewer independently read and appraised the risk of bias for each review, while a second reviewer verified the results. Any discrepancies were resolved by discussion or by a third reviewer, if needed. Response options for the AMSTAR 2 included: “Yes”, “Partial Yes” and “No”. In order to reply “Yes” or “Partial Yes”, the review had to meet all of the criteria specified by the tool. A “No” was used to indicate that the criteria for either “Yes” or “Partial Yes” were not met or there was an absence of the item overall.

An overall score was also given to each review to indicate whether the review was high, moderate, low or critically low quality. The overall score was based on the number of “No” responses to the critical checklist items (items 2, 4, 7, 9, 11, 13, 15), indicating “critical flaws” within the review’s design or conduct. Reviews were rated “high” quality if there were no critical flaws, “moderate” quality if there was one critical flaw, “low” quality if there were two critical flaws, and “critically low” quality if there were more than two critical flaws.

2.6 DATA SYNTHESIS

The results of the included reviews were summarized narratively. The data is presented in tables to allow for comparisons across populations, interventions, and outcomes in the following results section.

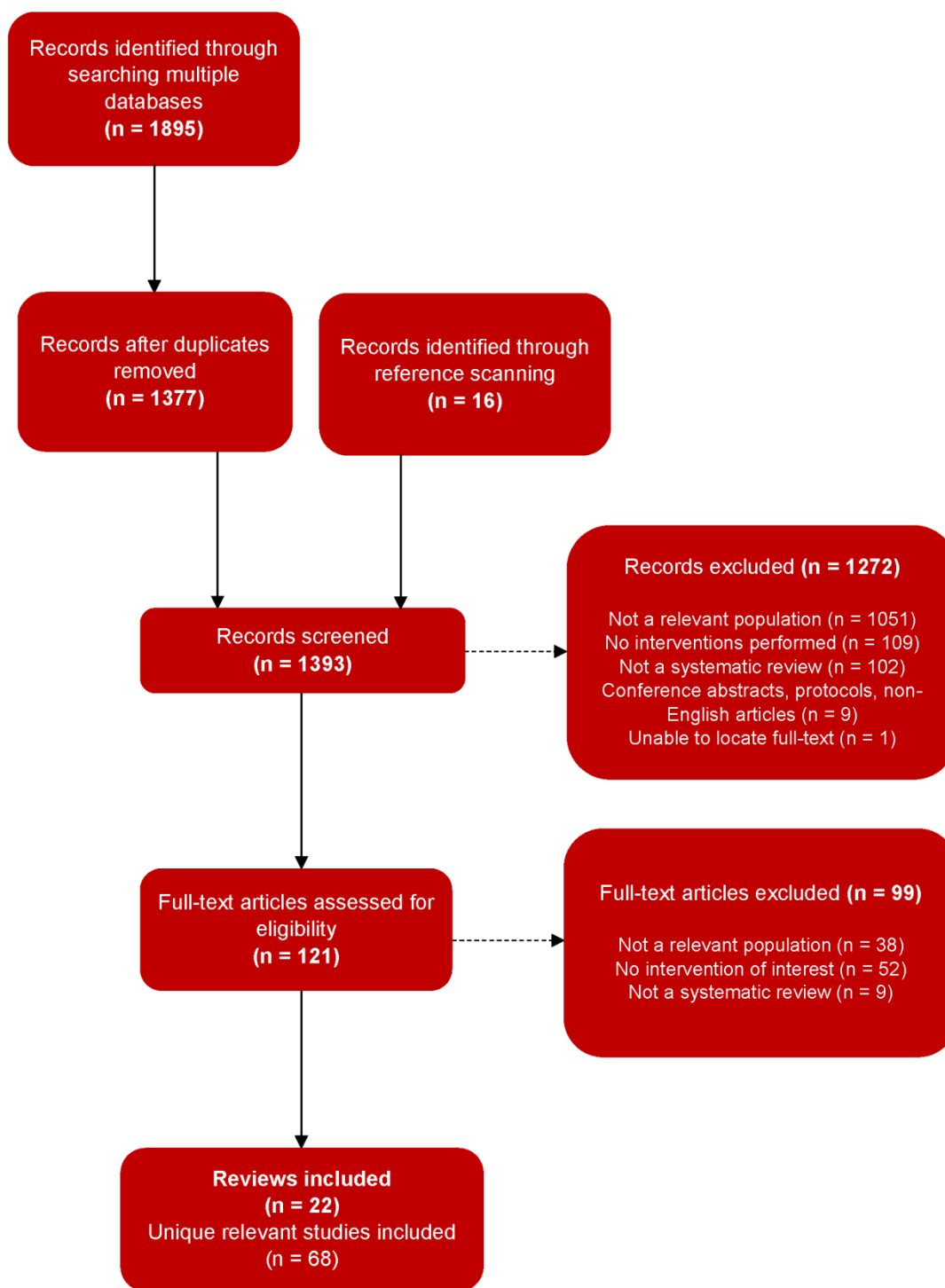
3. RESULTS

3.1 LITERATURE SEARCH

A comprehensive database search identified 1377 records, with an additional 16 located through scanning the reference lists of the included reviews. In total, 1393 titles and abstracts were screened for eligibility at level one and 121 full-text articles at level two. Twenty-two relevant reviews (including 68 unique primary studies) met eligibility criteria and data was abstracted from these articles. The full study flow, with reasons for exclusion, is provided in Figure 1.

One additional full-text review¹¹ was not found during the screening or data abstraction phases, however this article was recently retrieved by our library service and will be included in a future manuscript. Articles were also flagged during screening (but excluded from this overview) if they included only Emergency Medical Services (EMS) or paramedic populations. The list of flagged articles can be found in Appendix Table 3.

Figure 1: Review flow diagram



3.2 REVIEW CHARACTERISTICS

The 22 included reviews were conducted from 2009 to 2019 and the corresponding authors were predominantly located in the United States (USA) (32%) and Australia (32%), followed by Canada (14%) and the United Kingdom (UK) (9%) (Table 1). Within the 22 reviews, we identified 68 unique primary studies, examining both a relevant first responder population and an intervention targeting OSI. The majority of the studies focused on police (75%) and firefighters (22%) with only a small percentage focusing on correctional services (3%). No relevant coroner/forensic pathologist studies were found.

Table 1: Review and primary study characteristics

Characteristic	N (%)
# of included reviews	22
Date of publication	
2009-2012	5 (22.7%)
2013-2016	9 (40.9%)
2017-2019	8 (36.4%)
Country of publication	
Australia	7 (31.9%)
Canada	3 (13.6%)
Netherlands	1 (4.5%)
New Zealand	1 (4.5%)
Sweden	1 (4.5%)
United Kingdom	2 (9.1%)
United States	7 (31.9%)
# of included primary studies	68
Study Design	
Randomised controlled trials	25 (36.8%)
Non-randomised controlled trials	6 (8.8%)
Quasi-experimental	14 (20.6%)
Observational	16 (23.5%)
Case report	6 (8.8%)
Descriptive	1 (1.5%)
Population	
Police	51 (75.0%)
Firefighters	15 (22.1%)
Correctional services	2 (2.9%)
Coroner/Forensic pathologists	0 (0.0%)
Intervention	
Prevention	32 (47.1%)
Prevention/Resilience-building	11 (16.2%)
Rehabilitation	22 (32.3%)
Rehabilitation/Resilience-building	3 (4.4%)

3.3 SUMMARY OF INCLUDED REVIEWS

The following table (Table 2) summarizes the 22 included reviews. Although many of these reviews included a large number of primary studies, only a subset were relevant to this overview. The excluded primary studies either included populations that were not relevant to our overview (i.e. mixed populations or non-first responder populations) or did not include interventions targeting occupational stress injury (i.e. study on the prevalence of PTSD). Two of the reviews included in this table searched for intervention studies (part of their eligibility criteria) but were unable to locate any. The citations of the primary studies included in our overview are listed in the table below, and further details on each study can be found in sections 3.5 and 3.6.

Table 2: Review summaries

Review author (year)	Review country	Review objective(s)	Total # of studies included in review (# of relevant studies)	Citations of relevant studies (Author, year)	Population(s) included in relevant studies	AMSTAR 2 score
Lees, T (2019) ¹²	Australia	To review most recent information regarding anxiety, PTSD, and sleepiness and fatigue and identify the interventions and treatments proposed to overcome work related stressors and associated mental illnesses inflicting law enforcement officers.	43 (6)	Arble, 2016; Chongruska, 2012; Christopher, 2016; Oliver, 2009; Peres, 2011; Plat, 2013	Police	Critically Low
Barger, LK (2018) ¹³	USA	To critically review and synthesize existing literature on the impact of fatigue training on fatigue-related outcomes for Emergency Medical Services (EMS) personnel and similar shift worker groups.	18 (4)	Christopher, 2016; Holbrook, 1994; Kuehl, 2016; Sullivan, 2016	Police, firefighter	Moderate
Guilaran, J (2018) ¹⁴	New Zealand	To survey the extent of social support effectiveness on disaster responder groups.	24 (8)	Bacharach, 2007; Biggs, 2014; Cone, 2015; Leppma, 2017; Pietrzak, 2014; Schwarzer, 2014; Schwarzer, 2016; Tak, 2007	Police, firefighter	Critically Low
Patterson, PD (2018) ¹⁵	USA	To review the literature on the impact of shorter versus longer shifts on critical and important outcomes for EMS personnel and related shift	100 (6)	Amendola, 2011; Bell, 2015; Caputo, 2015; Paley, 1998;	Police, firefighter	High

Review author (year)	Review country	Review objective(s)	Total # of studies included in review (# of relevant studies)	Citations of relevant studies (Author, year)	Population(s) included in relevant studies	AMSTAR 2 score
		worker groups.		Peacock, 1983; Pierce, 1992		
Torchalla, I (2018) ¹⁶	Canada	To summarize the evidence base for interventions targeting individuals with work-related post-traumatic stress disorder (PTSD), to make recommendations for clinicians and administrative decision makers involved in their rehabilitation, and to guide future research in this area. Particular attention was given to studies that were conducted in naturalistic clinical settings or in a workers' compensation claim context.	11 (2)	Gersons, 2000; Lansing, 2005	Police	Critically Low
Varker, T (2018) ¹⁷	Australia	To quantify the nature and distribution of recent peer-reviewed research into the mental health and wellbeing of Australian emergency services personnel, using 'evidence-mapping' methodology.	43 (3)	Lewis, 2014; Skeffington, 2016; Tuckey, 2014	Police, firefighter	Critically Low
MacMillan, F (2017) ¹⁸	Australia	To systematically review studies of health promotion interventions in the police force.	21 (7)	Jeter, 2013; Kuehl, 2016; Norris, 1990; Norvell, 1993; Richmond, 1999; Short, 1984; Tanigoshi, 2008	Police	Low
Witt, K (2017) ¹⁹	Australia	To summarize the international literature on the effectiveness of suicide prevention programs for protective and emergency services employees.	13 (4)	Finney, 2015; Levenson, 2010; Mishara, 2012; Welch, 1998	Police, firefighter	Critically Low
Rose, FR (2016) ²⁰	USA	To conduct a systematic review and meta-analysis with regards to the effectiveness of psychological debriefing.	27 (8)	Bohl, 1991; Bohl, 1995; Carlier, 2000; Harris, 2002; Leonard, 1999; Regehr, 2001; Ruck, 2013; Tuckey, 2014	Police, firefighter, correctional services	Critically Low

Review author (year)	Review country	Review objective(s)	Total # of studies included in review (# of relevant studies)	Citations of relevant studies (Author, year)	Population(s) included in relevant studies	AMSTAR 2 score
Whybrow, D (2015) ²¹	UK	To summarize current knowledge about TRiM and make recommendations for further research.	13 (2)	Hunt, 2013; Watson, 2014	Police	Critically Low
Milner, A (2014) ²²	Australia	To provide a systematic assessment of workplace suicide prevention activities, including short-term training activities, as well as suicide prevention strategies designed for occupational groups at risk of suicide.	13 (1)	Mishara, 2012	Police	Critically Low
Neil-Sztramko, SE (2014) ²³	Canada	To synthesize interventions that have been implemented among shift workers to reduce the chronic health effects of shift work and to provide an overall evaluation of study quality.	44 (4)	Boivin, 2012; Folkard, 1993; Orth-Gomér, 1983; Peacock, 1983	Police	Moderate
Patterson, GT (2014) ²⁴	USA	To conduct a systematic review examining the effects of stress management interventions on outcomes among police officers and recruits.	12 (12)	Ackerly, 1986; Coulson, 1987; Digliani, 1994; Gersons, 2000; Ireland, 2007; McCraty, 1999; Norvell, 1993; Richmond, 1999; Shipley, 2002; Short, 1984; Tanigoshi, 2008; Wilson, 2001	Police	Critically Low
Bisson, JI (2013) ²⁵	UK	To assess the effects of psychological therapies for the treatment of adults with chronic PTSD.	70 (1)	Gersons, 2000	Police	High
Skeffington, PM (2013) ²⁶	Australia	To conduct a systematic review in order to identify and synthesize all programs aimed at the primary prevention of PTSD to date.	7 (3)	Arnetz, 2009; Sarason, 1979; Sijaric-Voloder, 2008	Police	Critically Low
Haugen, PT (2012) ²⁷	USA	To conduct a systematic review of the PTSD treatment literature (English and non-English) in order to evaluate such treatment proposals based on what is known about treating PTSD in	17 (8)	Cornelius, 2007; Coupland, 2009; Ford, 1996; Gersons, 2000;	Police, firefighter	Critically Low

Review author (year)	Review country	Review objective(s)	Total # of studies included in review (# of relevant studies)	Citations of relevant studies (Author, year)	Population(s) included in relevant studies	AMSTAR 2 score
		first responders. This review especially sought to identify RCTs whose primary outcome was PTSD.		Kitchiner, 2004; Lansing, 2005; Tolin, 1999; Wilson, 2001		
Plat, MJ (2011) ²⁸	Netherlands	To conduct a systematic review describing (1) the existing job specific workers' health surveillance (WHS) activities, and (2) the effectiveness of job-specific WHS interventions with respect to work functioning, for selected jobs.	31 (2)	Arnetz, 2009; Elliot, 2007	Police, firefighter, correctional services	Low
Stergiopoulos, E (2011) ²⁹	Canada	To identify interventions targeting work-related PTSD in order to get workers back to the workplace.	7 (1)	Gersons, 2000	Police	Moderate
Martin, A (2009) ³⁰	Australia	To investigate whether different types of health promotion intervention in the workplace reduce depression and anxiety symptoms.	22 (1)	McCraty, 2003	Correctional services	Critically Low
Walsh, DS (2009) ³¹	USA	To identify psychosocial effect of the experience of relief work; and to describe interventions that have been identified in reducing the severity of psychosocial disturbances in relief workers upon their return from a disaster.	12 (1)	Fullerton, 1992	Firefighter	Critically Low
Larsson, G. (2016) ³²	Sweden	To draw on the daily hassles perspective on stress and synthesize existing research on daily hassles in professional first responders using a systematic mixed studies review with an integrated design.	40 (NA)*	N/A	N/A	NA
Lambert, EG (2015) ³³	USA	To review the correctional staff burnout literature.	55 (NA)*	N/A	N/A	NA

Abbreviations: EMS – Emergency Medical Services; N/A – not applicable; PTSD – Post-Traumatic Stress Disorder; RCT – Randomised Controlled Trial; TRiM – Trauma Risk Management

Notes: * Although this review aimed to include intervention studies, the findings state they were not able to find any.

3.4 QUALITY APPRAISAL OF INCLUDED REVIEWS

A summary of the quality appraisal results of the 22 included reviews using the AMSTAR 2 tool can be found in Table 2. A more detailed quality appraisal table can be found in Appendix Table 2, where the responses are presented for each of the 16 items on the AMSTAR 2 tool. Two of the reviews could not be appraised for quality because they did not find intervention studies. The majority of the reviews were rated critically low (59%)^{12,14,16,17,19-22,24,26,27,30,31} or low (9%)^{18,28} in terms of the overall review quality. A total of five reviews were rated high (9%)^{15,25} or moderate (14%)^{13,23,29} quality. The most common critical flaws within the low quality reviews were the lack of a protocol or an *a priori* design (item 2) and no list of excluded studies (item 7). A large portion of the low quality reviews did not complete a risk of bias assessment (item 9) for the included studies, and were therefore unable to use the risk of bias in interpreting the results (item 13).

3.5 DATA SYNTHESIS

Since the included systematic reviews provided very little information on the interventions and outcomes of the primary studies, we also report the results from the 68 studies that were included in these reviews. In the following section, the primary studies are organized by study population.

3.5.1 Police

Eighteen reviews included 51 unique studies examining interventions targeting OSI in police officers. Summaries of the included police primary studies are presented in Appendix Table 4, including the study's objectives, methods, results and conclusions.

3.5.2 Firefighters

Interventions for firefighters were examined in 11 reviews, including 15 primary studies summarized in Appendix Table 5.

3.5.3 Correctional Services

The two intervention studies for correctional officers found in two reviews are summarized in Appendix Table 6.

3.5.4 Coroner/Forensic Pathologists

Despite a comprehensive search, no studies examining coroners or forensic pathologists were identified in any of the included reviews.

3.6 INTERVENTIONS AND OUTCOMES EXAMINED

In this section, the 68 primary studies are categorized by intervention type. Table 3 presents studies targeting the prevention of occupational stress injury, while Table 4 reports on studies examining rehabilitation strategies. If a resilience-building component was present within the prevention or rehabilitation intervention studies, it was denoted within the tables with an asterisk (*). A description of each of the study populations, interventions and findings are presented in the tables and a summary of each study is provided below.

3.6.1 Prevention

Prevention strategies were explored in 43 primary studies. Thirty-three of these studies included police (officers, recruits, veterans, management and support staff), 7 focused on firefighters, and 1 study was conducted with correctional staff.

Physical and mental health education/training (11 studies)

One study examined the SHIELD (Safety & Health Improvement: Enhancing Law Enforcement Departments) program, a wellness team-based intervention with the aim of reducing occupational risks and unhealthy behaviors in police officers (Kuehl, 2016)³⁴. The intervention involved weekly sessions on healthy eating, exercise, weight, stress and sleep, with an emphasis on team social support. There were statistically significant positive changes with respect to diet, sleep, stress and tobacco/alcohol use in officers enrolled in the program, however only healthy eating and alcohol/tobacco reduction were sustained overtime.

The impact of physical health promotion in police officers was examined in 4 studies. In Short et al.'s (1984)³⁵ study, obese police officers were randomized to an Instruction Group that involved 8 weekly 90-minute sessions covering exercise and nutrition or to a Conditioning Group that received the above instruction as well as a program of walk-jog activities for up to 45-minute 3 times a week. Both groups had increases in positive physical (e.g. increase in oxygen intake) and psychological (e.g. scores on the physical self and self-satisfaction scales) outcomes, but the Conditioning Group increased statistically significantly more. Norris (1990) conducted a 3-arm study comparing structured aerobic group exercise sessions, structured anaerobic group sessions, and no exercise sessions. The aerobic group showed a statistically significant decrease in stress, heart rate, and blood pressure, as well as a statistically significant increase in general health when compared to control. Another physical fitness intervention including circuit weight training was studied by Norvell et al. (1993)³⁶. Four months of circuit weight training resulted in multiple positive effects including an increase in strength, reduction in physical symptoms, and improvement in mood (including lowered anxiety, depression, and hostility). In the fourth study (Jeter, 2013)³⁷, yoga was incorporated in a police academy training program to assess the impact on stress, mood and mindfulness on police recruits. After 6 classes of yoga, the study found a statistically significant reduction in perceived stress, tension and fatigue, and an increase in mood. It is interesting to note that some trainees found the program to be beneficial and relaxing, while others were resistant to the idea of yoga as a part of police training.

Two studies assessed effective health promotion strategies in firefighters. A sleep health education program for firefighters was described by Sullivan et al. (2016)³⁸. The treatment group had statistically significantly fewer disability days and was less likely to file an injury report during the study than the control group, suggesting that a firefighter workplace-based sleep program may reduce injuries and days lost from work due to disability. Meanwhile, Elliot et al. (2007)³⁹ reported on two separate Promoting Health Lifestyles: Alternative Models' Effects (PHLAME) interventions: (1) an 11 session team-oriented educational intervention on nutrition, exercise and energy balance, and (2), an individual-oriented counseling through motivational interviewing while on duty. The study found statistically significant improvement in general wellbeing, healthy eating habits, and weight gain in participants of both the team and individual interventions.

One study (McCraty et al., 2003)⁴⁰ assessed the use of a prevention program in correctional officers. The Power to Change Performance program involved 5 training modules over 2 days focusing on positive emotion re-focusing techniques. The study reported an increase in employee productivity and psychological wellbeing and a statistically significant reduction in stress and health risk factors for correctional peace officers.

The effectiveness of psychological first aid (PFA) training for police managers and staff with support roles was examined by Lewis et al. (2014)⁴¹. The training program was delivered in a single face-to-face session and was focused on training employees to implement actions in their organizational setting following a potentially traumatic event (PTE). There was a significant increase in knowledge related to PTEs and psychological first aid (PFAs), as well as the self-reported skills required and confidence to respond to a PTE after the training. Holbrook et al. (1994)⁴² described a 1-hour long education workshop on self-management to improve sleep hygiene that did not find a significant difference in sleep hygiene practice (despite initial increases in knowledge and awareness); although a brief health assessment and motivational interviewing intervention to reduce excessive drinking, smoking and stress among police noticed some positive trends in both groups overtime, no statistically significant differences were found between the intervention and control groups in a study by Richmond et al. (1999)⁴³.

Stress management training (7 studies)

Four randomized trials were conducted describing stress management programs for police officers. HeartMath is a program involving 3 training sessions aimed at reducing stress, improving physiological and emotional balance, increasing mental clarity and enhancing performance and quality of life. McCraty et al. (1999)⁴⁴ found improvements in several of these areas providing support for the use of HeartMath in police officers. Sijaric-Voloder et al. (2008)⁴⁵ also reported on the development and evaluation of a stress management program for police officers involving 4 sessions a week for 4 weeks covering stress and trauma awareness, relaxation training, problem-solving skills and communication techniques. The program resulted in statistically significant reductions in anxiety sensitivity and somatic reactions to stress, as well as improved coping, help-seeking, and job performance. Six 2-hour sessions involving self-monitoring training, relaxation techniques and building coping responses comprised a stress management program by Sarason et al. (1979)⁴⁶. The authors found statistically significantly improved performance by the group receiving training compared to the control across a

range of simulated situations. No differences in physiological stress outcomes were found. A fourth stress management program (4 hours/week for 6 weeks) involving relaxation techniques, exercise and diet advice, as well as rational emotive modeling, and assertiveness/communication strategies resulted in no statistically significant differences in job-related outcomes, however there was a statistically significant increase in the use of smoking behavior as a result of treatment (Ackerley, 1986)⁴⁷.

An in-service stress management training session was described in an observational study by Oliver et al. (2009)⁴⁸ involving 4 hours of stress awareness and recognition and 4 hours of management training. Although there was a statistically significant decrease in anxiety over the first 12 months, eventually anxiety and behavioral scales scores increased overtime. Two additional studies described a stress reduction program, one using a cognitive-behavioral approach to training (Coulson, 1987)⁴⁹ and another using stress inoculation training (Digliani, 1994)⁵⁰, with no statistically significant differences in mental health outcomes found in either.

Suicide prevention program (4 studies)

Four studies examining suicide prevention programs involving various components were included. The Together for Life program (Mishara et al., 2012)⁵¹ is a comprehensive suicide prevention strategy targeting the Montreal Police Force. The intervention involved training for all officers, supervisors, and union representatives, as well as establishing a volunteer helpline and a publicity campaign. Twelve years after implementation of the program, the study reported a statistically significant decrease in suicide rates in Montreal police and a statistically significant reduction in suicide rates compared to other provincial police. Similarly, a suicide prevention programs for police described by Welch (1998)⁵² also found suicide rates were significantly reduced post intervention. A report was published on the Badge of Life Psychological Survival for Police Officers Program (BOL); however the effectiveness of this program on suicide rates was not evaluated (Levenson et al., 2010)⁵³. Also, Finney et al. (2015)⁵⁴ found no statistically significant differences in suicide rates after implementation of a suicide prevention program to educate firefighters about suicide.

Trauma prevention/resilience-building (5 studies)

Two studies explored effective resilience programs in junior officers. Arble et al. (2017)⁵⁵ examined a program designed to increase resilience and build coping mechanisms while reducing trauma. Each session used audio recordings and scripts to take new police officers through a sequence of imagined scenarios beginning with a relaxation scenario and building up to an enhanced trauma scenario. After the program, a statistically significant increase in positive coping strategies and statistically significant decreases in stress and substance abuse were reported in the new officers. Similarly, in a randomised trial (Arnetz et al., 2009)⁵⁶, a group of rookie police officers with trauma resilience training was compared to a group that received regular training. The resilience training involved education sessions, imagery training and mental skill rehearsal and resulted in statistically significantly less stress and better police performance during simulations.

Visuo-motor behavior rehearsal (VMBR) is another sequenced simulation intervention involving a relaxation period, followed by an imagery rehearsal portion, and ending with a highly stressful critical event training scenario. Shipley et al. (2002)⁵⁷ found that participants in the VMBR group experienced

statistically significantly lower anxiety and performed statistically significantly better in the critical event scenario than the control, adding to the evidence in support of resilience training. In addition, Mindfulness-Based Resilience Training (MBRT) was assessed in a study by Christopher et al. (2016)⁵⁸. The 8-week training program used experiential exercises like body awareness scans, meditation, martial arts, and mindful movement to introduce police officers to the practice of mindfulness. Group classes were supplemented with reading material and take-home practice exercises. The program statistically significantly improved psychological (resilience, emotional intelligence), and physiological (fatigue, burnout) stress outcomes.

A 4-hour resilience program called Mental Agility and Psychological Strength (MAPS) was examined in firefighter recruits (Skeffington et al., 2016)⁵⁹, however no evidence was found that MAPS training was effective in the primary prevention of PTSD.

Shift work (8 studies)

Eight studies compared different work hours and schedules to assess their impact on healthy habits, sleep and work hours/performance. In police officers, two studies reported on a change in shift schedule from the regular 8 hour shift to a 12 hour system. Peacock et al. (1983)⁶⁰ reported statistically significantly improved blood pressure, sleep patterns and alertness in police officers, and Pierce et al. (1992)⁶¹ resulted in statistically significant improvements in level of stress and fatigue, work performance, and overall job and life satisfaction. However, a compressed work week comparison in police officers (13 hour 20-min shifts vs. 10 hour shifts) examined by Bell et al. (2015)⁶² resulted in worse sleep, more fatigue, and overall lower quality of life. In addition, Amendola et al. (2011)⁶³ randomized police officers to 8 hour, 10 hour and 12 hour shifts and found no statistically significant differences in health and performance between the groups, although 10 hour shifts may lead to more sleep, less overtime, and a greater quality of life.

In firefighters, working 48 consecutive hours with 96 hours off statistically significantly increased mean hours of nighttime sleep and reduced daytime sleepiness when compared to working a regular shift; however, no statistically significant differences in health habits or job satisfaction were found in this study (Caputo et al., 2015)⁶⁴. In addition, a compressed work schedule for firefighters (10 hour days/14 hour nights vs. regular 8 hour shifts) studied by Paley et al. (1998)⁶⁵ found no statistically significant differences between the compressed and regular work schedules.

Orth-Gomér (1983)⁶⁶ compared clockwise (CW) shift rotation to the customary counter-clockwise (CCW) shift rotation and found statistically significantly lowered serum triglycerides and glucose, and significantly better sleep in the CW group. No statistically significant differences were seen in other outcomes. Another study did not focus on shifts changes but rather on improving outcomes in police officers working 7 consecutive night shifts (Boivin et al., 2012)⁶⁷. An intervention combining bright wide-spectrum light at night, orange-tinted goggles in the morning, and a stable daytime sleep/darkness schedule was tested against a control group; although there were some changes within groups overtime, there was no statistically significant difference observed between intervention and control.

Social support/integration (8 studies)

Eight observational studies reported on the relationship between pre-existing social and supervisory support and mental health outcomes, especially in disaster situations. The presence of social support and integration in the lives of police officers appeared to be important factors in the prevention of PTSD post-World Trade Centre attacks (Cone et al., 2015)⁶⁸. Two other studies by Schwarzer et al. (2014, 2016)^{69,70} also reported on PTSD outcomes after the 9/11 attacks. Both reported that higher exposure to a traumatic event resulted in higher levels of stress; this relationship was moderated by a high level of social integration (i.e. the structure and quantity of social relationships) and emotional support, respectively. In addition, Leppma et al. (2017)⁷¹ and Fullerton et al. (1992)⁷² found that higher levels of social support, gratitude and life satisfaction were statistically significant in mediating the relationship between stressful life events and psychological outcomes.

Workplace and supervisor support and job control were examined in three studies. In Bacharach et al. (2007)⁷³'s study, supervisory support and control was found to buffer the relationship between crisis incidents and the development of post-traumatic distress in firefighters. Tak et al. (2007)⁷⁴ conducted debriefing sessions to assess firefighter experiences, where perceived supervisor support was also found to be associated with depressive symptoms. A more recent study conducted in police officers (Biggs et al., 2014)⁷⁵ explored the health and work attitudes of officers after a natural disaster and found a statistically significant association between job control/supervisor support and work satisfaction, turnover, and psychological strain.

Table 3: Prevention strategies for OSI

PREVENTION				
Intervention type	Study author (year)	Study design (follow-up in months)	Population comparison	Findings (significant, not significant, no difference)
Physical and mental health education/training	Richmond, RL (1999) ^{*43}	RCT (8 months)	N = 852 Police	No significant intervention effects between experimental and control groups Significantly greater sick leave days reported in excessive drinkers and those reporting moderate to severe stress levels (p < 0.05, p < 0.05) Significant increase in awareness of alcohol policies in the work-place in both experimental and control groups over time (p < 0.01) Significant decline in percentage of smokers in both groups Significantly more symptoms of stress in women than men In the qualitative study, employees generally distrusted their organization's involvement in health unless work performance was affected. Seeking professional assistance for life-style issues was viewed as a sign of weakness. Alcohol use was seen as a way of obtaining information or group membership, self-medication and socializing.
	Kuehl, KS (2016) ^{*34}	RCT (24 months)	N = 408 Law enforcement officers and support staff	Significant positive changes occurred related to diet, sleep, stress, and tobacco and alcohol use at 12 weeks; only increased fruit and vegetable consumption, healthy eating, and tobacco and heavy alcohol use reduction persisted 24 months after the intervention.
	Short, MA (1984) ³⁵	RCT (8 weeks)	N = 45 Police	Significant increase in oxygen consumption and scores on the physical self and self-satisfaction subscales in both groups; but the conditioning group increased significantly (2 or 3 times) more. Significant reductions in both groups on the Total Variability measure from the TSCS, which have been associated with personality integration. These results demonstrate that physical conditioning and dietary educational sessions or educational sessions alone are associated with positive changes in self-concept in obese individuals and also corroborate other studies that show links between physical and psychological fitness.
	Holbrook, MI (1994) ⁴²	Quasi-experimental (1 month)	N = 53 Law enforcement officers	Significant increase in pre- to post-test awareness of sleep hygiene (t = 9.23, p < .001) Significant increase in knowledge about nicotine (t = 4.24, p < .001), hypnotics (t = 4.64, p < .001), and caffeine (t = 7.53, p < .001) no significant difference in patterns of poor sleep hygiene
	Norris, R (1990) ^{*76}	RCT (10 weeks)	N = 77 Police	Significant decrease in stress, timed run duration, heart rate, blood pressure in the aerobic versus anaerobic and control groups Significant decrease in heart rate and diastolic blood pressure in the anaerobic group versus control group Significant increase in life quality and general health in the aerobic and anaerobic groups versus control group

				Post-training fitness measures confirmed the effectiveness of training and between group differences for physiological and self-report measures were found. Subjects undergoing aerobic training evinced larger changes on the self-report measures of well-being and stress than the anaerobic trainers and both groups showed significant improvement when compared to controls.
Norvell, N (1993) ³⁶	RCT (16 weeks)	N = 43 Police		Significant increase in strength on cardiovascular fitness Significant improvements in mood, including decreases in somatization, anxiety, depression, and hostility Decrease in reports of physical symptoms and in improvements in job satisfaction These findings suggest that circuit weight training programs may contribute to important psychological benefits.
Lewis, V (2014) ^{*41}	Quasi-experimental (NR)	N = 582 Police Managers managers (321); peer supporters (261)		Significant increase to manager and peer supporter mean scores in all 3 domains: knowledge related to potentially traumatic events (PTEs) and psychological first aid (PFA), self-reported skills required to respond appropriately to a PTE, and confidence to respond to PTEs This study demonstrates that the provision of PFA training to managers and peer supporters is likely to lead to increased capacity to implement a PFA response within the organization through increases in relevant knowledge, skills, and confidence.
Jeter, PE (2013) ^{*37}	Quasi-experimental (20 weeks)	N = 42 Police academy cadets		Significant changes in perceived stress and mood, reductions in tension and fatigue, and a trend toward reduced anger No change in mindfulness was detected. Perceptions: some trainees found the program beneficial, relaxing and stress relieving while some were resistant to the program, as they felt yoga was not consistent with police training.
Elliot, DL (2007) ³⁹	RCT (12 months)	N = 599 Firefighter tx1 (234); tx2 (202); cx (163)		Significant increase in fruit and vegetable consumption (P < 0.01 and 0.05, respectively) and general well-being (P < 0.01) in both groups Significantly less weight gain occurred in both (P < 0.05) Both team-centered and individual-oriented interventions promoted healthy behaviors.
Sullivan, JP (2016) ³⁸	RCT (54 weeks)	N = 1,189 Firefighters		Significantly fewer (46%) disability days than control (1.4 ± 5.9 vs. 2.6 ± 8.5 days/firefighter, respectively; p = .003) Significantly less likely to file at least one injury report during the study (OR [95% CI] 0.76 [0.60, 0.98]; χ² = 4.56; p = .033) No significant differences in departmental injury or motor vehicle crash rates No significant changes pre- versus post-study in self-reported sleep or sleepiness

	McCraty, R (2003) ⁴⁰	RCT (3 months)	N = 88 Correctional officers tx (44); cx (44)	Significant reduction in stress and health risk factors in correctional peace officers in the Power to Change Performance program Increased employee productivity and psychological well-being
Trauma prevention/ Resilience building	Shiple, P (2002) ⁵⁷	RCT (NR)	N = 54 Police recruits tx (26); cx (28)	Significantly lower scores in the visuo-motor behavior rehearsal (VMBR) group on the cognitive state anxiety subscale of the Competitive State Anxiety Inventory-2 No change in somatic state anxiety and self-confidence in the VMBR treatment group Higher performance on the critical event scenario in VMBR group, including significantly more assailant “hits”
	Christopher, MS (2016) ⁵⁸	Observational (8 weeks)	N = 62 Police	Significant improvement in self-reported mindfulness, resilience, police and perceived stress, burnout, emotional intelligence, difficulties with emotion regulation, mental health, physical health, anger, fatigue, and sleep disturbance
	Arble, E (2017) ⁵⁵	Quasi-experimental (1 year)	N = 32 Police in the academy	Significant increase in positive reframing and humour coping strategy use Significant reductions in anxiety and alcohol use over the year Pilot may improve new officers' psychological, emotional and tactical performance
	Arnetz, B (2009) ⁵⁶	RCT (12 months)	N = 18 Police rookies tx (9); cx (9)	Significantly less negative mood, less stress, and better police performance (as rated by blind observer) compared to the control group No difference in positive mood between the groups Significantly less increase in heart rate and biomarkers of stress during simulation
	Skeffington, PM (2016) ⁵⁹	RCT (12 months)	N = 45 Firefighter recruits	No evidence that the intervention was effective in the primary prevention of mental health issues No significant impact of MAPS training on social support or coping strategies Significant difference across conditions in trauma knowledge is indicative of some impact of the MAPS program.
Stress management training	Oliver, WM (2009) ⁴⁸	Observational (1-18 months)	N = 664 Police officers	significant decrease in anxiety levels over the first 12 months, but this effect diminishes overtime (13-18 months) It is suggested that law enforcement agencies should implement or continue utilizing stress management programs, and further recommend that such training should be conducted yearly.
	Sijaric-Voloder, S (2008) ⁴⁵	RCT (3 months)	N = 20 Police tx (10); cx (10)	Significant anxiety sensitivity reduction, more active and planned coping strategies for stressful situations had less somatic reactions to stress and improved performance at work and in private life stress management program participants.

				Significantly more likely to request medical advice in crisis situations after completing psychotherapeutic program
	Ackerley, DG (1986) ⁴⁷	RCT (6 weeks)	N = 49 Police personnel tx (24); cx (25)	No significant effect of treatment was found regarding job satisfaction, burnout, or change in attitude towards family life, or in a locus of control measure. Significant increase in smoking behavior coping activities
	Digliani, JA (1994) ⁵⁰	RCT (4 weeks)	N = 51 Police tx (23); cx (28)	No significant differences between the treatment and control groups on trait anxiety, trait anger, and self-efficacy Feedback revealed that officers found the training program beneficial.
	McCraty, R (1999) ⁴⁴	RCT (16 weeks)	N = 59 Police and civilian personnel tx (28); cx (31)	Improvement in officers' capacity to recognize and manage their stress and negative emotions in both work and personal contexts. Reduction in stress, negative emotions and physical stress symptoms, increased positive emotion and physical vitality in training group compared to control group improvements in family relationships, more effective communication and cooperation within work teams, and enhanced work performance. Increased participants' calmness, clarity and focus during these scenarios and enabled them to rapidly and deeply recalibrate, both physiologically and psychologically, after the intense stress was over. This study provides evidence that practical stress and emotional self-management techniques can reduce damaging physiological and psychological responses to both acute and chronic stress in police, and positively impact a variety of major life areas in a relatively short period of time.
	Sarason, IG (1979) ⁴⁶	RCT (NR)	N = 18 Police officers tx (9); cx (9)	Significantly better performance of intervention group across a range of simulated situations as compared to the control group; this effect was most pronounced for simulated situations that were trained for during the intervention. Lower self-rating of performance, anxiety, and confidence than controls No differences in physiological measures were found.
	Coulson, JE (1987) ⁴⁹	Quasi-experimental (NR)	N = 63 Police officers and recruits tx1 (21); tx2 (21); cx (21)	No significant differences found between the three groups on pre-post-test measures of mood disturbance
Suicide prevention program	Finney, EJ (2015) ⁵⁴	Quasi-experimental (7 years)	N = 3810 Firefighters	No significant difference in suicide rates at post-intervention (IRR 0.82, 95%CI 0.17–3.87; one study; P value = 0.803)
	Levenson, RL Jr (2010) ⁵³	Descriptive (NA)	N = NR	NA - effectiveness of this program on suicide rates has not been evaluated to date
	Mishara, BL	Quasi-experimental	N = 4178	Significant decrease (p < .008) to 6.42 per 100,000 per annum in suicide

	(2012) ⁵¹	(12 years)	Police	rates in Montreal police , while the other Quebec police had an 11.4% non-significant increase in suicides to 29.0 per 100,000 Significant post program difference between Montreal suicide rates and other provincial police suicide rates (p < .007)
	Welch, J (1998) ⁵²	Quasi-experimental (5 months)	N = 10000 Police	Significant reduction in suicide rates at post-intervention (IRR 0.23, 95%CI 0.07–0.81; p-value = 0.022)
Shift work	Amendola, KL (2011) ⁶³	RCT (6 months)	N = 226 Police 8 hrs (67); 10hrs (81); 12hrs (78)	10-hour shifts: no significant health, safety, or performance problems. No negative effects on performance or health of officers. May lead to greater quality of life, more sleep and less overtime. 12-hour shifts: no significant performance declines. May lead to increase in sleepiness and decrease in alertness.
	Bell, LB (2015) ⁶²	Quasi-experimental (6 months)	N = 343 Police tx (180); cx (163)	No apparent advantages but considerable liabilities associated with 13hr 20mins shifts compared to 10hr shifts, including less sleep, worse quality of sleep, more fatigue and more daytime dysfunction due to sleepiness, slower reaction times, more lapses in concentration, and a worse reported quality of life (QoL).
	Orth-Gomér, K (1983) ⁶⁶	Quasi-experimental (4 weeks)	N = 45 Police	Significant between group difference (p<0.05) in triglycerides, glucose and blood pressure Positive change in fasting cholesterol, uric acid, subjective sleep quality No change in epinephrine/norepinephrine or tobacco consumption between groups
	Peacock, B (1983) ⁶⁰	Quasi-experimental (6 months)	N = 75 Police	Significantly improved W170, blood pressure, sleep duration, sleep quality and subjective level of alertness measures moving from 8 hour 12 day shift cycle to a 12 hour 8 day system
	Pierce, JL (1992) ⁶¹	Quasi-experimental (1 year)	N = 50 Police	Significant improvements in overall job, leisure time, and life satisfaction following shift change (p<0.01) Significantly decreased level of stress and fatigue following change (p<0.01) Significantly improved work coordination and the servicing of external constituents' needs following change in shift (p<0.01) No change in department's performance of its specific patrol functions No change in attitudes, organizational commitment, job involvement, and intrinsic motivation
	Boivin, DB (2012) ⁶⁷	RCT (7 days)	N = 15 Police tx (8); cx (9)	Significantly higher excretion rate of UaMT6s at the end compared to the start of the work week (p < .001); this rate increased significantly more in the intervention than control group (p = .032). Significant phase delay of salivary melatonin was observed in both groups at the end of study (p = .009); no significant between-group difference was reached. Significant decrease of reaction speed and subjective alertness

				<p>throughout the night shift in both groups ($p < .001$) Significant decrease in reaction speed throughout the work week in the control group ($p \leq .021$); no difference was observed in the intervention group. Overall, these observations indicate better physiological adaptation in the intervention group compared to the controls.</p>
	Caputo, LM (2015) ⁶⁴	Quasi-experimental (4 months)	N = 269 Firefighters	<p>Significant increase in mean hours of on-shift (intra-shift) nightly sleep, from 5.8 hours versus 6.6 hours, after the schedule change ($p < 0.001$) Significant decrease in mean scores of daytime sleepiness from 8.9 to 8.0 ($p < 0.001$) after schedule change Significant improvement feelings of refreshment after the 48/96-hour schedule implementation ($p < 0.05$) General trend towards reduced burnout after implementation Decrease in the proportion of participants that felt the shift interfered with responsibilities Increase in participants that felt the advantages of the current work schedule Outweighed the disadvantages after implementation (78% versus 88%, respectively); no large shift in job satisfaction No significant changes in health habits No significant difference in inter-shift (off-shift) sleep obtained, sleep interruptions or time to fall asleep between schedules</p>
	Paley, MJ (1998) ⁶⁵	Quasi-experimental (16 month)	N = 24 Firefighters	<p>No significant differences between the compressed (8hr) and non-compressed (10/14hr) work schedules Significant difference between day and night shifts in subjective measures of sleepiness (42.86, $p < 0.001$) and mood (NPRU-P; $p < 0.001$ and NPRU-N: $p < 0.005$)</p>
Social support/ integration	Cone, JE (2015) ⁶⁸	Observational (9 months)	N = 2204 Police	<p>Social support and social integration both appear to be important to prevent PTSD, and reduce the risk of developing symptoms of PTSD during a critical period of time after a disaster.</p>
	Leppma, M (2017) ⁷¹	Observational (NR)	N = 113 Police	<p>Stressful life events are independently associated with post-traumatic growth (PTG). Higher levels of gratitude ($p \leq .05$), satisfaction with life ($p \leq .05$), and social support ($p \leq .05$) are seen to moderate relationship between stressful life events and PTG. These findings suggest that promoting satisfaction with life, interpersonal support, and gratitude may be beneficial to those who are regularly at risk of trauma exposure.</p>
	Schwarzer, R (2014) ⁶⁹	Observational (4 years)	N = 2,943 Police	<p>Increased PTSD symptoms were associated with less support, and the direction of change also affected support. Cause and effect cannot be determined or disentangled here, although there is temporal precedence of symptom levels suggesting emotional support as an</p>

				outcome.
	Schwarzer, R (2016) ⁷⁰	Observational (9 years)	N = 2,204 Police	The higher the exposure level, the more stress responses occur. High level of social integration buffered relationship between exposure and stress
	Biggs, A (2014) ^{*75}	Observational (11 months)	N = 1623 Police	Positive association between involvement in communications and major operations and personal property damage or loss, with perceived work culture support, which, in turn, was associated with intrinsic job satisfaction, work engagement, turnover intentions, and psychological strain. Significant association between job control and supervisor support with intrinsic job satisfaction, work engagement, turnover intentions, and psychological strain Positive association between job demands and both work engagement and psychological strain
	Bacharach, SB (2007) ⁷³	Observational (NR)	N = 1110 Firefighters	Post-incident unit support and control climates are likely to serve as important protective factors for first responders involved in catastrophic critical incidents such as 9/11. Supervisory support climate: moderated the association between critical incident involvement and post traumatic distress. No significant moderating role between posttraumatic distress and negative emotional states. Unit-level employee control climate: moderated the relationship between posttraumatic distress and two negative emotional states; namely, anxiety and stress. No significant impact on the link between critical incident involvement and posttraumatic distress.
	Fullerton, CS (1992) ⁷²	Case report (2-4 days post disaster)	N = 20 Firefighters group debriefing (12); group interview (8)	Availability of social support, type of leadership, level of training, and use of rituals were shown to mediate stress.
	Tak, SW (2007) ⁷⁴	Observational (13 weeks)	N = 525 Firefighters	Less likely to report depressive symptoms compared to firefighters not living with their families Perceived low supervisor support was associated with depressive symptoms, whereas participating in group counseling was not.

Abbreviations: **CI** – Confidence Interval; **cx** – Control group; **IRR** – Incidence Rate Ratio; **MAPS** – Mental Agility and Psychological Strength; **N** – Total Sample Size; **NA** – Not Applicable; **NPRU-N** – Naval Psychiatric Research Unit Mood Scale – Positive Mood; **NPRU-P** – Naval Psychiatric Research Unit Mood Scale – Negative Mood; **NR** – Not Reported; **OR** – Odds Ratio; **PTG** – Post-traumatic Growth; **PTE** – Potentially Traumatic Events; **RCT** – Randomised Controlled Trial; **tx** – Treatment/intervention group

Notes: * The interventions implemented in these studies were also categorized as resilience-building strategies.

3.6.2 Rehabilitation

A total of 25 studies examined rehabilitation strategies and programs, including 18 targeting police officers, 8 targeting firefighters, and 1 in prison guards.

Counseling/debriefing therapy (16 studies)

Sixteen studies described the use of psycho-educational therapy in the rehabilitation of police officers (11), firefighters (4), and correctional staff (1). Critical incident stress debriefing (CISD), a 7-phase counseling intervention employed after a crisis or critical event, was examined in 8 studies. In police officers, Bohl (1991)⁷⁷ reported statistically significantly higher negative psychological health outcomes (i.e. depression, anger, anxiety and long-term stress) in the control group receiving no intervention when compared to CISD. Likewise, Leonard et al. (1999)⁷⁸ also found that CISD resulted in statistically significantly lower anger levels and increased the use of coping techniques when compared to a control group. However, in another study (Carlier et al., 2000)⁷⁹, 3 successive individual CISD sessions conducted after experiencing a critical event resulted in statistically significantly more PTSD symptoms in the debriefed group compared to control one week post-trauma, and no statistically significant difference in psychological morbidity between groups at 6 months.

In firefighters, CISD compared to control resulted in statistically significant positive psychological health outcomes in one study (Bohl, 1995)⁸⁰; however, another found no statistically significant relationship between CISD and PTSD (Harris et al., 2002)⁸¹. Firefighters in a third study comparing CISD to control (Tuckey et al., 2014)⁸² reported a statistically significant higher quality of life and lowered alcohol consumption, but no effects on psychological health outcomes. Regehr et al. (2001)⁸³ studied the use of a modified crisis debriefing intervention in Australian firefighters, and although the majority perceived the debriefings to be helpful, this study also did not result in statistically significant changes in psychological outcomes. Prison guards in a study conducted by Ruck et al. (2013)⁸⁴ were offered an adapted CISD program after experiencing traumatic events in the workplace. Those who accepted debriefing experienced a statistically significant reduction in stress, anxiety and depression scores.

Cognitive-behavioral therapy (CBT) is a form of psychotherapy focused on developing practical skills and strategies to improve mental health. Two studies reported on the use of CBT. The first is a case study of a retired police officer (Cornelius et al, 2007)⁸⁵ that found a CBT exposure-based approach resulted in overall improvement in psychological symptoms. The second was a wellness counseling program with elements of CBT that reported higher wellness scores in the counseling groups post-treatment (Tanigoshi et al., 2008)⁸⁶. A third study investigated exposure-based therapy and cognitive restructuring (ETCR) in a group of police officers who experienced a gunfire attack (Peres et al., 2011)⁸⁷, where the therapy group experienced decreased PTSD symptoms after ETCR.

Brief Eclectic Psychotherapy (BEP), a combination of CBT and other psychotherapeutic elements, was used to treat PTSD in police officers in two studies. In Gersons et al. (2000)⁸⁸'s study, BEP showed a statistically significant improvement in all PTSD symptoms and return to work when compared to a control group. A retrospective analysis of a BEP protocol (Plat et al., 2013)⁸⁹ found similar results. A third study described an eclectic group counseling intervention that combined CBT with religious interventions, mandala drawing, and reality therapy (Chongruksa et al., 2012)⁹⁰. In this study, the group

counseling intervention was targeted to police officers in terrorist situations and found a statistically significantly reduced psychological outcomes including anxiety, depression, and hostility, as well as lowered social dysfunction and physical symptoms.

Trauma risk management (TRiM) is not a debriefing intervention, but a post-trauma psychological risk assessment to identify those at high risk of developing negative psychological symptoms after a trauma. Two studies (Hunt et al., 2013; Watson, 2014)^{91,92} examined the use of this program in the police force. Both found that TRiM may play a role in identifying and providing early intervention to those experiencing trauma and lowering psychological distress.

Drug therapy (3 studies)

Three studies examined the effects of drug therapy on PTSD and sleep patterns. Coupland (2009)⁹³ found that 1mg (incremental increase of 1mg every 3-4 days) of prazosin at bedtime helped reduce insomnia and nightmares in a 42-year old firefighter with PTSD. Carbamazepine and sodium valproate were also found to improve PTSD symptoms, including sleep and depression in a 37-year old police officer (Ford, 1996)⁹⁴. In an RCT conducted by Folkard et al. (1993)⁹⁵, 5 mg of melatonin was administered to eight out of seven night shift police officers in order to improve sleep. The study found that police officers who took melatonin had statistically significantly improved sleep duration and quality from baseline and in comparison to the control group.

Eye movement desensitization and reprocessing (EMDR) therapy (3 studies)

Three studies investigated the effects of EMDR on firefighters and police officers who had PTSD. Kitchiner (2004)⁹⁶ showed that EMDR therapy was effective in reducing PTSD symptoms in firefighters. Similarly, six police officers undergoing EMDR therapy had statistically significant reductions in their PTSD symptoms in comparison to the control group (Lansing et al., 2005)⁹⁷. Wilson et al. (2001)⁹⁸ conducted an RCT of 62 police officer comparing the effects of EMDR with a stress management program on PTSD and stress symptoms. This study found that EMDR was statistically significantly more effective in lowering PTSD symptoms and stress in comparison to the stress management program.

Exposure therapy (1 study)

One case study aimed to examine the effects of exposure therapy, a type of therapy in which the subject is made to face stimuli or memory of a trauma, on a police officer with PTSD (Tolin et al., 1999)⁹⁹. This therapy was administered over 5 weekly sessions lasting 90 minutes and was shown to result in a long-term relief of PTSD symptoms, even 6 months after the intervention was complete.

Medical monitoring/therapy (1 study)

One longitudinal study investigated the effects of a medical monitoring and treatment program specifically for World Trade Centre police responders (Pietrzak et al., 2014)¹⁰⁰. This study found that the majority of police officers who attended 4 classes were more likely to be resistant or resilient to PTSD symptoms.

Writing therapy (1 study)

An RCT conducted by Ireland et al. (2007)¹⁰¹ examined the effect of writing about personal emotions on the distress level of police officers. Police officers were required to write for 15 minutes, 4 days a week. The writing therapy group had statistically significantly lower levels of stress and anxiety in comparison to police officers who did not participate in writing therapy.

Table 4: Rehabilitation strategies for OSI

REHABILITATION				
Intervention type	Study author (year)	Study design (follow-up in months)	Population comparison	Findings (significant, not significant, no difference)
Counseling/debriefing therapy	Chongruksa, D (2012) ⁹⁰	RCT (1 month)	N = 42 Police tx (22); cx (20)	Significantly reduced high scores of anxiety, depression, social dysfunction, physical symptoms, hostility, phobic anxiety, and interpersonal sensitivity.
	Hunt, E (2013) ⁹¹	Observational (NR)	N = 640 Police	Reduction in the majority of psychological risk indices between the initial and subsequent evaluation, greater traumatic exposure associated with longer sickness absence lengths Reduction in sickness absence in TRiM, especially in more junior ranks Our data suggest that TRiM may help to ameliorate some of the negative effects of high trauma exposure and may offer a way of assessing psychological risk so that officers can be offered early supportive interventions.
	Watson (2014) ^{†92}	Observational (NR)	N = 859 Operational and non-operational personnel	Significantly lower stigma, lower psychological distress, greater positive post-traumatic change and fewer barriers to help seeking in Trauma risk management (TRiM) group No significant difference between the groups in terms of attitudes towards stress and PTSD
	Bohl, N (1991) ⁷⁷	NRCT (3 months)	N = 71 Police tx (40); cx (31)	Significantly higher score in untreated group on all four measures tested (depression, anger, anxiety, long-term stress symptoms) Reduction in delayed stress symptoms in treated firefighters
	Carlier, IVE (2000) ⁷⁹	NRCT (6 month)	N = 243 Police tx (86); cx (157)	No differences in psychological morbidity were found between the groups at pre-test, at 24 hours or at 6 months post-trauma. Significantly more post-traumatic stress disorder symptomatology at one week post-trauma in debriefed group No one in the sample qualified for the PTSD diagnosis at 6 month post-test.
	Gersons, BPR (2000) ⁸⁸	RCT (3 month)	N = 42 Police tx (22); cx (20)	No significant differences between groups were observed at pretest or at session 4. Significant improvement in Brief Eclectic Psychotherapy group with respect to PTSD, work resumption, and some comorbid conditions at posttest and at follow-up
	Leonard, R (1999) ⁷⁸	Observational (up to 6 years)	N = 60 Police tx (30); cx (30)	Significant reduction in anger levels and greater use of some specific adaptive coping strategies in Critical incident stress debriefing (CISD) group
	Plat, MCJ (2013) ⁸⁹	Observational (16 weeks)	N = 121 Police	Reduction in officers on sick leave between intake (59) and 16 weeks (13) Reduction of the number of officers report PTSD symptoms of re-experiencing

				(121 to 12), avoidance (103 to 0), and hyper-arousal (117 to 7) Suggest that occupational health professionals should have contact with law enforcement organizations and that successful return to work should be considered as part of any intervention or treatment program
	Cornelius, TL (2007) ⁸⁵	Case report (2 months)	N = 1 Retired police officer	Improvement in overall anxiety, depressive symptoms, and frequency and severity of PTSD symptoms. Implication of this case is that cognitive behavior therapy is effective in ameliorating symptoms of PTSD and reducing depressive symptoms utilizing a gradual exposure methodology.
	Tanigoshi, H (2008) ⁸⁶	RCT (15 weeks)	N = 60 Police tx (30); cx (30)	Significant difference between pre-test and post-test mean total wellness scores for wellness counseling participants; and higher wellness scores in treatment than control group.
	Peres, JFP (2011) ⁸⁷	NRCT (40 days)	N = 36 Police tx1 (12); tx2 (12); cx (12)	Fewer PTSD symptoms post-psychotherapy in treatment group; and their scores and neural expressions were comparable to control resilient policemen.
	Bohl, N (1995) ⁸⁰	NRCT (3 months)	N = 65 Firefighters tx (30); cx (35)	Significant decrease in depression, anger and such stress related symptoms as nightmares, flashbacks, and appetite changes with treatment. No decrease in anxiety.
	Harris, MB (2002) ⁸¹	NRCT (NR)	N = 660 Firefighters tx (264); cx (396)	No relationship was found between debriefing and PTSD. Weak inverse correlation with negative affectivity Weak positive correlation with positive world assumptions
	Regehr, C (2001) ⁸³	Observational (NR)	N = 164 Firefighters	No significant association between attending crisis debriefing groups and scores on the Beck Depression Inventory Higher scores on intrusion subscale of the Impact of Events Scale when attending debriefing group
	Tuckey, MR (2014) ⁸²	RCT (1 month)	N = 67 Firefighters tx1 (36); tx2 (48); cx (38)	Significantly less alcohol use post-CISD compared to Screening Significantly greater post-CISD quality of life relative to Education No significant effects on post-traumatic stress or psychological distress Overall, CISD may benefit broader functioning following exposure to work-related potentially traumatic events.
	Ruck, S (2013) ⁸⁴	NRCT (1 month)	N = 220 Prison guards	Significant reduction in traumatic stress, anxiety and depression scores in prison staff receiving debriefing No significant difference in the symptoms of the non-debriefed group
Drug therapy	Folkard, S (1993) ⁸⁵	RCT (3 months)	N = 17 Police tx (8); cx (7)	Significant difference before-after intervention in subjective sleep duration (P<0.05), and positive change for placebo group Significant difference before-after intervention in subjective sleep quality (P<0.05), and detrimental change for placebo group

				Overall melatonin (5 mg) taken at the desired bedtime improved problems related to sleep and increased alertness during working hours, especially during the early morning.
	Ford, N (1996) ⁹⁴	Case report (8 months)	N = 1 Former police officer	Improvement in sleep and mood, a decrease in nightmares, and a diminishing startle response with carbamazepine treatment; however, carbamazepine withdrawn due to adverse events with a subsequent return of sleep disorder and depression. Improved sleep, nightmares ended, and although intrusive recollections continued, they were less frequent and distressing with sodium valproate. 8 months later, he felt he was largely recovered and had made some plans to return to work, although in a different area.
	Coupland, NJ (2009) ⁹³	Case report (NR)	N = 1 Firefighter	Improved sleep; fewer traumatic nightmares
EMDR therapy	Lansing, K (2005) ⁹⁷	Observational	N = 6 Police	Improvement and marked reductions in the Posttraumatic Stress Diagnostic Scale Score (PDS) Decreases in the left and right occipital lobe, left parietal lobe, and right pre-central frontal lobe Significant increased perfusion in the left inferior frontal gyrus Effective treatment for PTSD in this police officer group, showing both clinical and brain imaging changes.
	Wilson, SA (2001) ⁹⁸	RCT (6 months)	N = 62 Police tx (33); cx (28)	Lower ratings on measures of PTSD symptoms, subjective distress, job stress, and anger; and higher marital satisfaction ratings provided by officers in the Eye Movement Desensitization and Reprocessing (EMDR) condition than those in stress management program (SMP).
	Kitchiner, NJ (2004) ⁹⁶	Case report (1-5 months)	N = 3 Firefighters	Benefited from a relatively short time in treatment and all 3 cases were able to return to work (if off due to trauma) or work with less distress.
Exposure therapy	Tolin, DF (1999) ⁹⁹	Case report (6 months)	N = 1 Police officer	Positive association of exposure therapy with symptom relief through 6 month follow-up
Medical monitoring therapy	Pietrzak, RH (2014) ^{*100}	Observational (8 years)	N = 4,035 Police	PTSD symptoms were best characterized by four classes, with the majority (77.8%) in a resistant/resilient trajectory and the remainder exhibiting chronic (5.3%), recovering (8.4%) or delayed-onset (8.5%) symptom trajectories. Prior psychiatric history, Hispanic ethnicity, severity of World Trade Center (WTC) exposure and WTC-related medical conditions were most strongly associated with symptomatic trajectories of PTSD symptoms. Greater education and family and work support while working at the WTC site were protective against several of these trajectories.
Writing therapy	Ireland, M (2007) ^{*101}	RCT (3 weeks)	N = 67 Police tx (28); cx (39)	Significantly lower levels of stress and anxiety in writing group post-intervention than the control group Writing about emotions can help reduce distress in police officers.

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Abbreviations: **CISD** – Critical Incident Stress Debriefing; **cx** – Control; **mg** – milligrams ; **N** – Total Sample Size; **NRCT** – Non-randomised Controlled Trial; **NR** – Not Reported; **OR** – Odds Ratio; **PTSD** – Post-Traumatic Stress Disorder; **RCT** – Randomised Controlled Trial; **TRIM** – Trauma Risk Management; **tx** – Treatment/intervention; **WTC** – World Trade Center

Notes: * The interventions implemented in these studies were also categorized as resilience-building strategies.

† This study was an unpublished thesis; therefore, the information presented here was taken from review level data²¹.

4. DISCUSSION

4.1 SUMMARY OF EVIDENCE

We conducted a rapid overview in order to assess the effects of interventions on OSI amongst first responders. This overview included 22 reviews which contained 68 unique primary studies relevant to our research question. It is important to note that although the reviews contained 7 to 100 studies each, very few were intervention-oriented. We found that the majority of the primary intervention studies were conducted in police populations, followed by firefighters. Only two intervention studies were targeted towards correctional officers and no intervention studies were found for coroners and/or forensic pathologists. The results of the primary studies are mixed; with some promising prevention strategies including physical and mental health education, suicide prevention programs, trauma prevention/resilience-building interventions, and social support. Furthermore, counseling or debriefing therapy, EMDR for PTSD, and writing therapy may be effective in treating symptoms of OSI in first responders.

4.2 STRENGTHS AND LIMITATIONS

There were several notable strengths of this overview, including an *a priori* design by means of a PROSPERO protocol; which is currently pending registration. The guidelines set forth by the Cochrane Handbook⁷ were used to conduct this overview, in addition to the AMSTAR 2 tool¹⁰ for assessing quality of reviews. Finally, all screening and data abstraction of reviews was done in duplicate with a calibration exercise completed prior to every step, to ensure reviewer consistency.

Although full efforts were made to conduct a methodologically rigorous overview, there were some unavoidable limitations. The major limitation was the time constraint for conducting this review, allowing only for an overview as opposed to a systematic review and meta-analysis. Thus, only primary studies from the included reviews were covered and potentially relevant primary studies not contained in these reviews would not have been captured in our synthesis. As well, we did not have the time or resources to appraise the quality of the primary studies summarized in our overview and the results should be interpreted with caution.

4.3 CONCLUSION

The results from this overview suggest that potentially effective prevention and rehabilitation strategies exist targeting first responders at high-risk of developing OSI. However, further investigation is needed before the interventions can be implemented within specific first responder populations, especially correctional service workers and coroners. In addition, although some of the prevention strategies examined are multi-faceted, the majority of therapy interventions do not involve multiple components, which is a potential area for further study. Our findings will serve as a basis for the MCSCS to develop an evidence-based strategy to tackle OSI in first responders.

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Appendix Table 1: Summary of included reviews

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
Lees, T (2019) ¹²	Australia	43 (6)	To review most recent information regarding anxiety, post-traumatic stress disorder (PTSD), and sleepiness and fatigue and identify the interventions and treatments proposed to overcome work related stressors and associated mental illnesses inflicting law enforcement officers.	<p>Study designs: observational, clinical trials, randomised controlled trials (RCTs)</p> <p>Population: law enforcement officers</p> <p>Intervention: all interventions reported or recommended to overcome work related stressors. These could include: therapies (counseling, support therapies, psychotherapy); behavioural: (cognitive behavioural therapy, stress management, biofeedback, progressive muscle relaxation, educational programs, coaching and mentoring, resilience and coping training); exercise: (physical activities, weight training and all other types of physical training); management and education programs: (return to work programs, fatigue and/or stress management, mental health education programs, napping regimes, shift work timetable and schedule changes, as well as health and psychological checks); others: (yoga, meditation, diet regimes, acupuncture and alternative medications).</p> <p>Outcomes: presence of mental or psychological. Disorders/states confined to the following main areas: anxiety, PTSD, fatigue and sleepiness. Additionally, the reporting on or recommendation of interventions for work related stressors and associated mental illness.</p> <p>Exclusion: civilian workers related to law enforcement; study designs other than observational, clinical trial or RCT; non-English and non-peer-reviewed articles</p>	The literature indicates that police officers benefit from interventions targeting work-related stress and potential psychological disorders, provided that these interventions are continuous.
Barger, LK (2018) ¹³	USA	18 (4)	To critically review and synthesize existing literature on the impact of fatigue training on fatigue-related outcomes for Emergency Medical	<p>Study designs: RCTs, quasi-experimental studies, and observational study designs</p> <p>Population: persons 18 years of age and older classified as shift workers, EMS personnel or similar worker groups. Shift workers were defined as similar worker groups whose job activity requires multiple episodes of intense concentration and attention to detail per shift, with serious consequences resulting from a lapse in concentration.</p> <p>Intervention: evaluating the impact of fatigue training. Each study had to include education on fatigue and/or sleep health as a minimum.</p> <p>Outcomes: personnel safety, patient safety, personnel</p>	Fatigue training improved patient safety, personal safety, and ratings of acute fatigue and reduced stress and burnout. A meta-analysis of five studies showed improvement in sleep quality (Fixed Effects standardized mean difference (SMD) -0.87; 95% CI -1.05 to -0.69; p<0.00001; Random Effects SMD -0.80; 95% CI -1.72, 0.12; p<0.00001).

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			Services (EMS) personnel and similar shift worker groups.	performance, acute fatigue, indicators of sleep duration and quality, indicators of long-term health (e.g. cardiovascular disease), and burnout/stress Exclusion: book chapters, conference abstracts, newsletters and similar publications, dissertations and thesis documents	Reviewed literature indicated that fatigue training improved safety and health outcomes in shift workers.
Guilaran, J (2018) ¹⁴	New Zealand	24 (8)	To survey the extent of social support effectiveness on disaster responder groups.	Study designs: quantitative studies Population: disaster first responders (such as police responders and rescue and recovery workers) Intervention: must explicitly measure social support carried out in the context of a “disaster”, which was defined using the Emergency Database (EM-DAT) definition. Outcomes: must measure at least one psychological outcome. Exclusion: not reported (NR)	Social support was associated with: anxiety, burnout, depression, job control, job satisfaction, psychological distress, turnover intentions, and work engagement, with mean effect sizes from 0.36 to 0.57. Most studies measured perceived social support and negative outcomes. Social support correlated with outcomes in police responders and rescue and recovery workers.
Patterson, PD (2018) ¹⁵	USA	100 (6)	To review the literature on the impact of shorter versus longer shifts on critical and important outcomes for EMS personnel and related shift worker groups.	Study designs: RCTs, quasi-experimental studies, and observational study designs (e.g., prospective cohort, cross-sectional, and analyses of secondary/ administrative datasets) Population: diverse shift worker groups. “EMS personnel or similar worker groups, defined as shift workers whose job activity requires multiple episodes of intense concentration and attention to detail per shift, with serious adverse consequences potentially resulting from lapses in concentration.” Intervention: shorter versus longer shift schedules Outcomes: critical outcomes of interest were patient safety and personnel safety. Important outcomes of interest were personnel performance, acute fatigue, sleep and sleep quality, retention/turnover, long-term health, burnout/stress, and cost to system. Exclusion: book chapters, conference abstracts, newsletters and similar publications, dissertations and theses	This systematic review suggests that for outcomes considered critical or important to EMS personnel, shifts <24 hours in duration are more favorable than shifts ≥24 hours.
Torchalla, I (2018) ¹⁶	Canada	11 (2)	To summarize the evidence base for interventions	Study designs: RCT, non-randomised controlled trial (NRCT), and uncontrolled studies Population: persons such as railroad personnel, police officers, disaster workers, and other individuals with industrial injuries all	Several studies specifically targeted workers who had failed to return to work (RTW) after standard PTSD treatment. The

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			targeting individuals with work-related PTSD, to make recommendations for clinicians and administrative decision makers involved in their rehabilitation, and to guide future research in this area. Particular attention was given to studies that were conducted in naturalistic clinical settings or in a workers' compensation claim context.	of whom have been exposed to a traumatic event during their work duties and who report the presence of PTSD. Intervention: psychotherapeutic or pharmacological therapies addressing post-traumatic stress in individuals who have been exposed to a traumatic event during their work duties. Specific interventions included trauma-focused cognitive-behavioral therapy and eye movement desensitization and reprocessing. Outcomes: studies were required to report work-related (preferably RTW) outcomes; if this was not available, quantitative measures of traumatic stress symptomatology were acceptable. Studies were required to present the outcome variables for the sample as a whole using statistical analyses. Exclusion: studies with military samples; those that included individuals who had experienced non-traumatic work stressors (e.g. working overtime). Single case studies. Interventions that aimed at preventing PTSD (e.g. critical incident stress debriefing) were excluded. Studies that used non-psychological/-RTW measures (e.g., cerebral blood flow or heart rate). Studies that reported treatment outcomes for each participant individually and those that did not use statistical analyses were excluded. After completing the risk of bias assessment for all articles, studies that received a "weak" rating for their methodological quality were also excluded due to the high risk of bias associated with this rating.	results suggest that psychotherapy interventions are beneficial for helping clients recover from PTSD symptoms and RTW. In studies that reported on work status, RTW rates increased over time and generally lay between 58% and 80% across follow-up time points.
Varker, T (2018) ¹⁷	Australia	43 (3)	To quantify the nature and distribution of recent peer-reviewed research into the mental health and wellbeing of Australian emergency	Study designs: NR Population: Australian emergency services personnel Intervention: interventions related to mental health and/or wellbeing Outcomes: mental health and wellbeing of EMS personnel Exclusion: 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. In addition, if a study solely investigated aspects of emergency services	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

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			services personnel, using 'evidence-mapping' methodology.	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) it was excluded.	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.
MacMillan, F (2017) ¹⁸	Australia	21 (7)	To systematically review studies of health promotion interventions in the police force.	Study designs: pre/post or repeated measures design, ≥2 weeks duration Population: trainee police cadets or qualified officers Intervention: any type of health promotion intervention (e.g. supervised or unsupervised, structured or unstructured) targeted at improving employee lifestyle behavior/health Outcomes: any measure of health-related lifestyle behaviour (e.g. physical activity) or health outcome (e.g. weight) Exclusion: non-English language, and non-peer-reviewed studies; observational studies without clearly defined or measured changes in outcomes (e.g. studies which only had a pre-intervention or post-intervention measurements); studies targeting workers other than only police officers or police academy cadets; studies including police working in extreme settings/locations (e.g. war zones); studies without a health outcome (e.g. measuring job readiness/ability outcomes).	In those studies with the lowest risk of bias (n=2), a large effect on blood pressure and small effects on diet, sleep quality, stress and tobacco use, were reported. Health promotion interventions can impact beneficially on health of the police force, particularly blood pressure, diet, sleep, stress and tobacco use. Combined structured programs with education and behaviour change support and programs including peer support resulted in the most impact on health-related outcomes.
Witt, K (2017) ¹⁹	Australia	13 (4)	To summarize the international literature on the effectiveness of suicide prevention	Study designs: randomised, quasi-randomised, or controlled before/after design Population: protective or emergency services (i.e., police, military, ambulance, correctional, and fire services) Intervention: universal/workforce-wide suicide prevention program Outcomes: suicide rates Exclusion: participants were diagnosed with any psychiatric	Six studies reported sufficient information on suicide rates to enable inclusion in quantitative analyses. On average, these programs were associated with an approximate halving in suicide rates over an average follow-up period of 5.25 years (SD=4.2;

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			programs for protective and emergency services employees.	disorder and/or had been recruited from psychiatric treatment facilities; participants were recruited on the basis of a history of previous suicide attempts or ideation. Also excluded were veterans, retired, or persons otherwise not currently actively employed. Studies with a postventative rather than preventative focus; protocols and/or descriptions of programs that have not yet been implemented.	range: 1–11) (Incidence Rate Ratio 0.45, 95%CI 0.31–0.65; five studies; I2 14.8%).
Rose, FR (2016) ²⁰	USA	27 (8)	To conduct a systematic review and meta-analysis with regards to the effectiveness of psychological debriefing.	Study designs: NR Population: first responders defined as: police officers, prison guards, fire fighters, search and rescue personnel, ambulance personnel, paramedics, emergency room nurses, and military servicemen and women Intervention: psychological debriefing which must have occurred no earlier than 24 hours after the critical incident and within a mean of ten days. Debriefing was compared to a control group that experienced a similar critical incident. Outcomes: measures that assess psychological functioning must be valid, reliable, and peer reviewed (i.e., research investigating only perception of debriefing will not be used) and relate to first responders. Exclusion: laboratory experiments in which participants view videos of an accident were excluded. Studies that did not state if individual or group debriefing were used excluded in the primary analysis in addition to studies using retrospective data.	This meta-analysis found only minimal support, at best, for the effectiveness of group psychological debriefing with first responders in studies with significant confounders.
Whybrow, D (2015) ²¹	UK	13 (2)	To summarize current knowledge about trauma risk management (TRiM) and make recommendations for further research.	Study designs: NR Population: military personnel or civilians Intervention: TRiM Outcomes: any outcomes or evaluation of TRiM Exclusion: articles describing the TRiM process were excluded if they did not measure outcomes or evaluate TRiM.	TRiM outcomes were represented in different ways within the relevant studies suggesting that TRiM may have effects additional to those that it seeks to achieve. In general, the process appears to enhance trauma-exposed personnel's reliance on peer support and TRiM was reportedly acceptable and sustainable. Evidence suggests that TRiM's utility has moved beyond the military to other organizations where

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
					personnel risk occupational traumatic exposure.
Milner, A (2014) ²²	Australia	13 (1)	To provide a systematic assessment of workplace suicide prevention activities, including short-term training activities, as well as suicide prevention strategies designed for occupational groups at risk of suicide.	<p>Study designs: any study types and grey literature</p> <p>Population: persons employed in workplaces at risk of suicide (such as police, military personnel)</p> <p>Intervention: workplace suicide prevention and/or workplace training</p> <p>Outcomes: suicide risk</p> <p>Exclusion: activities directed at clients or other users of services, including students in school settings, hospital patients or persons in contact with the police. Studies non-English language articles; study protocols, descriptions of future studies without results.</p>	There were 13 interventions relevant for the review including a few examples of prevention activities developed for at-risk occupations (e.g. police, army, air force and the construction industry) as well as a number of general awareness programs that could be applied across different settings. Results from workplace suicide prevention initiatives that had been evaluated suggest that prevention initiatives had beneficial effects.
Neil-Sztramko, SE (2014) ²³	Canada	44 (4)	To synthesize interventions that have been implemented among shift workers to reduce the chronic health effects of shift work and to provide an overall evaluation of study quality.	<p>Study designs: RCT and NRCT study designs were included, as well as case-control, and cohort studies if the exposure was an intervention. Before-and after studies, or natural interventions (defined as studies involving an intervention not initiated by researchers) were included if there was at least one main outcome measured both pre- and post-intervention in order to determine the effect of the intervention itself.</p> <p>Population: persons working permanent or rotating night shifts at the time of intervention</p> <p>Intervention: interventions aimed to improve one or more chronic disease-related health outcomes among shift workers and must have been implemented for ≥7 consecutive days. We included non-pharmacological and pharmacological interventions.</p> <p>Outcomes: outcomes related to chronic disease risk as defined by the World Health Organization (WHO): “diseases of long duration and generally slow progression”. The related health outcomes included were: sleep quantity and quality; markers of circadian disruption/adaptation; biological markers of chronic</p>	Rotating and permanent night shift workers were included, mostly from the manufacturing, healthcare, and public safety industries. Studies were grouped into four intervention types: shift schedule; controlled light exposure; behavioral; and, pharmacological. Results generally support the benefits (regarding overall effects on chronic disease outcomes) of fast-forward rotating shifts; simultaneous use of timed bright light and light-blocking glasses; and physical activity, healthy diet, and health promotion. Mixed results were observed for hypnotics.

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
				disease; and common modifiable risk factors for chronic disease as identified by the WHO. Exclusion: simulated work environments or non-shift workers (e.g., healthy volunteers) were excluded. Interventions that were conducted among workers with extreme work schedules (e.g., >24 hours of continuous work) or workers who cross time zones (e.g., astronauts, aircrew, military workers) were excluded. Studies only reporting organizational outcomes (e.g., productivity, absenteeism) were excluded as were, studies that only measured work-related injuries. Sleepiness and fatigue are part of the diagnosis of shift work sleep outcomes as well as mental health and psychosocial outcomes such as psychological stress, work-life balance, burnout, mood, and well-being were also excluded as were “attitudes towards intervention.”	
Patterson, GT (2014) ²⁴	USA	12 (12)	To conduct a systematic review examining the effects of stress management interventions on outcomes among police officers and recruits.	Study designs: RCT, random assignment to conditions, or quasi-experimental designs that included a control group. Qualitative data were included in the review if mixed methods studies met the inclusion criteria. Published and unpublished studies were accepted. Population: police officers and recruits (veteran police officers, police recruits, and/or civilian (non-sworn) law enforcement personnel. Studies that included other professional groups, such as firefighters or teachers, could be included in the review if separate outcome data were provided for law enforcement personnel). Intervention: any psychosocial or physical stress management intervention given to reduce stress outcomes. Outcomes: stress outcomes Exclusion: lack of either pre-test or post-test data or of separate outcome data reported for police officers or recruits	The average duration of the interventions was 10.95 h with a range of 30 min to 24 h. A total of 221 effects were examined in a meta-analysis. Effect sizes were calculated separately for physiological, psychological and behavioral outcomes. The overall mean effect for physiological outcomes was 0.196, 0.038 among psychological outcomes, and -0.176 among behavioral outcomes. These small effect sizes suggest that the interventions were not effective. Moderator analyses results did not show any meaningful differences across the studies.
Bisson, JI (2013) ²⁵	UK	70 (1)	To assess the effects of psychological therapies for the treatment	Study designs: RCTs, cluster-RCTs and crossover trials Population: any adult (≥18 years) suffering from chronic traumatic stress symptoms with a duration of ≥3 months. At least 70% of participants were required to be diagnosed as suffering from PTSD according to Diagnostic and Statistical	The primary outcome was reduction in severity of PTSD symptoms. Individual TFCBT and EMDR were more effective than waitlist/usual care (SMD -1.62;

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			of adults with chronic PTSD.	Manual of Mental Disorders (DSM)-III, DSM-IIIR, DSM-IV, International Statistical Classification of Diseases and Related Health Problems (ICD)-9 or ICD-10 criteria, by means of a structured interview or diagnosis by a clinician. Intervention: any psychological therapy designed to reduce symptoms of chronic PTSD. Individual trauma-focused cognitive behavioural therapy (TFCBT), eye movement desensitization and reprocessing (EMDR), non-trauma-focused CBT (non-TFCBT), other therapies (supportive therapy, non-directive counseling, psychodynamic therapy and present-centered therapy), group TFCBT, or group non-TFCBT, compared to one another or to a waitlist or usual care group. Outcomes: primary outcome was severity of clinician-rated traumatic stress symptoms Exclusion: NR	95% CI -2.03 to -1.21; 28 studies; n = 1256 and SMD -1.17; 95% CI -2.04 to -0.30; 6 studies; n = 183 respectively). No statistically significant difference was found between individual TFCBT, EMDR and stress management, immediately post-treatment. Non-TFCBT was more effective than waitlist/usual care and other therapies. Other therapies were superior to waitlist/usual care control as was group TFCBT.
Skeffington, PM (2013) ²⁶	Australia	7 (3)	To conduct a systematic review in order to identify and synthesize all programs aimed at the primary prevention of PTSD to date.	Study designs: NR Population: persons potentially exposed to an event meeting Criterion A-1 for PTSD as outlined in the DSM-IV Intervention: a resilience-building program Outcomes: psychological well-being Exclusion: treatment of PTSD or studies conducted on persons with current PTSD symptomatology	Currently, there is no solid body of research on the primary prevention of PTSD to justify or guide interventions.
Haugen, PT (2012) ²⁷	USA	17 (8)	To conduct a systematic review of the PTSD treatment literature (English and non-English) in order to evaluate such treatment proposals based on what	Study designs: RCTs Population: first responders with a primary diagnosis of PTSD based on DSM or ICD criteria. Studies whose subjects had psychiatric disorders comorbid with PTSD were included. Intervention: psychological or pharmacological intervention. Treatment studies had to compare two active treatment groups, or one active group to a nonspecific control or a wait-list group. Pharmacological investigations had to compare a drug treatment to a placebo or an active comparator. Outcomes: PTSD diagnosis or symptom status was the chief study outcome. Exclusion: non-English, not a treatment study, sample not first responders, PTSD not primary outcome	We identified two RCTs of PTSD treatment in first responders that tested a psychosocial treatment. These showed significant large treatment effects. We did not locate a single psychopharmacological RCT for PTSD in first responders. An additional 2 psychosocial studies and 13 case or observational studies comprised the remaining extant literature.

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
			is known about treating PTSD in first responders. This review especially sought to identify RCTs whose primary outcome was PTSD.		
Plat, MJ (2011) ²⁸	Netherlands	31 (2)	To conduct a systematic review describing (1) the existing job specific workers' health surveillance (WHS) activities, and (2) the effectiveness of job-specific WHS interventions with respect to work functioning, for selected jobs.	<p>Study designs: study design with a control group or comparison over time</p> <p>Population: fire fighters, ambulance personnel, police personnel and military personnel</p> <p>Intervention: For the first objective, we required a description of a job-specific WHS or elements of a WHS and the (future) use of the activity in a WHS, medical evaluation or evaluation of the ability to perform job tasks. The inclusion for job-specific physical energetic tests was even stricter, as we required a simulation of a real task. For the second objective, the following inclusion criteria were applied in addition to the first three criteria described: a job-specific intervention which could be used in a WHS; relevant/related outcome measure for work functioning, like job performance or work-related injuries.</p> <p>Outcomes: relevant/related outcome measure for work functioning, like job performance or work-related injuries</p> <p>Exclusion: an absence of a clear relation to the job requirements; a lack of description of job-specific WHS activity or medical evaluation or to test of the ability to perform job tasks</p>	For the first objective, studies described several job-specific WHS activities aimed at aspects of psychological, 'physical' (energetic, biomechanical and balance), sense-related, environmental exposure or cardiovascular requirements. Studies found for the second objective measured different outcomes related to work functioning. Studies showed effectiveness on at least some of the defined outcomes and described several job-specific interventions: trauma resilience training, healthy lifestyle promotion, physical readiness training, respiratory muscle training, endurance and resistance training, a physical exercise program and comparing vaccines. Compared to studies focusing on physical tasks, a few studies were found that focus on psychological tasks. Effectiveness studies for job-

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
					specific WHS interventions were scarce.
Stergiopoulos, E (2011) ²⁹	Canada	7 (1)	To identify interventions targeting work-related PTSD in order to get workers back to the workplace.	<p>Study designs: NR</p> <p>Population: PTSD acquired in a workplace and a clinical diagnosis of PTSD (by a clinician or validated instrument)</p> <p>Intervention: workplace PTSD intervention aimed at getting workers back to their posts</p> <p>Outcomes: return to work, work functioning</p> <p>Exclusion: non-work related PTSD; PTSD that was combat or disaster/terrorist related; PTSD with a diagnosis of a secondary traumatic stress. Interventions that specifically target another mental health condition like depression or substance abuse.</p>	In the research articles addressed in the current review, study populations included police officers, public transportation workers, and employees injured at work. The studies examined the effectiveness of EMDR, cognitive-behavioural techniques, and an integrative therapy approach called brief eclectic psychotherapy. This suggest that work-related interventions show promise as effective strategies for promoting return to work in employees who acquired PTSD in the workplace.
Martin, A (2009) ³⁰	Australia	22 (1)	The aim of the study was to investigate whether different types of health promotion intervention in the workplace reduce depression and anxiety symptoms.	<p>Study designs: quantitative designs</p> <p>Population: workers</p> <p>Intervention: the intervention had to target mental health directly or indirectly through a known risk factor for depression or anxiety, such as smoking, chronic disease, substance abuse, obesity or inactivity, and poor psychosocial work climate.</p> <p>Outcomes: reported standardized mental health screening measure for depression or anxiety. This measure could be specific to depression or anxiety symptoms e.g., the Beck Depression Inventory (BDI); the anxiety subscale of the Depression, Anxiety and Stress Scales (DASS), a composite screening measure that provides a combined assessment of depression and anxiety symptoms [e.g., the General Health Questionnaire (GHQ)] or a subscale of a general health measure that has evidence of validity as a depression or anxiety screening tool [e.g., the SF-12 mental health summary scale].</p> <p>Exclusion: NR</p>	The pooled results indicated small, but positive overall effects of the interventions with respect to symptoms of depression [SMD 0.28, 95% confidence interval (95% CI) 0.12-0.44] and anxiety (SMD 0.29, 95% CI 0.06-0.51), but no effect on composite mental health measures (SMD 0.05, 95% CI -0.03-0.13). The interventions that included a direct focus on mental health had a comparable effect on depression and anxiety symptoms, as did the interventions with an indirect focus on risk factors. When the aim is to reduce symptoms of depression and anxiety in employee populations, a broad

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
					range of health promotion interventions appear to be effective, although the effect is small.
Walsh, DS (2009) ³¹	USA	12 (1)	To identify psychosocial effect of the experience of relief work; and to describe interventions identified in reducing the severity of psychosocial disturbances in relief workers upon their return from a disaster.	<p>Study designs: qualitative and quantitative designs</p> <p>Population: relief workers from professional and non-professional backgrounds, responding to both natural and man-made disasters</p> <p>Intervention: interventions that reduce severity of PTSD post-relief</p> <p>Outcomes: occurrence and severity of PTSD</p> <p>Exclusion: non-English language studies and excluded military and national defense responses</p>	Three interventions that positively affected the responses of relief workers to disaster experiences emerged: debriefing, team building and preparation.
Larsson, G (2016) ³²	Sweden	40 (0)*	To draw on the daily hassles perspective on stress and synthesize existing research on daily hassles in professional first responders using a systematic mixed studies review with an integrated design.	<p>Study designs: any qualitative or quantitative study or literature review</p> <p>Population: first responders</p> <p>Intervention: NR</p> <p>Outcomes: NR</p> <p>Exclusion: non-peer-reviewed articles; anything other than: English, German, Spanish and Scandinavian languages</p>	Selected papers represented literature reviews, as well as qualitative, longitudinal and cross sectional studies. Five superior categories emerged in the analysis: Individual antecedent and continuously framing factors, environmental antecedent and continuously framing factors, appraisal and coping processes, daily hassles and outcome. None of the studies were intervention-oriented, although several authors pointed to the potential of altering appraisal and coping processes related to daily hassles.
Lambert, EG	USA	55 (0)*	To review the	Study designs: NR	Almost no research on effective

Review author (year)	Review country	# of included studies (# of relevant studies)	Review objective(s)	Eligibility criteria	Findings
(2015) ³³			correctional staff burnout literature.	Population: correctional services staff Intervention: NR Outcomes: staff burnout Exclusion: non-published articles	interventions designed to deal with correctional staff burnout was found. Based on this review, significant gaps remain in the research on correctional staff burnout.

Abbreviations: **CI** – Confidence interval; **DSM** – Diagnostic and Statistical Manual of Mental Disorders; **EMS** – Emergency medical services; **I²** – heterogeneity; **ICD** – International Statistical Classification of Diseases and Related Health Problems; **NR** – Not reported; **NRCT** – Non-randomised controlled trial; **PTSD** – Post-traumatic stress disorder; **RCT** – Randomised controlled trial; **SD** – Standard deviation; **SMD** – Standard mean difference; **WHS** – Workers’ health surveillance

Notes: *Although this review aimed to include intervention studies, the findings state they were not able to find any.

Appendix Table 2: Quality appraisal of included reviews

Author (Year)	1. PICO components	2. A priori design*	3. Rationale for study selection	4. Literature search*	5. Duplicate Selection	6. Duplicate Abstraction	7. List of excluded studies*	8. Description of included studies	9a. Risk of Bias assessment in RCTs*	9b. Risk of bias assessment in non-randomised studies*	10. Funding sources	11. Appropriate MA methods*	12. Used RoB in MA	13. Used RoB in interpreting results*	14. Discussion of heterogeneity	15. Publication bias*	16. Conflict of Interest	Overall Rating
Lees, T (2019) ¹²	Y	N	N	Partial Y	Y	N	N	N	Includes only NRCTs	Y	N	No MA	No MA	N	No MA	No MA	N	Critically Low
Barger, LK (2018) ¹³	Y	Y	N	Partial Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	N	Moderate
Guilaran, J (2018) ¹⁴	Y	N	N	Partial Y	N	N	N	Y	Includes only NRCTs	N	N	Y	N	N	N	N	N	Critically Low
Patterson, PD (2018) ¹⁵	Y	Y	N	Partial Y	Y	Y	Y	Y	Y	Y	N	No MA	No MA	Y	No MA	No MA	N	High
Torchalla, I (2018) ¹⁶	Y	N	Y	Partial Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Critically Low
Varker, T (2018) ¹⁷	Y	N	Y	Partial Y	N	N	N	Y	N	N	N	No MA	No MA	N	No MA	No MA	Y	Critically Low
MacMillan, F (2017) ¹⁸	Y	N	N	Partial Y	Y	Y	N	Y	Includes only NRCTs	Y	N	No MA	No MA	Y	No MA	No MA	Y	Low
Witt, K (2017) ¹⁹	Y	N	N	Partial Y	Y	Y	N	Y	N	N	N	Y	N	Y	N	N	Y	Critically Low
Rose, FR (2016) ²⁰	Y	Y	Y	Yes	N	N	N	Y	N	N	N	N	No	N	N	N	N	Critically Low
Whybrow, D (2015) ²¹	Y	N	N	Partial Y	N	N	N	Partial Y	N	N	N	No MA	No MA	N	No MA	No MA	Y	Critically Low
Milner, A (2014) ²²	Y	N	N	Partial Y	N	N	Y	Y	Includes only NRCTs	N	N	No MA	No MA	N	No MA	No MA	N	Critically Low

Author (Year)	1. PICO components	2. A priori design*	3. Rationale for study selection	4. Literature search*	5. Duplicate Selection	6. Duplicate Abstraction	7. List of excluded studies*	8. Description of included studies	9a. Risk of Bias assessment in RCTs*	9b. Risk of bias assessment in non-randomised studies*	10. Funding sources	11. Appropriate MA methods*	12. Used RoB in MA	13. Used RoB in interpreting results*	14. Discussion of heterogeneity	15. Publication bias*	16. Conflict of Interest	Overall Rating
Neil-Sztramko, SE (2014) ²³	Y	Partial Y	N	Partial Y	Y	N	N	Y	Y	Y	N	No MA	No MA	Y	No MA	No MA	Y	Moderate
Patterson, GT (2014) ²⁴	Y	N	Y	N	N	N	N	Y	Y	Y	N	Y	N	Y	N	N	N	Critically Low
Bisson, JI (2013) ²⁵	Y	Y	N	Y	Y	Y	Y	Y	Y	Includes only RCTs	N	Y	Y	Y	Y	Y	Y	High
Skeffington, PM (2013) ²⁶	Y	N	N	Partial Y	N	N	N	Y	Includes only NRCTs	N	N	No MA	No MA	N	No MA	No MA	N	Critically Low
Haugen, PT (2012) ²⁷	Y	N	N	Partial Y	N	N	N	Y	N	N	N	No MA	No MA	N	No MA	No MA	N	Critically Low
Plat, MJ (2011) ²⁸	Y	N	N	Partial Y	N	N	N	Y	Y	Y	N	No MA	No MA	Y	No MA	No MA	Y	Low
Stergiopoulos, E (2011) ²⁹	Y	Partial Y	N	Partial Y	Y	N	N	Y	Partial Y	Y	N	No MA	No MA	Y	No MA	No MA	Y	Moderate
Martin, A (2009) ³⁰	Y	N	N	Partial Y	Y	Y	N	Partial Y	N	N	N	Y	N	N	Y	N	N	Critically Low
Walsh, DS (2009) ³¹	Y	N	N	Partial Y	N	N	N	Y	Includes only NRCTs	N	N	No MA	No MA	N	No MA	No MA	N	Critically Low
Larsson, G. (2016) ³²	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lambert, EG (2015) ³³	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Abbreviations: MA – Meta-analysis; N – No; NA – Not applicable; NRCT – Non-randomised controlled trial; RCT – Randomised controlled trial; Y – Yes

Notes: *These were considered critical domains and were subsequently given greater weight in the overall AMSTAR 2 rating

Appendix Table 3: List of flagged EMS and Paramedics articles

Flagged EMS/paramedics citation list (n=15)
1. Acker JJ, Johnston TM, Lazarsfeld-Jensen A. Industrial paramedics, out on site but not out of mind. <i>Rural Remote Health</i> . 2014;14(4):2856.
2. Donnelly E, Siebert D. Occupational risk factors in the emergency medical services. <i>Prehosp Disaster Med</i> . 2009;24(5):422-429.
3. Ebadi A, Froutan R, Malekzadeh J. The design and psychometric evaluation of the emergency medical services resilience scale (EMSRS). <i>Int Emerg Nurs</i> . 2019;42:12-18.
4. Gartner FR, Nieuwenhuijsen K, van Dijk FJ, Sluiter JK. The impact of common mental disorders on the work functioning of nurses and allied health professionals: a systematic review. <i>Int J Nurs Stud</i> . 2010;47(8):1047-1061.
5. Golding SE, Horsfield C, Davies A, et al. Exploring the psychological health of emergency dispatch centre operatives: a systematic review and narrative synthesis. <i>PeerJ</i> . 2017;5:e3735.
6. Gowing JR, Walker KN, Elmer SL, Cummings EA. Disaster Preparedness among Health Professionals and Support Staff: What is Effective? An Integrative Literature Review. <i>Prehosp Disaster Med</i> . 2017;32(3):321-328.
7. Graham J. Cognitive behavioural therapy for occupational trauma: a systematic literature review exploring the effects of occupational trauma and the existing CBT support pathways and interventions for staff working within mental healthcare including allied professions. <i>Cogn Behav Therap</i> . 2012;5(1):24-45.
8. Maguire BJ, O'Meara P, O'Neill BJ, Brightwell R. Violence against emergency medical services personnel: A systematic review of the literature. <i>Am J Ind Med</i> . 2018;61(2):167-180.
9. Mildenhall J. Occupational stress, paramedic informal coping strategies: a review of the literature. <i>Journal of Paramedic Practice</i> . 2012;4(6):318-328.
10. Morgan PM. The psychological impact of mass casualty incidents on first responders: A systematic review. <i>J Emerg Manag</i> . 2016;14(3):213-226.
11. Petrie K, Milligan-Saville J, Gayed A, et al. Prevalence of PTSD and common mental disorders amongst ambulance personnel: a systematic review and meta-analysis. <i>Soc Psychiatry Psychiatr Epidemiol</i> . 2018;53(9):897-909.
12. Phung VH, Trueman I, Togher F, Orner R, Siriwardena AN. Community first responders and responder schemes in the United Kingdom: systematic scoping review. <i>Scand J Trauma Resusc Emerg Med</i> . 2017;25(1):58.
13. Robertson N, Perry A. Institutionally based health care workers' exposure to traumatogenic events: systematic review of PTSD presentation. <i>J Trauma Stress</i> . 2010;23(3):417-420.
14. Sofianopoulos S, Williams B, Archer F. Paramedics and the effects of shift work on sleep: a literature review. <i>Emerg Med J</i> . 2012;29(2):152-155.
15. Spaducci G, Stubbs B, McNeill A, Stewart D, Robson D. Violence in mental health settings: A systematic review. <i>Int J Ment Health Nurs</i> . 2018;27(1):33-45.

Appendix Table 4: Primary police studies

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Arble, E (2017) ⁵⁵	USA	This study aimed to conduct a preliminary test of the imagery-based trauma prevention program to improve coping and prevent mental health problems among new police officers during their first year working in a high-threat urban environment.	In an uncontrolled demonstration project, junior officers were trained by senior officers to engage in imaginal rehearsal of specific dangerous situations while incorporating optimal police tactics and healthy emotional reactions. A class of 32 officers in the police academy engaged in the program, and they and the trainers reported high satisfaction with it. After their first year of field work, 22 officers were reassessed.	Compared to pre-training, these officers showed significant increases in the use of positive reframing and humor and significant reductions in anxiety and alcohol use over the year.	These results offer preliminary evidence for the feasibility and effectiveness of this trauma prevention program for new police officers.
Leppma, M (2017) ⁷¹	USA	This study investigated the development of PTG among 113 police officers working in the New Orleans area following Hurricane Katrina.	Hierarchical regression was used to evaluate if gratitude, social support, and satisfaction with life moderated the relationship between stressful life events (as measured by the total life stress score) and PTG, after adjustment for age, sex, race, level of involvement in Hurricane Katrina, and alcohol intake.	Results indicate that stressful life events are independently associated with PTG. Gratitude, satisfaction with life, and social support were seen to moderate this relationship; as stressful life events increased so too did PTG—particularly among officers with higher levels of gratitude (B = 0.002, p ≤ .05), satisfaction with life (B = 0.002, p ≤ .05), and social support (B = 0.001, p ≤ .05).	These findings suggest that promoting satisfaction with life, interpersonal support, and gratitude may be beneficial to those who are regularly at risk of trauma exposure.
Christopher, MS (2016) ⁵⁸	USA	In this pilot study we examined the feasibility and preliminary effectiveness of a mindfulness-based intervention designed to address police officer stress.	A total of 43 police officers completed an 8-week Mindfulness-Based Resilience Training (MBRT) program, which was designed to improve mindfulness, resilience, stress, health outcomes, and emotional functioning.	Using multilevel models we found significant improvement in self-reported mindfulness, resilience, police and perceived stress, burnout, emotional intelligence, difficulties with emotion regulation, mental health, physical health, anger, fatigue, and sleep disturbance. Although there were no significant pre-to-post-MBRT changes in cortisol awakening response (CAR), while controlling for pre-MBRT increase area under the curve (AUCI), change in mental health	Given voluminous research on stress and related consequences, and the dearth of research on effective stress management interventions among police officers, these preliminary findings suggest that an 8-week intervention can be both feasible and effective.

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
				was a significant predictor of post-AUCI.	Continued exploration in this area may help us understand and measure the mental qualities that lead to the improvements in health and functioning observed in MBRT.
Kuehl, KS (2016) ³⁴	USA	The SHIELD (Safety & Health Improvement: Enhancing Law Enforcement Departments) Study is a worksite wellness team-based intervention among police and sheriff departments which aimed to assess the program's effectiveness to reduce occupational risks and unhealthy lifestyle behaviors.	Both intervention and control groups were followed for 24 months, and we report those durability findings, along with qualitative group interview results that provide insight into the changes of the long-term outcomes. Long-term effects were observed for consumption of fruits and vegetables, and there was some evidence for effects on tobacco and alcohol use. Assessment of dietary habits, physical activity behaviors, weight loss maintenance, and substance use is rare more than 1 year following an intervention, and in general, initial positive changes do not persist in prior research.	The SHIELD team-based health promotion program was found to be feasible and effective at 6 months in improving diet, sleep, stress, and overall quality of life of law enforcement department personnel.	The SHIELD program was feasible, effective, and durable for improving dietary changes.
Schwarzer, R (2016) ⁷⁰	USA	This analysis examines the relationship between initial exposure levels, long-term PTSD symptoms, and subsequent emotional support among police responders.	The study population included police responders who had reported their 9/11 exposure levels at Wave 1 (2003/4), provided three waves of data on PTSD symptoms using the 17-item PCL scale, and rated their received emotional support at Wave 3 (N = 2,204, 1,908 men, 296 women, mean age: 38 years at exposure). A second-order growth curve reflected a PTSD symptom trajectory which was embedded in a structural equation model, with exposure level specified as an exogenous predictor, and emotional support specified as an endogenous outcome.	Exposure had a main effect on mean symptom levels (intercept) across three waves but it made no difference in changes in symptoms (slope), and no difference in emotional support. The symptom trajectory, on the other hand, had an effect on emotional support. Its intercept and slope were both related to support, indicating that changes in symptoms affected later emotional support.	Initial trauma exposure levels can have a long-term effect on mean symptom levels. Emotional support is lower in police responders when PTSD symptoms persist over seven years, but becomes higher when reduction in symptoms occurs.

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Bell, LB (2015) ⁶²	USA	To determine the impact of a longer-than-average compressed workweek on police officers' sleep, cognitive abilities, health, quality of life, and work performance.	Two precincts of the Phoenix Police Department participated in a 9-month, repeated measures study. The experimental precinct worked three consecutive 13-hr 20-min (13:20-hr) shifts per week for 6 months, while the control precinct worked four 10-hr shifts per week. Officers were assessed using the Pittsburgh Sleep Quality Index, Psychomotor Vigilance Test, STROOP Color-Word test, Quality of Life Inventory, and measures of salivary cortisol. The Phoenix Police Department provided data for Professional Standards Bureau complaints, shooting qualifications, vehicular accidents, self-initiated calls, adult bookings, field interrogations, overtime, and time off for the 6 months of the study period and the same 6 months of the previous year. Self-reported caffeine intake and shift preference were also collected.	Officers working 13:20-hr shifts experienced significant ($p < .05$) decreases in hours of sleep, overall quality of sleep, concentration, cognitive processing, and quality of life (overall and in six of eight subareas). Significant ($p < .05$) increases were observed in fatigue, daytime dysfunction due to sleepiness, reaction time, anticipatory errors, and Professional Standards Bureau complaints. There were no significant differences in most indices of work performance or differences due to working day or night shifts. When officers working 13:20-hr shifts returned to 10-hr shifts, all variables returned to baseline (pre-study) levels. Officers from both precincts overwhelmingly preferred 10-hr shifts.	This study indicates that there are no apparent advantages but considerable liabilities associated with 13:20-hr shifts for police officers.
Cone, JE (2015) ⁶⁸	USA	The aim of the present study was to examine the prevalence of continued or resolved PTSD in men and women police enrollees in the Registry who completed all of the assessment instruments in Waves 1 (2003-4), 2 (2006-7) and 3 (2011-12). This study also examined the factors associated with continued or resolved PTSD, including unmet health care needs and social support.	Police enrollees without pre-9/11 PTSD were studied. Probable PTSD was assessed by Post-traumatic Stress Check List (PCL). Risk factors for chronic, new onset or resolved PTSD were assessed using multinomial logistic regression.	Half of police with probable PTSD in 2003-2007 continued to have probable PTSD in 2011-2012. Women had higher prevalence of PTSD than men (15.5% vs. 10.3%, $P = 0.008$).	Police responders to the World Trade Center (WTC) attacks continue to bear a high mental health burden. Improved early access to mental health treatment for police exposed to disasters may be needed.
Biggs, A (2014) ⁷⁵	Australia	This research investigated the impact of a natural disaster on the health and work attitudes of	Structural equation modeling was employed to test whether exposure to a natural disaster intensified job demands	Exposure to certain aspects of a natural disaster was significantly associated with work culture support,	This research suggests that positive work-related outcomes for

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		police officers.	and diminished job resources, which, in turn, negatively influenced work outcomes. The research sample consisted of 1,623 police officers who completed electronic surveys collected approximately 10 months prior to, and 1 month after, a natural disaster.	which, in turn, was associated with job satisfaction, work engagement, psychological strain, and turnover intentions. Job resources in particular had a significant impact upon the outcome variables, supporting theoretical models that emphasize their critical role in the stressor–strain process.	organizations directly involved with major disasters may be attained through (a) the provision of a supportive work culture, (b) targeted supportive organizational responses to employees personally affected by disasters, and (c) adequate recognition for the work performed by employees involved in disaster relief efforts.
Lewis, V (2014) ⁴¹	Australia	This study examined the impact of psychological first aid (PFA) training for both managers and peer supporters in a high-risk organization.	This article describes an evaluation of PFA training provided to 321 managers and 261 peer supporters within an Australian high-risk organization.	The results demonstrate that training led to increases in 3 key domains: knowledge related to PTEs and PFA, self-reported skills required to respond appropriately to a PTE, and confidence to respond to PTEs. Following the training, both managers and peer supporters had significantly higher mean scores in all 3 domains than prior to training.	This study demonstrates that the provision of PFA training to managers and peer supporters is likely to lead to increased capacity to implement a PFA response within the organization through increases in relevant knowledge, skills, and confidence.
Pietrzak, RH (2014) ¹⁰⁰	USA	This study has two objectives. First, to characterize longitudinal trajectories of WTC-related PTSD symptoms an average of 3, 6 and 8 years after 9/11 in a large cohort of more than 10 000 police and non-traditional WTC-responders. Second, to examine pre-, peri- and post- 9/11 determinants of WTC-related PTSD symptom trajectories in	A total of 10835 WTC responders, including 4035 professional police responders and 6800 non-traditional responders (e.g. construction workers) who participated in the WTC Health Program (WTC-HP), were evaluated an average of 3, 6 and 8 years after the WTC attacks.	Among police responders, longitudinal PTSD symptoms were best characterized by four classes, with the majority (77.8%) in a resistant/resilient trajectory and the remainder exhibiting chronic (5.3%), recovering (8.4%) or delayed-onset (8.5%) symptom trajectories. Among non-traditional responders, a six-class solution was optimal, with fewer responders in a resistant/resilient trajectory (58.0%) and the remainder	Trajectories of PTSD symptoms in WTC responders are heterogeneous and associated uniquely with pre-, peri- and post-trauma risk and protective factors. Police responders were more likely than non-traditional responders to exhibit a resistant/resilient

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		these responders.		exhibiting recovering (12.3%), severe chronic (9.5%), subsyndromal increasing (7.3%), delayed-onset (6.7%) and moderate chronic (6.2%) trajectories. Prior psychiatric history, Hispanic ethnicity, severity of WTC exposure and WTC-related medical conditions were most strongly associated with symptomatic trajectories of PTSD symptoms in both groups of responders, whereas greater education and family and work support while working at the WTC site were protective against several of these trajectories.	trajectory. These results underscore the importance of prevention, screening and treatment efforts that target high-risk disaster responders, particularly those with prior psychiatric history, high levels of trauma exposure and work-related medical morbidities.
Schwarzer, R (2014) ⁶⁹	USA	This study, based on 2943 police officers, examines mental health outcomes among officers who responded to the 9/11 terrorist attack on the WTC.	The Wave 1 data collection took place between September 2003 and November 2004 with a follow-up study (Wave 2) conducted from November 2006 through December 2007. A moderated mediation model was specified that uses event exposure as a distal predictor, earlier stress response as a mediator, and later stress response as an outcome, and social integration as a moderator of this relationship.	The mediation hypothesis was confirmed, and moderation occurred at two stages. First, there was a multiplicative relationship between exposure levels and social integration: The higher the exposure level, the more stress responses occur, but this effect was buffered by a high level of social integration. Second, Wave 1 stress interacted with social integration on Wave 2 stress: The more the police officers were socially integrated, the lower the Wave 2 stress, which happened in a synergistic manner.	The findings contribute to the understanding of mediating and moderating mechanisms that result in health outcomes such as PTSD or resilience.
Watson (2014) ⁹²	UK	This study aimed to examine the association of the Trauma Risk Management (TRiM) program with stigma and attitudes to stress and trauma among police officers.	This cross-sectional study of 859 operational and non-operational police officers compared self-reported psychological distress, attitudes towards help seeking, stigma and post-traumatic psychological growth among those who attended TRiM sessions and those who	Those in the TRiM group reported significantly lower stigma, lower psychological distress, greater positive post-traumatic change and fewer barriers to help seeking, than those in the non-TRiM group. However, there was no significant	The authors conclude that even in forces using TRiM, there is still a considerable degree of stigma, particularly public-stigma, and barriers to seeking help

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			did not. A total of 693 police officers participated in the TRiM program, with 166 not participating in any post-trauma risk management program.	difference between the groups in terms of attitudes towards stress and PTSD.	for psychological distress, which needs to be addressed in future research and development of interventions. The research offers preliminary support for the use of TRiM within police settings.
Hunt, E (2013) ⁹¹	UK	The Cumbrian Constabulary deployed an organizational peer support response for personnel involved known as TRiM. The aim was to examine data routinely gathered during the TRiM process to evaluate the relationship of the intervention to sickness absence.	Using incident databases, details were gathered regarding exposure to the murders and type of TRiM intervention, including an assessment of the psychological risk to the individual of developing a trauma-related mental health problem. Sociodemographic information was collated by the occupational health department. Cumulative sickness absence data in the 2 months following the murders were used as a proxy for mental health status.	A total of 717 police officers and civilian support staff were identified. High levels of traumatic exposure were associated with subsequent receipt of a TRiM intervention. The majority of psychological risk indices reduced between the initial and subsequent evaluation. Greater traumatic exposure was associated with longer sickness absence lengths. Engagement in the TRiM process was associated with a reduction in sickness absence especially in more junior ranks.	We found that TRiM deployed within a police force responding to a major event offered a way of structuring a response for those involved. Our data suggest that TRiM may offer a way of assessing psychological risk so that officers can be offered early supportive interventions. Our data suggest that TRiM may help to ameliorate some of the negative effects of high trauma exposure.
Jeter, PE (2013) ³⁷	USA	This pilot study evaluated the effects of Kripalu yoga on perceived stress, mood, and mindfulness during police academy training.	Forty-two recruits participated in a 6-class yoga intervention. Participants completed the Profile of Mood States-Short Form, Perceived Stress Scale, and the Five Facet Mindfulness Questionnaire prior to and immediately following completion of the yoga program, as well as an exit survey.	Paired samples t-tests revealed significant post-intervention changes in perceived stress and mood, reductions in tension and fatigue, and a trend toward reduced anger. Changes in mindfulness were not detected. The exit survey indicated perceived benefits of yoga for some participants.	This preliminary study suggests that yoga may be beneficial for reducing stress, tension, and fatigue among police academy trainees. Future longitudinal randomized controlled trials are needed to evaluate its full potential as a permanent

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
					component of police academy training.
Plat, MCJ (2013) ⁸⁹	NR	This study i) describes the number of police personnel with PTSD who are working and those who are on sick leave before and after an out-patient-clinic treatment program and ii) examines which factors are related to return to work.	Police personnel treated for PTSD (n = 121). In this retrospective study all police officers had an intake interview before and an outtake interview following a 16-week treatment for PTSD. Information about several personal characteristics, PTSD complaints, and work related factors were gathered. A t-test and chi-square test were used to evaluate differences between working police personnel and police personnel on sick leave at intake and outtake. Binary logistic regression was used to test whether the intake data were related to returning to work at outtake.	At the start of the treatment half of the police personnel were on sick leave (n = 59) and at outtake 48 participants who were not working at intake had returned to work. None of the variables at intake contributed significantly to return to work at outtake.	The majority of police officers returned to work after the treatment program. We recommend that attention be paid to successful return to work as part of the treatment program, therefore the occupational health professional and employer should be involved.
Boivin, DB (2012) ⁶⁷	Canada	The aim of the present combined field and laboratory study was to assess circadian entrainment in two groups of police officers working seven consecutive 8/8.5hr night shifts as part of a rotating schedule.	Eight full-time police officers on patrol (mean age ± SD: 29.8 ± 6.5yrs) were provided an intervention consisting of intermittent exposure to wide spectrum bright light at night, orange-tinted goggles at sunrise, and maintenance of a regular sleep/darkness episode in the day.	In both groups of police officers, the excretion rate of UaMT6s at home was higher during daytime sleep episodes at the end compared to the start of the work week (p < .001). This rate increased significantly more in the intervention than control group (p = .032). A significant phase delay of salivary melatonin was observed in both groups at the end of study (p = .009), although no significant between-group difference was reached. Reaction speed dropped, and subjective alertness decreased throughout the night shift in both groups (p < .001). Reaction speed decreased throughout the work week in the control group (p ≤ .021), whereas no difference was observed in the intervention group. Median	These observations indicate better physiological adaptation in the intervention group compared to the controls.

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
				reaction time was increased as of the 5th and 6th nights compared to the 2nd night in controls ($p \leq .003$), whereas it remained stable in the intervention group.	
Chongruksa, D (2012) ⁹⁰	Thailand	This study aims to develop the eclectic group counseling intervention for Thai police officers to reduce the risk of developing symptoms of poor mental health while deploying in terrorist situations.	Our eclectic group counseling included the interactive model of Cognitive Behavioral Therapy, religious interventions, mandala drawing, and Reality Therapy. The design is an experiment-controlled trial with 42 participants (The experiment = 20, the control = 22; Thai-Buddhists = 32, Thai-Muslims = 10).	For participants attending the eclectic counseling group, all three effects showed a curvilinear trend with the drop of mental health symptoms at mid-intervention, after termination, and weakening at one-month follow up. In contrast, most effects for participants receiving the control showed more of a linear pattern of mental health symptom at mid-intervention, after termination, and at one-month follow up.	This study should be viewed as an initial step toward examining the longitudinal effects of eclectic group counseling on preventing symptoms of poor mental health. The addition of effect size at mid-intervention, termination and one-month follow up, aided in determining the degree to which initial positive outcomes were sustained over time.
Mishara, BL (2012) ⁵¹	Canada	The aim was to evaluate Together for Life, a suicide prevention program for the Montreal police.	All 4178 members of the Montreal police participated. The program involved training for all officers, supervisors, and union representatives as well as establishing a volunteer helpline and a publicity campaign. Outcome measures included suicide rates, pre-post assessments of learning, focus groups, interviews, and follow-up of supervisors.	In the 12 years since the program began the suicide rate decreased by 79% (6.4/100,000), while other Quebec police rates had a non-significant (11%) increase (29.0/100,000). Also, knowledge increased, supervisors engaged in effective interventions, and the activities were highly appreciated.	The decrease in suicides appears to be related to this program since suicide rates for comparable populations did not decrease and there were no major changes in functioning, training, or recruitment to explain the differences. Comprehensive suicide prevention programs tailored to the work environment may significantly impact suicide rates.

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Amendola, KL (2011) ⁶³	USA	The objectives of this research were to test the impacts of three shift lengths (8-, 10-, and 12-hour) on performance, health, safety, quality of life, sleep, fatigue, alertness, off-duty employment, and overtime among police.	This study consisted of a randomized block experimental design. There were 275 participating officers from two large police departments. Data were collected as part of a multi-site clinical trial for which we employed the same protocols in both sites. The blocks included site and time of day of the shift. Unique measures of work performance, safety, and fatigue were collected using laboratory based simulations collected during the end of the shifts, and self-report instruments were used to capture other outcomes such as health and quality of life.	The results indicated that those working 10-hour shifts had a significantly higher quality of work life ($f=.16$) and averaged significantly more sleep ($f=.19$) than those on 8-hour shifts. Furthermore, those working 8-hour shifts averaged significantly more overtime ($f=.42$) than did those assigned to 10- and 12-hour shifts. In addition, officers working 12-hour shifts experienced greater levels of sleepiness ($f=.20$) and reported lower levels of alertness ($f=.21$) at work than officers on 8-hour shifts.	There do not appear to be any significant health, safety, or performance problems associated with compressed work week schedules in policing. Although our study did not reveal any significant effects associated with objective measures of fatigue across shifts, the implementation of 12-hour shifts should be done only after careful consideration of some of the potential concerns.
Peres, JFP (2011) ⁸⁷	NR	We investigated the brain activity underlying trauma, the coping effect of psychotherapy, and resilience in a highly homogenous sample that experienced the same traumatic event.	The design applied was a between-group comparison of cerebral blood-oxygenation-level-dependent signals and symptom scores of police officers with and without partial PTSD (pPTSD). We used functional magnetic resonance imaging (fMRI) to investigate the retrieval of traumatic memories of 36 volunteers divided in three groups: (1) pPTSD policemen submitted to psychotherapy; (2) pPTSD policemen on the wait list; and (3) symptom-free (resilient) policemen. All participants were given a baseline fMRI scan and a follow-up scan some 40 days later. Not given psychotherapy, groups 2 and 3 were controls.	Group 1 showed 37% fewer PTSD symptoms post-psychotherapy and their scores and neural expressions were comparable to Group 3 resilient policemen. A marked increased in medial prefrontal cortex (mPFC) activity was concomitant with decreased amygdala activity during traumatic memory retrieval in both resilient and pPTSD participants (after psychotherapy) and these findings were associated with symptom attenuation.	Our results provide neurophysiological evidence of resilience in a high-risk group for PTSD. Psychotherapy may help to build narratives and resilient integrated translations of fragmented traumatic memories via mPFC, and thus weaken their sensory content while strengthening them cognitively.
Levenson, RL Jr (2010) ⁵³	USA	This article discusses the Badge of Life Psychological Survival for Police Officers Program (BOL), founded in 2008, with the goal of developing all effective police	Along with standard suicide prevention protocols typically used in other programs, an Emotional Self Care Program (ESC) was designed to focus on the officer stability and responsibility to	BOL began long-term efforts to bridge the gap by demonstrating not only their wealth of value in mental health programs, but by providing a structured means by which	BOL continues to be a strong, innovative voice in the formulation of new ideas to improve the emotional well-being of

POLICE					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		officer suicide primary and secondary prevention program.	care for his own emotional well-being. The model relies on teaching the factor of resilience as a significant component of stress-resistance. Selected for their credibility and trust level, peer support officers conduct the actual annual training workshops, set the example, and encourage involvement at all levels. A "cradle-to-the-grave" program (i.e., rookies to retirees),	departments can feel more comfortable taking advantage of these rich-in-experience resources. Since its formation, BOL has grown with alacrity. BOL's membership is represented by police administrators, "road cops," officers who suffer from PTSD, and parents and wives who have lost their loved ones to suicide.	law enforcement officers throughout the United States and Canada. Training and education in police officer suicide prevention remains the core of BOL, while parallel issues currently under study are the recognition and acceptance of what we term the Line of Duty Suicide (LODS) by police administrators and police officers, in general.
Arnetz, B (2009) ⁵⁶	Sweden	The objective of this study is to test the effects of police trauma resilience training on stress and performance during a critical incident police work simulation.	Rookie police officers (N=18) participated in a randomized trial of a 10-week imagery and skills training program versus training as usual. Twelve months later, psychophysiological stress and police work performance were assessed during a live critical incident simulation.	Training resulted in significantly less negative mood, less heart rate reactivity, a larger increase in antithrombin, and better police performance compared to controls. Trends for cortisol and self-reported stress also suggested benefits of training.	This novel training program is a promising paradigm for improving police well-being, stress resiliency, and optimizing job performance.
Oliver, WM (2009) ⁴⁸	NR	This study assessed the impact that a stress management program had on small-town and rural police officers and sheriffs' deputies in West Virginia.	Assessing the impact of stress management training on officers' anxiety, self-reported levels of stress, and behaviors in a paired sample (pre-test/post-test) t-test.	Findings indicate that only one of the three measures employed, the Self-Report measure, was significant. In this case, the mean improved from 3.469 to 2.212. In the case of both the anxiety and behavioral scales, the means actually increased, but again, neither was found to be statistically significant.	Findings suggested that these programs do have an impact on officer stress, but as the lag time increases, there is a diminished return of benefit, supporting the need for continued education.
Sijaric-Voloder, S (2008) ⁴⁵	Bosnia and Herzegovina	Objective of our work was to develop a structured stress management program based on cognitive behavior therapy	The subjects were police officers, aged from 30 to 45 years, divided into two groups, each consisting of 20 persons. One group received structured stress	Statistical data analyzes revealed that the Subjects who had received stress management program displayed a statistically significant anxiety	Statistical data analyzes revealed that the Subjects who had received stress

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		principles for persons in high risk professions such as police officers. Another objective was to evaluate the effects of structured stress management program on police officers by measuring their anxiety levels before and after the treatment.	management program and another did not. All members of both groups completed BAI and ASI tests ahead and after the treatment, as well as three months after the treatment.	sensitivity reduction, developed more active and planned coping strategies for stressful situations, had less somatic reactions to stress and have thus also achieved improved performance at work and in private life. The subjects were also significantly more likely to request medical advice after completing psychotherapeutic program.	management program displayed a statistically significant anxiety sensitivity reduction, developed more active and planned coping strategies for stressful situations, had less somatic reactions to stress and have thus also achieved improved performance at work and in private life. The subjects were also significantly more likely to request medical advice after completing psychotherapeutic program.
Tanigoshi, H (2008) ⁸⁶	Canada	The purpose of this exploratory study was to determine the effectiveness of wellness counseling on increasing wellness among law enforcement officers. The study also examined whether position in the Transtheoretical Model and self-efficacy influenced the effectiveness of counseling on wellness.	5x, 60-min cognitive-behavioural counseling, personalized wellness sessions were implemented every other week. Referral to mental health services as required. Outcomes were measured using Wellness (5F-Wel Survey), Self-efficacy (single-item self-efficacy scale), Readiness to change wellness (stage of Readiness to Change Questionnaire) scales.	The treatment of wellness counseling had a significant effect on increasing overall total wellness levels between pre-test (M = 217, SD = 23.44) and post-test (M = 234, SD = 22.67) measurements. The control group's wellness levels remained unchanged from pre-test to post-test.	These findings indicate that counseling may increase wellness among law enforcement officers.
Cornelius, TL (2007) ⁸⁵	USA	The aim of this study was to identify the conceptual framework for treatment, explore the course of therapy, and identify socially valid means of treatment and assessment in outpatient therapy.	This case report addresses treatment of PTSD with a 72-year-old former police officer who was experiencing intrusive thoughts, nightmares, experiential and affective avoidance, and hyperarousal resulting from witnessing a series of traumatic events during his time in law	Although the latency between events and treatment was more than 20 years, this patient was responsive to a cognitive-behavioral, exposure-based treatment. Several other factors, including the client's age and chronic pain, complicated this case.	At the termination of treatment, this patient evidenced improvements in overall anxiety, depressive symptoms, and frequency and severity of PTSD

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			enforcement.		symptoms. Recommendations for clinicians and treatment implications are also presented.
Ireland, M (2007) ¹⁰¹	Australia	This study examined the impact that writing about personal emotions had on distress levels in police officers.	A total of 67 police officers randomly assigned to either a writing intervention or a non-writing control group completed the study. Over a period of 4 work days the intervention group members wrote for 15 minutes a day about their strong emotions related to work or not, and what they planned to do about the emotions. All participants completed measures of stress, anxiety, and depression before and after the intervention.	The results showed that the writing group experienced significantly lower levels of stress and anxiety post-intervention than the control group.	The results suggest that writing about emotions can help reduce distress in police officers.
Lansing, K (2005) ⁹⁷	USA	In this study, the authors evaluated the effectiveness and physiological effects of EMDR in police officers involved with on-duty shootings and who had PTSD.	Six police officers involved with on-duty shootings and subsequent delayed-onset PTSD were evaluated with standard measures, the Post-traumatic Stress Diagnostic Scale (PDS), and high-resolution brain single photon emission computed tomography (SPECT) imaging before and after treatment.	All police officers showed clinical improvement and marked reductions in the PDS. In addition, there were decreases in the left and right occipital lobe, left parietal lobe, and right pre-central frontal lobe as well as significant increased perfusion in the left inferior frontal gyrus.	In our study, EMDR was an effective treatment for PTSD in this police officer group, showing both clinical and brain imaging changes.
Shipley, P (2002) ⁵⁷	Canada	This study examined the effectiveness of visuo-motor behavior rehearsal (VMBR) as a method of reducing acute stress and improving police officer performance.	Fifty-four recruits were randomly assigned to a treatment and a non-treatment condition prior to undergoing a highly stressful, critical event training scenario involving "live fire."	A manipulation check showed that participants who received VMBR displayed significantly lower scores on the cognitive state anxiety subscale of the Competitive State Anxiety Inventory-2; somatic state anxiety and self-confidence were unaffected by the VMBR treatment. Most importantly, participants in the VMBR training condition displayed better performance on the critical event scenario, including significantly more	The findings of this study revealed that VMBR training can reduce cognitive state anxiety and improve police officer performance in a dynamic and stressful live-fire training simulation. The link between VMBR training and human performance under stress can be

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				assailant “hits.”	conceptualized in the context of a serial four-stage model of stress and performance.
Wilson, SA (2001) ⁹⁸	USA	The present study investigates the use of EMDR in the field of police psychology, striking new ground in applying the treatment to the area of occupational stress management that has traditionally employed an educational approach.	Sixty-two police officers were randomly assigned to either EMDR or a standard stress management program (SMP), each consisting of 6 hours of individualized contact.	At completion, officers in the EMDR condition provided lower ratings on measures of PTSD symptoms, subjective distress, job stress, and anger; and higher marital satisfaction ratings than those in SMP.	The effects of EMDR were maintained at the 6-month follow-up, indicating enduring gains from a relatively brief treatment regimen for this subclinical sample of officers who were experiencing some level of stress from their job.
Carrier, IVE (2000) ⁷⁹	Netherlands	The present study tests the hypothesis that debriefing reduces the psychological morbidity caused by work-related incidents.	Because debriefing techniques were not designed for application on a ‘one-off’ basis, the procedure studied here consisted of three successive debriefing sessions (at 24 hours, 1 month and 3 months post-trauma), which included traumatic stress education. In a sample of 243 traumatized police officers, a subgroup of debriefed officers (N = 86) was compared with non-debriefed internal (N = 82) and external (N = 75) control groups.	No differences in psychological morbidity were found between the groups at pre-test, at 24 hours or at 6 months post-trauma. One week post-trauma, debriefed subjects exhibited significantly more post-traumatic stress disorder symptomatology than non-debriefed subjects. High levels of satisfaction with debriefing were not reflected in positive outcomes.	Our findings on satisfaction are in agreement with evidence that participants generally appreciate the intervention. This seems to reflect a natural tendency in people who have recently been traumatized to seek emotional support, recognition, understanding and endorsement. Nevertheless, this high degree of satisfaction with debriefing was in no way reflected in fewer stress symptoms, lower rates of sick leave or a more rapid resumption of work. In the future, studies of the efficacy of

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
					group, as opposed to individual, debriefing are needed.
Gersons, BPR (2000) ⁸⁸	The Netherlands	The present study investigated the combined effect of the cognitive-behavioral and psychodynamic approaches within one and the same treatment method.	Forty-two police officers with the diagnosis of PTSD participated in the study; 22 were randomly assigned to the treatment group and 20 to the wait-list control group. Assessments of PTSD and comorbid conditions were made 1 week before treatment, after treatment session 4, upon termination of treatment (16 sessions), and at follow-up 3 months later.	As expected, no significant differences between groups were observed at pre-test or at session 4. At posttest and at follow-up, BEP had produced significant improvement in PTSD, in work resumption, and in some comorbid conditions.	Our treatment was effective for all three PTSD symptom clusters and showed clinically significant change.
Leonard, R (1999) ⁷⁸	Australia	This study investigates appraisal and coping behaviours, and symptom and expectation outcomes following a critical incident and Critical Incident Stress Debriefing (CISD).	Two groups of 30 Australian police officers from the New South Wales Police Service who had been involved in shooting incidents were examined. One group received CISD and the other did not.	The group that received CISD showed a significant reduction in anger levels and greater use of some specific adaptive coping strategies. However, one cannot be certain as to the extent of CISD's contribution to this improvement, since a variety of other factors in the officers' lives, as evidenced by other measures taken throughout the study, may help to explain the variation.	Results are discussed in light of the contextual features in officers' lives that impact upon the outcome responses to such incidents.
McCarty, R (1999) ⁴⁴	USA	This study explored the impact on a group of police officers from Santa Clara County, California of the HeartMath® stress and emotional self-management training, which provides practical techniques designed to reduce stress in the moment, improve physiological and emotional balance, increase mental clarity and enhance performance and quality of life.	HeartMath® stress and emotional self-management training; Areas assessed included: physical health and vitality, emotional wellbeing, coping and interpersonal skills, work performance, workplace effectiveness and climate, family relationships, and physiological and psychological recalibration following acute stress. In addition, physiological measurements were obtained to determine the real-time cardiovascular impact of acutely stressful situations	Results showed that the HeartMath training improved officers' capacity to recognize and manage their stress and negative emotions in both work and personal contexts. Over the course of the study, officers trained in the stress management techniques experienced reductions in stress, negative emotions and physical stress symptoms, as well as increased positive emotion and physical vitality as compared to a control group that	This study provides evidence that practical stress and emotional self-management techniques can reduce damaging physiological and psychological responses to both acute and chronic stress in police, and positively impact a variety of major life areas in a relatively

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			encountered in simulated police calls used in police training, and to identify officers at increased risk of cardiovascular disease and premature mortality.	did not receive the training.	short period of time.
Richmond, RL (1999) ⁴³	Australia	To evaluate the effects of a brief intervention to reduce excessive drinking, smoking and stress among police.	1) Controlled intervention trial with pre and post-intervention assessment approximately 8 months apart; (2) focus group identification of relevant factors. Assessment was carried out of 954 NSW (New South Wales, Australia) police at 19 stations within two matched districts in the Sydney metropolitan area. Five focus groups were carried out with 43 randomly selected police from the matched districts. Weekly alcohol consumption and binge drinking, smoking and symptoms of stress were measured by a self-administered Health and Fitness Questionnaire.	Alcohol consumption, particularly among men, was high at both baseline and follow-up assessments, although comparisons between groups across occasions showed no significant intervention effects. Excessive drinkers and those reporting moderate to severe stress levels reported more sick leave days (p, 0.05, p, 0.05). A significant increase in awareness of alcohol policies in the work-place showed in both experimental and control groups over time (p, 0.01). The percentage of smokers declined significantly in both intervention and control groups. Overall, women had significantly more symptoms of stress than men.	The brief interventions did not produce significant improvements in three lifestyle factors beyond positive trends in alcohol consumption among women and general reductions in smoking among both study groups. Combining quantitative and qualitative approaches helped identify interactive individual and organizational factors which influence behavioural and cultural norms.
Tolin, DF (1999) ⁹⁹	USA	The present single subject report describes the successful implementation of this therapy with a police officer diagnosed with chronic PTSD following a work-related incident.	Exposure therapy; An intensive time-series design was used. Treatment consisted of a three-session measurement-only period to measure severity and stability of symptoms, followed by a five-session treatment phase, and a second three-session measurement-only phase to assess the stability of therapeutic change. Mr. R. completed self-report inventories of symptom severity at each assessment point. More comprehensive assessments were administered at pretreatment,	We found that symptom relief was clearly associated with the onset of exposure therapy, and persisted after termination of this therapy through a 6-month follow-up period.	To our knowledge, this case is the most detailed demonstration of the cognitive behavioral treatment of PTSD in an emergency service worker, suggesting that this form of treatment holds promise for clinicians treating such personnel. Future studies should use group designs in which

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			immediately following treatment, and 6 months post-treatment.		exposure therapy is compared to wait-list control or nondirective counseling, as has been done with other populations.
Welch, J (1998) ⁵²	South Africa	Members of the HR and the employee support services travelled the length and breadth of the Free State running life skills and stress management workshops, and training commanders to recognize warning details and implement prevention techniques.	Suicide prevention – includes: awareness training (unclear duration) delivered by members of human resources and/or employee support services; gatekeeper training (unclear duration) delivered by members of human resources and/or employee support services; 24hr crisis telephone hotline; life skills and stress management workshops (unclear duration) delivered by members of human resources and/or employee support services; crisis intervention team; suicide post-intervention services; changes to media reporting guidelines following the suicide of an officer.	From the start of year conducted to the end of May, three officers committed suicide, compared to 13 in the same period the year before. The team expects the death toll to continue to fall. It is believed that 400 suicides were prevented by the campaign.	Some of the service's wider problems are also starting to be addressed as a result of the suicide prevention research. Management buy-in to the project has grown stronger.
Ford, N (1996) ⁹⁴	Australia	This paper reports the use of carbamazepine and sodium valproate in a man with PTSD whose symptoms had failed to respond to two tricyclic antidepressants.	In the third week of admission, carbamazepine was added to the other medications. The dose of carbamazepine was increased to 400 mg/day giving steady state levels of 27 ~moles/L. He was readmitted to the hospital, and sodium valproate was commenced and increased to 500 mg twice daily, achieving steady-state levels of 520 ~moles/L.	Three days after commencing carbamazepine dose, he began to become more relaxed with an improvement in sleep and mood, a decrease in nightmares, and a diminishing startle response. He started to spend time out of the ward, and at one point took trial leave with his family. He was withdrawn from carbamazepine due to side effects; improved on sodium valproate. Following sodium valproate treatment, two days after reaching this dose his edginess began to decrease and he began to leave his room. Over the next 2 weeks his mood and sleep	In treating this man there was a clear association between the commencement of anticonvulsants and marked improvement in symptoms, particularly those of startle response, irritability, sleep disturbance, and depression. Following cessation of carbamazepine, his symptoms returned, leading to discharge on a cumbersome drug

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
				improved. The nightmares ended, and although intrusive recollections continued they were less frequent and distressing. He was discharged and followed up as an outpatient.	regime. The introduction of sodium valproate was associated with improvement. Sedation was not complained of with either drug, arguing against this as an acute effect producing improvement. Improvement was seen within 2 days of reaching this dose. It is possible on each occasion that this man's PTSD symptoms improved secondary to improvement in his depression.
Digliani, JA (1994) ⁵⁰	USA	Fifty-one Colorado patrol and detention officers from the Fort Collins Police Services, Loveland Police Department and Larimer County Sheriff's Department participated in a stress inoculation training program.	Officers were stratified by agency and primary function, then randomly assigned to either the treatment or delayed control group. Treatment group officers participated in a five-session, two-hour per session stress inoculation training program conducted over approximately seven weeks. Measures of trait anxiety, trait anger, current stressors, overall stress level, and self-efficacy were obtained for both groups prior to, following, and approximately four weeks after stress inoculation training.	Analyses of covariance demonstrated significant main effects on the first of the current stressor measures, and significant interaction effects on the second current stressor measure. Overall stress level indicated change in the predicted direction; however the degree of change lacked statistical significance. There were no significant differences between the treatment and control groups on trait anxiety, trait anger, and self-efficacy.	Treatment group feedback revealed that officers found the training program beneficial. The results generally supported stress inoculation training as an effective stress management approach for law enforcement officers.
Holbrook, MI (1994) ⁴²	USA	This study aimed to increase subjects' knowledge of sleep hygiene as measured by the Sleep Hygiene Awareness and Practice Scale by introducing instruction on stimulus-control techniques	31 male and 7 female law-enforcement officers voluntarily participated in a training session on sleep hygiene practices. On the Sleep Hygiene Awareness and Practice Scale administered prior to and after training	A comparison of scores on sleep hygiene indicated a significant increase in pre- to post-test awareness of sleep hygiene ($t = 9.23$, $p < .001$) and in knowledge about nicotine ($t = 4.24$, $p < .001$), hypnotics	A more productive approach may be to incorporate a comprehensive behavioral program within departments to

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		and information regarding the effects of stimulants and hypnotics on sleep and sleep maintenance.	were significant increases in awareness of sleep hygiene and knowledge of nicotine, caffeine, and hypnotics. We predicted that use of this knowledge would increase sleep satisfaction.	($t = 4.64, p < .001$), and caffeine ($t = 7.53, p < .001$). However, 1-mo. follow-up scores on the Post-sleep Inventory reflected no change. It appears that scheduling demands, coupled with feelings of low self-efficacy toward managing those demands, resulted in little or no practice of sleep hygiene.	instill and reinforce better practice of sleep hygiene.
Folkard, S (1993) ⁹⁵	UK	This study aimed to examine the effect of melatonin on sleep and alertness in a double-blind study of a group of police officers on a shift system involving a span of seven successive night (22:00-6:00 hr) shifts.	The pineal hormone melatonin is potentially useful in the treatment of disorders, especially sleep disorders, associated with circadian rhythm disturbance. We have examined its effects on sleep, mood, and behaviour in a double-blind, placebo-controlled study of a small group of police officers working spans of seven successive night shifts.	Compared to placebo, and to no treatment, melatonin (5 mg) taken at the desired bedtime improved problems related to sleep and increased alertness during working hours, especially during the early morning. In letter-target performance tests visual search speed and accuracy were either unchanged or slightly improved. Memory scanning speed and perception of mental load were adversely affected.	This preliminary study suggests that melatonin has beneficial effects on sleep and alertness, but that its effects on performance need careful evaluation.
Norvell, N (1993) ³⁶	USA	The effects of circuit weight training on mood, perceived stress, job satisfaction, and physical symptoms were investigated in a sample of state law enforcement officers.	Forty-three male officers who were not regularly exercising were assigned to either 4 months of circuit weight training or a wait-list control condition.	Four months of circuit weight training led to a significant increase in strength on cardiovascular fitness. Subjects also demonstrated significant improvements in mood, including decreases in somatization, anxiety, depression, and hostility. Circuit weight training also resulted in a decrease in reports of physical symptoms and in improvements in job satisfaction.	Results indicated that subjects who dropped out of the exercise training program evidenced significantly greater anxiety, depression, and hostility at pretreatment than subjects who completed the program. These findings suggest that circuit weight training programs may contribute to important psychological benefits.

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Pierce, JL (1992) ⁶¹	USA	This investigation examined police officers' responses to a change from a forward rotating 8-hour-shift schedule to a 12-hour compressed shift schedule.	Within two weeks of the first data collection period, all the department's uniformed personnel were placed on a two-week forward-rotating 12-hour-day, 48-hour, eight-day-week work schedule that gave them four days on and four days off.	As predicted, significant improvements were observed in the areas of schedule-related interference with personal activities, work-schedule attitudes, general affect, and stress and fatigue. In addition, organizational effectiveness improved, but general work attitudes remained unchanged.	Our findings suggest that combining a compressed and a shift schedule may mitigate some of the negative effects frequently associated with shift work and capitalize on some of the positive effects associated with compression.
Bohl, N (1991) ⁷⁷	USA	The long-term effectiveness of brief psychological interventions in police officers who have been involved in critical incidents was assessed.	Three months after the critical incident, two groups that were similar with respect to age, number of years worked, and number of prior incidents were compared: Officers who had been treated within 24 hours after the incident and officers who had not been treated at all.	On formal, written tests, the treated group was significantly less depressed ($p < .001$) and angry ($p < .02$) than the untreated group; also the treated group reported significantly fewer stress-related symptoms ($p < .001$) than the untreated group. The two groups did not differ significantly on a measure of anxiety.	Overall, the data provided evidence for the effectiveness of brief interventions in police officers. It is suggested that treatment programs be mandatory for all officers involved in critical incidents.
Norris, R (1990) ⁷⁶	UK	To determine whether fitness alters psychological and physiological indices of well-being, male police officers were assigned to either an aerobic or anaerobic training condition or to a no treatment control group.	The training groups met three times per week in 45 min sessions aimed at improving either cardiovascular endurance or muscle strength. Aerobic fitness level. Heart rate, blood pressure and self-report of stress and well-being were measured prior to and following 10 weeks of training.	Post-training fitness measures confirmed the effectiveness of training and between group differences for physiological and self-report measures were found. Subjects undergoing aerobic training evinced larger changes on the self-report measures of well-being and stress than the anaerobic trainers and both groups showed significant improvement when compared to controls.	This experiment provides support for the hypothesis that exercise, and in particular aerobic exercise, has positive effects of well-being. It is suggested that future research might usefully explore the particular contribution of different aspects of the training situation to these effects.
Coulson, JE (1987) ⁴⁹	USA	A group of veteran police officers were studied in relation to the effectiveness of a stress	Two control groups, a veteran group who received no stress reduction training and an academy group which received	Contrary to the main hypothesis formulated, there were no significant differences found between the three	The specific format utilized is discussed and suggestions are offered

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		reduction program which utilized a cognitive-behavioral approach to training. A new instrument, the Coulson Police Job Stress Discussionnaire (CPJSD), was field tested.	standard basic training but not the stress reduction program, were compared on pre-test and post-test Profile of Mood States (POMS) mood disturbance scores.	groups on post-test POMS measures of mood disturbance when compared with pre-test measures. The construct validity of the POMS for use with police officers is challenged.	for future study design. Specific difficulties inherent in the study of police groups are examined. The usefulness of the CPJSD for police job stress reduction program is suggested, as is the need for further field testing of this instrument.
Ackerley, DG (1986) ⁴⁷	USA	This study was designed to address whether the sample, police personnel in a Midwestern suburban police force, are under high levels of stress, and whether the administration of a stress management program would effect changes in ways of coping with stress, quality of family life as it relates to work, job satisfaction, perceived control over events in their lives, and level of professional burnout.	The independent variable was a six-week stress management program. The dependent variables were assessed using the Social Readjustment Rating Scale, the Maslach Burnout Inventory, Police Officer's Questionnaire, the Rotter I-E Scale and eight behavioral indicators of job performance. A randomized block design was used to assign subjects, 49 police personnel within four intact squads, as a group to one of two conditions: a treatment group and control group.	Analyses of variances on hypotheses related to the three aspects of the burnout syndrome were not found to be significant. Analyses of variances on hypotheses related to a change in job satisfaction as a result of treatment were not found to be significant. Analysis of covariance on hypotheses related to a change in attitude toward family life as a result of treatment were not found to be significant. Individual item analysis of variance on the frequency of use of coping activities showed significant differences for smoking behavior. Analysis of variance on the locus of control measure showed no significant changes as a result of treatment.	From the findings in this study, it may be concluded that the hypotheses related to burnout, quality of family life as it relates to work, job satisfaction, perceived control over events were not supported. Of the coping activities, only smoking behavior showed an increase as a result of treatment.
Short, MA (1984) ³⁵	USA	The purpose of the study was to investigate possible psychological changes in obese men after participating in an eight-week nutrition and physical conditioning program.	The subjects, 45 male, metropolitan policemen who were considered at least 20 percent over their optimum body weights, were placed on diets and received weekly instruction on topics of nutrition and exercise. The subjects were randomly divided into two groups, one	Both groups displayed significant increases in oxygen consumption and on the Physical Self and Self-satisfaction subscales, but on all these measures, the Conditioning Group increased significantly (2 to 3 times) more. For both groups, the	These results demonstrate that physical conditioning and dietary educational sessions or educational sessions alone are associated with positive

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			that participated in aerobic conditioning and one that did not. The amount of oxygen consumption, as an index of physical fitness, and performance on selected subscales of the Tennessee Self-concept Scale (TSCS), were measured before and after the training and conditioning programs.	Total Variability measure from the TSCS showed significant reductions, which have been associated with personality integration.	changes in self-concept in obese individuals and also corroborate other studies that show links between physical and psychological fitness.
Orth-Gomér, K (1983) ⁶⁶	NR	The effects of a new shift rotation schedule on coronary risk factors were assessed.	Short-term intervention trial in 45 volunteer policemen that were divided into two groups. They worked 4 weeks each on their customary schedule (counter-clockwise rotation) and on the new schedule (clockwise rotation). Serum lipids, glucose, uric acid, blood pressure, nocturnal urinary excretion of catecholamines, the quality and quantity of sleep, and tobacco consumption were assessed before, during, and after each schedule.	During clockwise rotation, serum levels of triglycerides (but not cholesterol), and of glucose (but not uric acid) were significantly lower than during counter-clockwise rotation. Sleep was reported to be longer and better with clockwise rotation, but tobacco consumption did not differ between the two schedules. After clockwise rotation, systolic (but not diastolic) blood pressure and urinary excretion of catecholamines were significantly lower than after counter-clockwise shift rotations.	The results suggest that adapting shift rotation to biological circadian rhythms has a favorable short-term effect, not only on subjective wellbeing but also on risk factors for ischemic heart disease.
Peacock, B (1983) ⁶⁰	USA	This study conducted an extensive before and after study when a city police force changed from an 8 hour 12 day shift cycle to a 12 hour 8 day system.	The tests were conducted over a complete shift cycle for each shift system. The investigation of the 12 hour 8 day system took place after the officers had been exposed to it for 6 months. The individual tests were conducted at the beginning and the end of a shift after careful weighing of the advantages and disadvantages of close within-shift monitoring of performance, interference with the officer's normal activity and possible start-up and end effects.	W170, blood pressure, sleep duration, sleep quality and subjective level of alertness measures showed improvements with the new system. Critical flicker fusion showed reliable within shifts decrements, but no between system differences. Oral temperature showed the expected circadian changes with no indication of phase shift under either system. Urinary catecholamine and grammatical reasoning measures showed no influence of shift-related factors.	The overwhelming atmosphere of support for the new system coupled with the absence of any negative ergonomics evidence led to its adoption on a permanent basis.

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Sarason, IG (1979) ⁴⁶	USA	Police Academy trainees participated in a stress management program which focused on developing skills for coping with anxiety and anger.	Stress management training took place in six 2-hour sessions and included instruction and practice in the self-monitoring of reactions to stressful situations, muscular relaxation, and the development of adaptive self-statements. Self-report measures of anxiety and anger were obtained before and after the stress management program. In addition, self and observer ratings of trainees' performance in stressful simulated police activities were utilized as post-treatment dependent measures.	In comparison to a control group of trainees, the performance of the treatment group was rated, by academy personnel, as superior in several of the simulated police activities.	The results of the present study suggest that stress management with law enforcement officers may be most effective when the program focuses on the specific situations which are likely to be encountered by trainees. Limitations of the present program are examined and suggestions for future efforts with law enforcement personnel are discussed.

Notes:[†] This study was an unpublished thesis, therefore the information presented here was taken from review level data.

Appendix Table 5: Primary firefighter studies

FIREFIGHTERS					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Skeffington, PM (2016) ⁵⁹	Australia	To develop and evaluate an evidence-based and theory driven program for the primary prevention of PTSD.	A pre-intervention / post-intervention / follow up control group design with clustered random allocation of participants to groups was used. The “control” group received “Training as Usual” (TAU). Participants were 45 career recruits within the recruit school at the Department of Fire and Emergency Services (DFES) in Western Australia. The intervention group received a four hour resilience training intervention (Mental Agility and Psychological Strength training) as part of their recruit training school curriculum. Data was collected at baseline and at 6- and 12-months post intervention.	We found no evidence that the intervention was effective in the primary prevention of mental health issues, nor did we find any significant impact of MAPS training on social support or coping strategies. A significant difference across conditions in trauma knowledge is indicative of some impact of the MAPS program.	While the key hypotheses were not supported, this study is the first RCT investigating the primary prevention of PTSD. Practical barriers around the implementation of this program, including constraints within the recruit school, may inform the design and implementation of similar programs in the future.
Sullivan, JP (2016) ³⁸	USA	We tested the hypothesis that a workplace-based Sleep Health Program (SHP) incorporating sleep health education and sleep disorders screening would improve firefighter health and safety compared to standard practice.	Prospective station-level randomized, field-based intervention in a US fire department with 1189 firefighters. Interventions included sleep health education, questionnaire-based sleep disorders screening, and sleep clinic referrals for respondents who screened positive for a sleep disorder. Firefighters were randomized by station.	Using departmental records, in an intention-to-treat analysis, firefighters assigned to intervention stations which participated in education sessions and had the opportunity to complete sleep disorders screening reported 46% fewer disability days than those assigned to control stations (1.4 ± 5.9 vs. 2.6 ± 8.5 days/firefighter, respectively; $p = .003$). There were no significant differences in departmental injury or motor vehicle crash rates between the groups. In post hoc analysis accounting for intervention exposure, firefighters who attended education sessions were 24% less likely to file at least one injury report during the study than those who did not attend, regardless of randomization (OR [95% CI] 0.76 [0.60, 0.98]; $\chi^2 = 4.56$; $p = .033$). There were no significant changes pre- versus post-study in self-reported sleep or sleepiness in those who participated in the intervention.	A firefighter workplace-based SHP providing sleep health education and sleep disorders screening opportunity can reduce injuries and work loss due to disability in firefighters.
Caputo, LM (2015) ⁶⁴	USA	Our study objective was to explain and quantify the impact of switching from the Kelly schedule to the 48/96 schedule by	Sleep diaries and self-reported surveys were administered to firefighters at an urban fire department. Sleep diaries measuring the number of hours slept and feelings of refreshment were compared one month	The 59 firefighters included in the study reported an increase in sleep on-shift after the new schedule implementation (5.8 to 6.6 hours/night, $p < 0.001$). Participants also reported increased feelings of	American firefighters appeared to benefit from a 48/96 schedule, with short-term improvements in sleep patterns, feelings of

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		measuring changes in sleep, feelings of daytime function, as well as perceptions of professional and personal well-being for American firefighters. Secondary study objectives included changes in professional and personal well-being time for personal schedules, satisfaction, and health habits before and after the 48/96 schedule was implemented.	before and four months after implementation of the 48/96 schedule. The self-reported surveys measured sleepiness levels via the Epworth Sleepiness Scale.	refreshment on days off ($p < 0.001$) and decreased daytime sleepiness ($p < 0.001$). We also found a general trend of improved perceptions of satisfaction, less shift interference with personal schedules and decreased feelings of burnout.	burnout, and time for personal schedules.
Finney, EJ (2015) ⁵⁴	USA	This article captures the history of suicide within the Houston Fire Department and summarizes each phase of the HFD Suicide Prevention Program in its development, purpose, methodology, and implementation.	The purpose of Phase 1 was to gather input and ideas from active duty firefighters on suicide in the fire service and to learn what they would like to see from the department regarding mental health issues. Via a special bulletin, all stations were ordered by the Fire Chief to attend a suicide prevention presentation. The purpose of Phase 2 was to educate firefighters about suicide and bring about more awareness of the subject to the entire department. Phase 2 of the Suicide Prevention Program was done face to face (in person) as a presentation to all of the stations and districts. The purpose of Phase 3 was to educate officers about how to identify the difference between “problems” and “crises”, to advise officers on how to deal with crisis situations, to describe proper documentation of mental health events, and to help officers identify and utilize mental health resources. Phase 3 of the Suicide Prevention Program was done as an online course. Via a special bulletin, all officers were made aware of Phase 3 and were ordered by the Fire Chief to complete this course.	The Suicide Prevention Program was successful in educating a large majority of the HFD firefighters about the history of suicide in the department, how to recognize suicide risks among firefighters, and the mental health resources available to members. In addition, it resulted in the creation of a more coordinated team (FSN) intended to address the mental health needs of HFD members. After the HFD Suicide Prevention Program began in 2007, there were no suicides of active duty members for five years, and at least three virtually certain suicides were averted.	While we cannot say for certain that this is the direct result of the program, it is clear that there has been a much greater emphasis on preventing the tragedy of suicide within the department since the program was put in place. We plan to maintain an awareness of the problem of suicide among our firefighters through continuing educational efforts and by outreach efforts by the department psychologist and the Firefighter Support Network.
Tuckey, MR	Australia	We conducted the first	To assess both goals we measured four	Controlling for pre-intervention scores,	Overall, CISD may benefit

FIREFIGHTERS					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
(2014) ³²		randomized controlled trial of critical incident stress debriefing (CISD) with emergency workers (67 volunteer fire-fighters) following shared exposure to an occupational potentially traumatic event (PTE). The goals of group CISD are to prevent post-traumatic stress and promote return to normal functioning following a PTE.	outcomes, before and after the intervention: post-traumatic stress, psychological distress, quality of life, and alcohol use. Fire brigades were randomly assigned to one of three treatment conditions: (1) CISD, (2) Screening (i.e., no-treatment), or (3) stress management Education.	CISD was associated with significantly less alcohol use post-intervention relative to Screening, and significantly greater post-intervention quality of life relative to Education. There were no significant effects on post-traumatic stress or psychological distress.	broader functioning following exposure to work-related PTEs. Future research should focus on individual, group, and organizational factors and processes that can promote recovery from operational stressors. Ultimately, an occupational health (rather than victim-based) approach will provide the best framework for understanding and combating potential threats to the health and well-being of workers at high risk for PTE exposure.
Coupland, NJ (2009) ³³	Canada	The purpose of this study is twofold: to determine whether a specified stress reduction model is effective and to provide information on stress reduction for those who are involved in stress-reduction programs.	Prazosin is prescribed at a dose of 1 mg at bedtime for 1 week, increasing in 1 mg increments every 3-4 days thereafter.	It initially makes him feel light-headed and tired on rising; but this passes. Dry mouth is tolerable after eating breakfast. By week 3 he reports improved sleep and continues taking 6 mg at bedtime after week 4. At follow-up, he reports being less restless and having deeper, longer and more refreshing sleep, with some weeks free of traumatic nightmares. He worries less about sleep and only moves to a separate bed on "bad nights."	Blockade of central (α1-adrenergic receptors with antagonists such as prazosin is better supported, with 3 pilot placebo-controlled augmentation trials (2 crossover, 1 parallel group design) showing superiority for prazosin at bedtime for the targeted symptoms of insomnia and nightmares. Prazosin also improved total and rapid eye movement (REM) sleep duration. The use of prazosin to treat PTSD is off-label, but labelled prescribing information stresses avoidance of hypotension by using a 1 mg first dose, slow titration and caution with concomitant medications with hypotensive effects

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
					and sedatives/hypnotics.
Bacharach, SB (2007) ⁷³	USA	We generate and test a context theory of the impact of involvement in work-related critical incidents, positing that variation in units' post-event support and control climates explains cross-unit variation in individual stressor-strain relationships, that post-traumatic distress mediates the link between critical incident involvement and negative emotional states, and that current support and control climates assume relevance by operating as contextual moderators of these individual-level mediated paths.	Using multilevel data from New York City firefighters, many of whom were involved in 9/11, these data were collected in early 2003 via a self-report questionnaire distributed to all members of a stratified random sample of 144 (out of a total of 346) engine and ladder companies, regardless of their level of involvement in the events surrounding the September 11, 2001, attack on the WTC. Specifically, using the Fire Department of New York's (FDNY's) three category system differentiating more active from less active firehouses, we randomly sampled an equal number of the firehouses in each category (48 each from "highly active," "moderately active," and "relatively inactive") for inclusion in the study.	The results of the confirmatory factor analysis of the four endogenous variables (post-traumatic distress, depression, anxiety, and stress) indicated support for a four-factor model.	The results presented above suggest that post-traumatic distress mediates the relationship between the intensity of critical incident involvement and subsequent anxiety and stress, and that this mediated relationship itself appears to be conditioned by current (post-incident), unit-level contextual factors. More specifically, we found that the distress-mediated effects of incident involvement on post-incident anxiety and stress varied over work units and that this unit-level variance was largely explained when two current unit-level control and support-related climate factors were taken into account. Moreover, each of these two climate-related buffering factors was found to play a unique role in attenuating the impact of the intensity of firefighter involvement in 9/11 on subsequent negative emotional states.
Elliot, DL (2007) ³⁹	USA	PHLAME's (Promoting Healthy Lifestyles: Alternative Models' Effects) firefighter study objective was to assess and compare team-centered curriculum and individual counseling to promote healthy	Prospective trial among 599 firefighters randomized by station to 1) team-centered curriculum, 2) one-on-one motivational interviewing (MI), and 3) controls. Assessment included dietary behavior, physical activity, weight, and general well-being at baseline and 12 months.	Both interventions were acceptable and delivered with high fidelity. The team and MI programs increased fruit and vegetable consumption ($P < 0.01$ and 0.05 , respectively) and general well-being ($P < 0.01$). Significantly less weight gain occurred in both ($P < 0.05$). A cross-sectional model was consistent with mediation differing between interventions.	Both a team-centered and individual-oriented intervention promoted healthy behaviors. The scripted team curriculum is innovative, exportable, and may enlist influences not accessed with individual formats.

FIREFIGHTERS					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		lifestyles.			
Tak, SW (2007) ⁷⁴	USA	This report examines associations between depressive symptoms and concurrent comorbidity.	The National Institute for Occupational Safety and Health conducted an evaluation regarding physical and psychological health symptoms among New Orleans firefighters 13 weeks after Hurricane Katrina struck the U.S. Gulf Coast on August 29, 2005.	Firefighters housed with their families were less likely to report depressive symptoms compared to those not living with their families. Perceived low supervisor support was associated with depressive symptoms, whereas participating in group counseling was not.	The results underscore the need for the incorporation of physical and psychological health follow-up of emergency responders after natural disasters to better understand, monitor, and treat their health conditions.
Kitchiner, NJ (2004) ⁹⁶	UK	This paper will describe 3 cases which all suffered with PTSD and were treated via the partnership with a controversial therapy, eye movement desensitisation reprocessing (EMDR).	EMDR for 3 patients, with 3-month follow-up.	All 3 patients who underwent EMDR reported a decline in intrusive symptoms and memories, fewer nightmares, less physiological arousal, and improved sleep and interpersonal interactions. These were sustained over the course of their sessions and until the 3-month follow-up period.	The case examples above all benefited from a relatively short time in treatment and were able to return to work (if off due to trauma) or work with less distress. EMDR has been an emerging therapy which would appear to be a potentially useful psychological treatment for PTSD, despite its lack of credible scientific explanation on how it actually works in reducing symptoms.
Harris, MB (2002) ⁸¹	USA	This study examined the relationships between debriefings and several mental health variables in a large sample of firefighters.	Of the 1,747 firefighters who were surveyed in the Federal Emergency Management Agency (FEMA) study, 852 met the selection criteria of (a) completing all measures and (b) reporting experience of a stressful incident in the course of their work during the previous 6 months that both the participant and peers agreed was a critical incident. We tested for differences on all scales and demographic categories between the sample and the original 1,749 firefighters, as well as for differences in demographics between the debriefed and non-debriefed groups within the 660 cases in the final sample. To test for differences	Debriefing had a weak inverse correlation with negative affectivity and a weak positive correlation with positive world assumptions. No relationship was found between debriefing and PTSD.	Although causal conclusions could not be taken from the results of the present study, the findings emphasize the need for further research on CISD, stress exposure, and dispositional variables in firefighters. Future research should address individual differences and the hypothesis of diathesis-stress.

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Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
			between the groups on Trauma Exposure and Debriefing of Firefighters, ethnicity, gender, volunteer status, education, marital status, language, and age group, the chi-square test was used.		
Regehr, C (2001) ⁸³	NR	This study attempts to investigate the efficacy of crisis debriefing (CD) group interventions in a sample of firefighters following a critical incident.	This study addresses the efficacy of CD groups for 164 Australian firefighters following a critical incident.	Findings indicated that the majority of firefighters attending crisis debriefing groups perceived that the intervention was beneficial in reducing their level of stress. However, there was no significant association between attending CD groups and scores on the Beck Depression Inventory. Attending a CD group was associated with higher scores on intrusion subscale of the Impact of Events Scale.	This study, as others, has determined that firefighters attending crisis debriefing groups feel subjectively better. However, they do not appear to experience reduced levels of post-traumatic symptoms and depression when compared to their colleagues who did not attend. This suggests that no singular, simplistic approach to managing the aftermath of traumatic events can meet the needs of all affected emergency service personnel.
Paley, MJ (1998) ⁶⁵	USA	The specific aim of the current study is to evaluate a compressed work schedules (CWS) to better understand its influence on the sleep and fatigue of shift-workers.	A 10hr day/14hr night rotating CWS was introduced to a fire department to replace an 8hr, three shift rotating schedule. This study is comprised of an assessment of a 10hr day/14hr night rotating CWS and an evaluation of the impact of a change in work schedules, comparing 8hr shifts to the extended work periods.	The results of the current study revealed no significant differences between the compressed and non-compressed work schedules. Subjective measures of sleepiness and mood were shown to increase over the course of the extended work shifts. Despite the increase, the CWS is deemed acceptable because it did not negatively impact on the workers who participated to a greater extent than when they worked on the non-compressed schedule.	Previous research has demonstrated that negative outcomes may be associated with shiftwork, especially night work. Despite the increase, the CWS is deemed acceptable because it did not negatively impact on the workers who participated to a greater extent than when they worked on the non-compressed schedule.
Bohl, N (1995) ⁸⁰	USA	Objective tests were used to assess symptoms and firefighters treated with critical incident stress	Such a program provides that individuals who have been involved in a traumatic incident meet with a psychologist for a counseling session some time during the first 48 hours after the incident. Individuals are seen only	The results showed that a brief intervention, 1 1/2 hours in length, given 24 hours after a critical incident reduces delayed stress symptoms in firefighters. On all four measures tested-depression, anger,	It is recommended, therefore, that treatment be mandatory for firefighters who have been involved in a critical

FIREFIGHTERS					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
		debriefing (CISD) were compared with untreated firefighters.	once, typically for one or two hours, but the session is intense. Participants are asked to describe the traumatic episode and encouraged to vent the strong feelings aroused by the incident. They are reassured about the normality of those feelings, provided with information about the possible occurrence of delayed symptoms, and helped to assimilate the occurrence so it can be seen in the context of prior experiences. In the study reported here, a formal evaluation was done. Objective tests were used to assess symptoms, and treated firefighters were compared with untreated firefighters.	anxiety, and long-term stress symptoms- the untreated group scored significantly higher, which meant that men in the group had more signs of delayed stress than the treated group. They were more anxious, depressed, and angry and were experiencing more nightmares, flashbacks, and changes in sleeping and eating habits.	incident. The findings presented here provide clear evidence that, as is the case with police officers, such treatment works. A mandatory program would take the burden of decision making out of the individual's hands.
Fullerton, CS (1992) ⁷²	USA	We report the psychological responses of firefighters participating in an air disaster rescue and performing rescue missions in a large city.	The psychological responses of two groups of firefighters were examined following the performance of rescue work. One was a group of firefighters in Sioux City, Iowa, participating in a mass-casualty air disaster rescue; the other was a special firefighting unit performing rescue missions in New York City. The use of data from two firefighter groups enabled us to study similarities that emerged; it should be noted that no control or comparison groups were used.	Four types of responses were reported: identification with the victims, feelings of helplessness and guilt, fear of the unknown and physiological reactions. Stress was found to be mediated by availability of social support, type of leadership, level of training, and use of rituals.	It is evident that social support, an important mediator of the stress experience, can contribute to the behavioral and mental health outcomes of individuals exposed to disaster. Teaching ways of decreasing identification and emotional involvement with victims may be an effective preventive measure for rescue worker distress. Following a disaster, it is important to provide the opportunity for rescue workers to share their feelings of guilt and helplessness, and to gain reassurance from peers and leaders.

Appendix Table 6: Primary correctional officer studies

CORRECTIONAL OFFICERS					
Study author (year)	Study country	Study objective(s)	Methods	Results	Conclusion
Ruck, S. (2013) ⁸⁴	UK	This study was designed to evaluate the effectiveness and a program of support for prison service staff following a traumatic incident within a prison environment.	Prison staff who had been exposed to a range of traumatic events were offered debriefing. Measurements were taken soon after the incident and again one month later. The scores of those receiving debriefing were compared with those who did not receive debriefing.	Prison staff receiving debriefing showed a significant reduction in their traumatic stress, anxiety and depression scores. There was no significant difference in the symptoms of the non-debriefed group.	The findings suggest that group-based well-structured debrief sessions can be useful in reducing symptoms of post-traumatic stress following exposure to critical incidents in the workplace. The results suggest that there are benefits in undertaking group debriefing within an organisational setting.
McCarty, R (2003) ⁴⁰	USA	This study investigated the impact of HeartMath's Power to Change Performance stress and health risk reduction program on physiological and psychological stress and health risk factors in a sample of correctional peace officers.	Eighty-eight officers from three facilities were randomized to an experimental group and a wait-list control group. The experimental group participated in the stress and health risk reduction program, which was delivered over two consecutive days. The program included instruction on health risk factors as well as training in positive emotion-focused stress reduction techniques intended to reduce negative emotional arousal, improve physiological balance, increase positive affect, and enhance performance. Measures of physiological and psychological stress and health risk were assessed before the program and again 3 months afterward. Three self-report psychological surveys were also included to assess emotional stress and work-related variables.	An analysis of baseline data revealed that officers in this study were under greater stress and at greater health risk in comparison to a reference sample of working adults. A within-group analysis of pre-post changes showed that 3 months after the intervention program, employees in the experimental group demonstrated significant reductions in stress and health risk factors, as well as significant improvements in work-related parameters. There were also improvements in key organizationally relevant measures in the experimental group after the program, including significant increases in productivity, motivation, goal clarity, and perceived manager support. Finally, the reduction in health risk factors achieved in this study are projected to lead to reductions in both health care and absentee costs, yielding a total projected annual cost savings of \$699 per employee.	The results of this study indicate that the Power to Change Performance program was effective in significantly reducing stress and health risk factors in a population of correctional peace officers, while enhancing employee productivity and psychological well-being. These changes were realized with minimal intervention and in a relatively brief period of time, and should result in significant cost savings to the organization if the program is expanded to larger employee populations.