

A systematic review of the current evidence regarding interventions for anxiety, PTSD, sleepiness and fatigue in the law enforcement workplace

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Abstract: Law enforcement is inherently stressful, and police officers are particularly vulnerable to mental and physical disorders. As such, researchers are currently assessing intervention strategies that may combat or manage these psychological, physical and mental issues. 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. The EMBASE, OVID MEDLINE and PsycINFO databases were canvassed for articles investigating anxiety, post-traumatic stress disorder, sleepiness, and fatigue. Initial article selections were made based on title, whilst final inclusion was informed by a full critical appraisal with respect to the primary and secondary effects. The systematic search returned 363 records, of which 183 were unique. Following screening, 43 records were included in the final review. The included literature assessed the efficacy of several interventions, and provided a number of recommendations regarding interventions, and policy. Moreover, literature indicates that police officers benefit from interventions targeting work-related stress and potential psychological disorders, if these interventions are continuous. Furthermore, larger controlled studies are required to further elucidate the benefits of psychosocial intervention in law enforcement.

Key words: Police, Mental health, Anxiety, Fatigue, Post-traumatic stress disorder (PTSD), Wellbeing programs, Management

Introduction

Law enforcement workers are crucial for the maintenance of law, peace and order in society; however, the nature of law enforcement renders these occupations inherently stressful. It is well documented that police of-

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Officers are particularly vulnerable to mental and physical disorders, including post-traumatic stress disorder (PTSD), anxiety, musculoskeletal disorders, cardiovascular disease, fatigue, and sleep-related disorders^{1–6}). Further, family history of mental disorders and substance abuse may render a person more vulnerable to work stressors⁷). Thusly, job-related stressors of law enforcement can lead to increased socio-economic burden associated with absenteeism, job dissatisfaction, burnout and compensation claims. Indeed, occupational stressors have been known to cause mental and physical ailments in police officers, which can impair performance^{8, 9}), quality of life and often lead to early retirement. Despite this, PTSD and/or burnout prevalence in law enforcement may be no greater than other occupations or the community^{1, 5}); highlighting, the contention regarding the presence and effect of mental stressors in law enforcement.

As such, researchers are now proposing or implementing interventions to combat and/or manage these mental ailments associated with work related stressors, e.g. psychoeducational programs, preventative imagery training, mental practice of tactical skills, and education on stress and health have been reported to improve officer health and coping abilities¹⁰); however, continued benefits may be dependent on continued training and education¹¹). Additionally, literature in this area largely remains compartmentalised and typically only focuses on researching or reviewing research on singular conditions; moreover, the literature was most recently reviewed in 2008¹²), leaving significant room for advancement. Therefore, this paper aimed to systematically review most recent information regarding anxiety, PTSD, and sleepiness and fatigue and identify the interventions proposed (from 2009 to 2016, and the date of request) to overcome work related stressors and associated mental illnesses inflicting law enforcement officers. Specifically, we seek to answer the following questions:

1. What is the prevalence of anxiety, PTSD, fatigue, and/or sleepiness in law enforcement officers?
2. What are the effects of anxiety, PTSD, fatigue, and/or sleepiness on job performance of law enforcement officers?
3. What interventions have been used/recommendations been made to alleviate the effects of anxiety, PTSD, fatigue, and/or sleepiness on job performance in law enforcement officers?

Methods

This systematic review was undertaken on the request of the Health and Wellbeing division of the New South Wales (NSW) Police Force, Sydney, NSW, Australia.

Selection criteria for the present review

Review period

This systematic review was confined to relevant publications from 2009 to July 2016, when the review was commissioned and undertaken. The systematic search commenced in 2009, as the present review was conducted as a follow-up to a previous review published in 2008¹²).

Types of studies and study design

All studies published in English as full peer-reviewed journal articles, during the aforementioned review period were included.

Target participants in the included studies

All studies with law enforcement officers linked to the workplace were included; including observational approaches, as well as clinical or randomised control trials, in which officers participated. No exclusions were made based on age, sex, occupational rank, area of command or country of origin. Further, studies that included civilian workers related to law enforcement were excluded.

Categories of effects

All studies were included based on the primary and secondary search measures; studies were not excluded based on the measures or instruments used.

Primary effects

Primary effects selected for the present review included the 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 illnesses was also selected as a primary effect. All interventions reported or recommended in the publications were considered for this review; such interventions could include:

1. Therapies: Counselling, support therapies, psychotherapy
2. Behavioural therapies: Cognitive behavioural therapy, stress management, biofeedback, progressive muscle relaxation, educational programs, coaching and mentoring,

resilience and coping training

3. Exercise therapies: Physical activities, weight training and all other types of physical training

4. 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.

5. Others: Yoga, meditation, diet regimes, acupuncture and alternative medications

Secondary effects

Specific effects of the primary measure were gauged by identifying secondary measures linked to the following:

1. Workplace: Job satisfaction, job stress, absenteeism, burnout, adverse events experienced

2. Mental/behavioural states: Suicides, substance abuse, smoking, errors and accidents, anger and hostility, mood effects, sleep issues

3. Health: Medical attention sought, mental health and related hospitalisations

4. Lifestyle: Quality of life, social isolation

Literature search methods

Only full peer-reviewed journal publications were selected for review; those studies published as another type (i.e. abstracts, letters to the editor, etc.) or in a language other than English were excluded.

Electronic database search

The databases selected were EMBASE, OVID MEDLINE (Ovid MEDLINE[®] In-Process & Other Non-Indexed Citations, Ovid MEDLINE[®] Daily, Ovid MEDLINE[®] and Ovid OLDMEDLINE[®]) and PsycINFO, and were searched on the 22/07/2016.

The primary search terms were: police, law enforcement and law officer. The secondary search terms were: anxiety, PTSD, fatigue and sleepiness; the descriptors and synonyms were modified as per the specific requirements for each database. Using these search terms, a total of 363 studies were output from the searched databases with the following counts: anxiety (119), PTSD (164), fatigue (67) and sleepiness (13).

The search structure for the OVID MEDLINE databases was as follows:

No. of Results

1. police.ti (2,810)
2. law enforcement.ti (485)
3. law officer.ti (0)

4. 1 or 2 or 3 (3,282)

5. fatigue.ab,ti. (Search term in step 5 was replaced multiple times) (69,157)

sleepiness.ab,ti. (10,341)

anxiety.ab,ti. (134,262)

PTSD.ab,ti. (15,883)

6. 4 and 5 (where 5 was:)

fatigue.ab,ti. (29)

sleepiness.ab,ti. (10)

anxiety.ab,ti. (60)

PTSD.ab,ti. (87)

7. Limit 6 to (yr="2009–Current" and journal article)

fatigue.ab,ti. (19)

sleepiness.ab,ti. (5)

anxiety.ab,ti. (37)

PTSD.ab,ti. (53)

The overall systematic search strategy is presented in Fig. 1.

Additionally, the search strategies for the EMBASE and PsycINFO databases can be found in Appendix 1 and 2.

Selection of studies

Two authors (SL and TL) initially evaluated the search results to identify the studies that reported on the primary

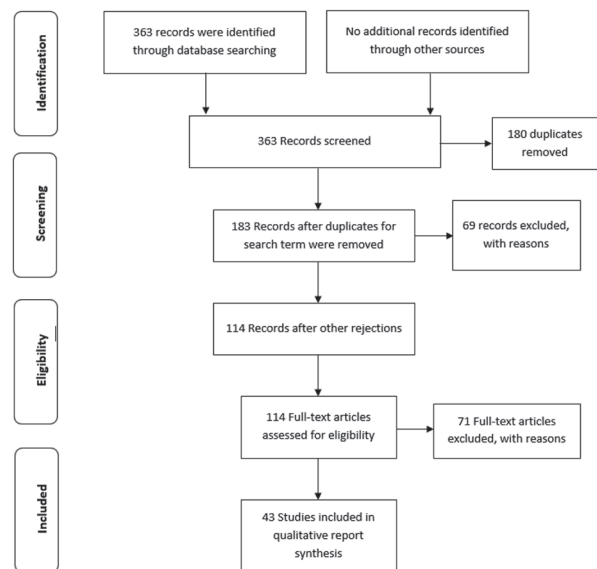


Fig. 1. Systematic review search method.

Figure 1 (adapted from Moher *et al.*⁵³) depicts the flow of information through the different phases of the systematic review. The initial search identified 363 records, from which 180 duplicates were removed. Of the remaining 183 records, 114 were selected for full appraisal and 43 were included in the final review.

effects based upon title alone; no disagreement was identified between the two reviewers. After the visual inspection, duplicates were removed, and other aforementioned exclusion criteria applied. Following this, full texts of the selected studies were sourced and critically appraised for inclusion in the review, based upon their relevance to the aforementioned primary and secondary effects i.e. mental illness related interventions and treatments in law enforcement.

Results

After exclusion, a total of 114 studies resulted from the systematic search; from these, 43 were included in the final systematic review: anxiety (13), PTSD (11), fatigue (15) and sleepiness (4) (Fig. 1).

The criteria listed in Table 1 were utilised to provide an assessment of the quality of each of the 43 articles included in the present review. Using these criteria, 8 studies were categorised as high quality, 15 as medium quality and 20 as low quality.

Discussion

The main findings of these studies, including any intervention used or recommended are discussed in the following sections.

Anxiety

Anxiety is a commonly experienced mental disorder; broadly defined as an aversive emotional and motivational state of unpleasant consciously perceived feelings of apprehension and tension associated with threatening circumstances^{13, 14}. The experience of anxiety relies upon the inappropriate activation of the hypothalamic pituitary adrenal axis; resulting in a number of physiological and psychological changes. Most importantly, anxiety may induce cognitive alterations that could have serious consequences in law enforcement.

Findings of the review

The search term ‘anxiety’ identified 37 journal articles for possible review; of these, 6 directly assessed an intervention, and 9 articles provided discussion related to police officer’s experiencing anxiety and are summarised here.

Firstly, van der Velden *et al.*¹⁵, demonstrated that problems with colleagues, life-events, and mental health problems significantly predicted metal health problems at follow-up. Additionally, previous mental health problems lowered resiliency and rendered officers more likely to develop new mental health problems. In terms of police specific outcomes, a questionnaire from Renden *et al.*¹⁶, positively correlated police officer anxiety with ‘the over and underuse of legal force’, as well as ‘problems with skill execution’ and ‘the demand more frequent and more realistic training’. Most importantly, anxiety was negatively correlated to ‘performance effectiveness’, demonstrating that anxiety is associated with inefficient and less effective performance and reduction in job confidence; a finding supported by Tehrani¹⁷.

Furthermore, two studies from Nieuwenhuys *et al.*^{18, 19}, investigated the effect of anxiety on both shooting accuracy and behaviour; the earlier paper suggested that anxiety may alter the functional relationship between distance and perceived threat, causing officers to fire earlier as the suspect is perceived to be closer or more dangerous. Additionally, the authors suggested that as officers fire sooner under increased anxiety the time allowed for a suspect to respond is decreased, thereby influencing and potentially lethally escalating the situation. The more recent study had similar results, indicating that despite extra effort, shooting accuracy, as well as response and performance time declined significantly under high anxiety; suggesting that officers acted fast at the cost of accuracy. Furthermore, participant blink rate increased and head/body orientation differed under high anxiety, limiting incoming task-relevant information and reducing performance. Recently, Landman *et al.*,²⁰ re-analysed data from two previous

Table 1. Quality assessment criteria for each of the studies on the interventions and treatments for work related stressors and associated mental illnesses in law enforcement

Quality categories	High	Medium	Low
Prospective design	Prospective	Prospective	Prospective or retrospective
Intervention or recommendation	Intervention	Intervention	Intervention or recommendations
Ascertainment of outcome	Follow-up conducted at 12 months or beyond	Follow-up conducted at 6–12 months	Follow-up conducted at less than 6 months, or no follow-up
Control for confounding	Adjustment for two or more confounding factors	Adjustment for at least one confounding factor	No adjustment for confounding factors

studies^{8, 21}) and assessed if decision-related action orientation (AOD) helps police officers down regulate perceived anxiety and maintain performance. They found that AOD score was correlated with anxiety, work experience, shot accuracy and shooting time among others; extrapolating from these results suggested that AOD may help officers cope with anxiety, and prevent anxiety from influencing their attention and behaviour, without reducing the emotional experience itself.

Finally, the first of two studies from Renden *et al.*^{9, 22}), investigating arrest skills/performance demonstrated that self-defence performance declines under high anxiety; however arrest performance remained unaffected. The more recent study demonstrated that lower overall performance, poorer communication, incorrect proportionality of applied force, and reduced quality of skill execution were associated with anxiety; demonstrably impacting officer effectiveness. Additionally, similar to that of the officers in the study from Nieuwenhuys *et al.*¹⁹), behaviour patterns began to include avoidance tendencies under high anxiety, which also tend to lead to poorer performance.

Overall, recent literature suggests that anxiety negatively impacts police officer performance, which in turn can affect occupational outcomes and officer health. However, it has been suggested that this may be alleviated over time, and more directly via contact with non-occupational medical services²³). For these very reasons the strategic and effective assessment and implementation of intervention programs to counter balance the effects of anxiety are a must.

Interventions & recommendations

As previously mentioned, 6 articles applied and assessed an intervention for anxiety. The first of these aforementioned studies is from Nieuwenhuys and Oudejans²¹) who investigated the short- and long-term effects of training with anxiety on shooting behaviour; where experimental (who practiced under anxiety conditions) and control groups of officers executed shooting exercises in low and high anxiety situations. Anxiety negatively affected shot accuracy of both groups pre-practice; importantly, the shot accuracy of the experimental group post-practice no longer deteriorated; an effect that was retained over a 4 month retention test. Based on these results, the authors suggest that training with anxiety should be implemented in police practice and education, as it teaches officers to maintain goal-directed behaviour. More recently, Nieuwenhuys *et al.*¹⁹), performed a similar study, which also used a video based practice system. After an initial pre-test, officers were divided into four practice groups (video

based practiced under high and low threat, real-life practice under high threat, and a control group) and practiced for three consecutive weeks. Interestingly, at pre-test all groups experienced greater anxiety and performed poorer under high-threat; an effect that persisted at post-test. Nieuwenhuys *et al.*¹⁹), postulated that more anxious police officers are more inclined to use their fire arm and make a greater number of incorrect shooting decisions, and go on to conclude that the impact of a threat on shooting decisions is robust and may be difficult to overcome within the limits of available practice paradigms. Furthermore, Colin *et al.*²⁴), similarly investigated shooting performance; however they utilised an imagery intervention (that asked officers to either imagine successful shot execution, or successful shot execution under threat and any accompanying emotions) between the low threat and high threat trials. Analysis indicated that both imagery groups maintained their shot accuracy in high anxiety situations compared to the control group. The authors conclude that focusing on successful task execution improves performance, and that the imagery intervention may enable attention maintenance and could supplement regular practice to further improve performance.

Chongruksa *et al.*²⁵), assessed if eclectic group counselling that included cognitive behavioural therapy, religious interventions, mandala drawing, and reality therapy could reduce the risk of developing poor mental health. Participating officers were allocated into a control group (who attended psychoeducation sessions) or the experimental group and self-reported mental health scores were recorded. Significant reductions in mental health scores were found to be in favour of the experimental group; although it must be said that the control group also experienced lesser reductions. Chongruksa *et al.*²⁵), conclude that eclectic group counselling effectively mitigated the symptoms of anxiety, depression and social dysfunction both during and after the program, and warrants future research. Prior to this, Oliver and Meier¹¹) used a more traditional in-service stress management training program and follow up mental health surveys to assess the impact of stress management training on anxiety, stress levels and behaviour of officers. They found that only stress levels were reduced after the intervention, and the anxiety and behavioural scales were non-significantly increased. However, when accounting for the response time lag, anxiety levels significantly decreased over the first 12 months, but then increased; suggesting that the intervention can reduce anxiety and stress; however the effects diminish over time. Based upon their results Oliver and Meier¹¹) suggest that

law enforcement agencies should implement or continue utilising stress management programs, and further recommend that such training should be conducted yearly.

Most recently, Arble *et al.*²⁶⁾, assessed an imagery driven scenario program designed to improve coping and performance, whilst also preventing trauma (including mental health outcomes) among urban police officers. The program utilised 9 relevant and potentially traumatic scenarios written using highly evocative and detailed descriptions; whilst, the second scenario set also included self-awareness eliciting language, and optimal tactical information. Information regarding coping strategy use, social support, sleep disruption, and alcohol use, as well as anxiety, depression and PTSD symptomology was collected immediately prior to the first session, and at 12 months following academy graduation. Preliminary testing determined that positive reframing and humour coping strategy use increased significantly, and self-blame coping strategy use, anxiety and alcohol use decreased although the former did not reach significance. As such, the piloted program may improve new officers' psychological, emotional and tactical performance; although the intervention was designed for an urban police force, which may limit its generalisability.

For the most part the literature indicates that stress management programs designed around improving resilience and coping strategy utilisation can ameliorate the effects of anxiety; furthermore, training in anxiety inducing situations can also effectively mitigate its detrimental impact. Furthermore, seven of the nine included articles discussed the outcome/s of police officer's experiencing anxiety and made recommendations which warrant attention.

At an individual level, van der Velden *et al.*¹⁵⁾, suggest that previous mental health problems should be assessed as part of a mental health program, especially after trauma. Further, repeated mental health problems warrant referral to counselling or psychiatric treatment¹⁵⁾. Similarly, early and easy access to medical services can reduce and alleviate anxiety post body fluid exposure²³⁾. Tehrani¹⁷⁾ suggests that encouragement and support from management structures facilitates a sense of good job performance and reduces anxiety and depression incidence. van der Velden *et al.*¹⁵⁾, also implicate management and suggest they pay attention to mental health and organizational stressors, life-events, and provide relevant support and interventions after traumatic events and at regular intervals. They further suggest that at an organisation level, in-company assistance teams can protect officers against mental health problems.

Furthermore, Nieuwenhuys *et al.*¹⁹⁾, suggest that officers should be made aware that their performance may be affected in high threat/anxiety situations, as they may be able to account for this decline via training. Additionally, a number of studies^{8, 16, 22)} suggest that training with constraints or under high anxiety/threat may allow officers to maintain performance. Renden *et al.*¹⁶⁾, expands this suggestion and postulate three variables to be considered in police training: (1) frequency of training, (2) training realism and context, and (3) usefulness and effectiveness of arrest and self-defence skills. Finally, Nieuwenhuys and Oudejans⁸⁾ suggest understanding the psychological and physiological changes that occur in high anxiety conditions may be useful when designing future interventions aimed at improving shooting performance.

Post-traumatic stress disorder

Post-traumatic stress disorder is a mental health condition, triggered by either experiencing or witnessing a terrifying event. Symptoms may include flashbacks, nightmares and severe anxiety, as well as uncontrollable thoughts about the event²⁷⁾. Police officers experience cumulative exposure to duty-related critical incidents and occupational stressors that contribute to the development of PTSD symptoms²⁸⁾, and may confer increased risk for mental health morbidities and hastened mortality²⁹⁾.

Findings of the review

The search term 'PTSD' identified 52 unique journal articles for possible review; the vast majority of these papers examined risk factors for PTSD and do not comment upon its impact, however some work did comment on prevalence of PTSD. With respect to prevalence, studies vary widely, however almost $8.0 \pm 4.4\%$ of the sampled police force had lifetime full PTSD and $7.8 \pm 4.5\%$ had lifetime partial PTSD following their most stressful duty-related traumatic event³⁰⁾, and interestingly women had higher prevalence of PTSD than men (15.5% vs. 10.3%)³¹⁾ Nonetheless, 2 of the included articles assessed an intervention (1 directly and 1 indirectly), and an additional 9 articles provided discussion related to interventions for police officer's experiencing PTSD and are summarised here.

Firstly, Peres *et al.*³²⁾, provided an indirect examination of an exposure-based therapy and cognitive restructuring program (ETCR) for PTSD. In their work, they examined the PTSD symptomology, brain activity and resiliency of 36 police personnel, 24 of whom had PTSD, and 12 of which undertook the ETCR program. PTSD, resiliency and fMRI data was captured initially at 3 months post

traumatic event (a wave of gunfire attacks in which the officers had been involved), and was followed-up by a second examination 40 d later. The present results demonstrated that all symptom scores of the ECTR group had dropped to values comparable to the control group. Whilst Peres *et al.*³²⁾, do not provide a direct discussion of the ECTR program, they do suggest that perhaps ECTR may influence the development of a more narrative pattern of trauma, that enables better self-management of trauma and PTSD symptoms, and therefore holds promise as a PTSD intervention for law-enforcement.

Plat *et al.*³³⁾, provided the only other assessment of a PTSD intervention. In this instance, the Brief Eclectic Psychotherapy program (BEP), which combines cognitive-behavioural and psychodynamic approaches (including five essential elements: psycho-education, imaginary guidance, writing assignments and mementos, domain of meaning or integration and a farewell ritual) over 16 weekly sessions of individual psychotherapy, with the aim to examine its impact on sick leave and return to work factors.

The retrospective study of 121 police officers with PTSD who undertook the 16 wk program found that at intake 59 officers were on sick-leave, which reduced to 13 at outcome. Moreover, the number of officers reporting PTSD symptoms of re-experiencing, avoidance, and hyperarousal reduced from 121, 103, and 117 to 12, 0 and 7, respectively; providing demonstrable evidence of the impact of the BEP program on both ability to return to work, and experience of PTSD symptomology. Plat *et al.*³³⁾, go on to suggest that occupational health professionals should have contact with law enforcement organisations and that successful return to work should be considered as part of any intervention or treatment program.

Recommendations

As previously mentioned 9 articles provided at least one recommendation regarding PTSD related interventions in the law enforcement work place. Firstly, research suggests that police officers may be a highly resilient group overall³⁴⁾. However, research conducted by Maguen *et al.*²⁸⁾, notes that an individual's work environment is a highly influential and possible mutable resiliency factor, that may enable the prevention of problematic mental health states PTSD included, and therefore should be closely monitored in police.

More broadly, Mumford *et al.*³⁵⁾, suggest that any intervention or wellness programs should offer a comprehensive array of support services, including alcohol abuse treatment, whole life wellness training, and mental health

services that may be extended to families of officers. And that at a policy level, law enforcement agencies pay attention to not only shift length and schedules, but also sedentary time. Also with reference to policy decisions, Ménard *et al.*³⁶⁾, suggest that policies designed to reduce social stressors may help to reduce officer trauma and subsequent PTSD, and that policies should include a multipronged approach toward mental health. Additionally, Ménard *et al.*³⁶⁾, also recommend police departments to promote adaptive coping behaviours to counter negative strategies like alcohol use, and that departments should also provide ongoing health education and other services (e.g., gym memberships, counselling, coping skills training) to help develop and utilise adaptive coping strategies. Further, it is suggested that departments proactively and continuously deal with social stressors rather than just providing services after critical events.

At a more detailed level, Chopko *et al.*³⁷⁾, recommend that prolonged exposure therapy (PE) should be considered an option when determining a treatment plan, as it focuses on both reducing avoidant behaviours and cognitive restructuring, challenging two major PTSD symptom clusters. Additionally, coping strategy assessment relevant to both work-related and personal stress should also be factored into determining interventions or personal treatment plans.

Maia *et al.*³⁸⁾, suggest that behavioural and cognitive anxiety management skills training to build emotion regulation may confer PTSD resilience, and that practicing these skills in critical incident training exercises may stress inoculate police personnel. Additionally, immediate post exposure antianxiety, behavioural and pharmacological interventions should be delivered to vulnerable police personnel so as to reduce the risk of developing PTSD; and that personal and workplace social support should be similarly mobilised and otherwise encouraged at all times. More recently, Maia *et al.*³⁹⁾, suggest that paying attention to tonic immobility may help identify PTSD susceptible subgroups and that psychoeducational interventions designed to raise awareness of tonic immobility could lessen the emotional impact experienced. Moreover, Pietrzak *et al.*⁴⁰⁾, suggest that interventions for subsyndromal PTSD are necessary as its prevalence may be higher than diagnosable PTSD.

Finally, Fox *et al.*⁴¹⁾, indicate that the recognition of unique law enforcement cultural factors that can lead to and sustain mental-health conditions and a need for anonymous, non-department related mental health services where officers can seek assistance are key to any and all intervention and/or intervention strategy. Further, they

also suggest that primary care providers should take steps to contextualise patients who are law enforcement officers against these cultural factors and needs to identify and manage psychological states.

Sleepiness and fatigue

Currently, there is no agreed upon definition for fatigue and is often used synonymously for sleepiness, which may result from their frequent coexistence and similar presentation. Sleepiness can be considered an individual's propensity to fall asleep, while fatigue is considered a mental state in which an individual's capacity to initiate or continue performing a task is diminished. Importantly, both fatigue and sleepiness have been associated with an increased occurrence of occupational accidents and injury, hospitalization and absenteeism, and both remain major concerns in policing where constant alertness and decision-making are essential. As such, adequate fatigue and sleepiness management policies must be in place to ensure the occupational health, safety and wellbeing of police officers and the community.

Findings from the review

Of the 31 unique articles found, only one involved the assessment of an intervention. Four articles directly addressed the prevalence of and/or associations with sleepiness on the wellbeing of police officers. Rajaratnam *et al.*³⁾, sought to identify relationships between sleep disorder risk and self-reported health, safety and performance outcomes. Utilizing a cross-sectional survey with two year follow-up, 40.4% of subjects screened positive for at least one sleep disorder, with 28.5% found to experience excessive sleepiness as determined by the Epworth Sleepiness Scale (ESS). A number of serious co-morbidities including gastrointestinal disorder, anxiety, and burnout, were also found to be significantly associated with sleep disorder prevalence³⁾. Similarly, Waggoner *et al.*⁴²⁾, examined the links between shift work-induced fatigue and critical operational performance. Police officers performed a series of psychomotor vigilance tasks and subjective survey measures (including the ESS and Karolinska Sleepiness Scale (KSS)) before and after undertaking a high fidelity driving simulator. Lane deviation (the primary measure for driving performance), lapses in attention and subjective sleepiness (KSS) were all significantly worse after the night shift work. Further, subjects were found to experience both diminished sleep quality and excessive sleepiness⁴²⁾. Another study seeking to determine the impact of extended shift work was conducted by Elliott and Lal⁴³⁾ wherein

Australian general duties police officers were assessed before and after their regular twelve hour shift. With respect to sleepiness scores (ESS), the majority of officers were found to be within normal ranges, with a subsequent partial correlation analysis identifying a negative association between ESS score post-shift diastolic blood pressure.

The final study was from Yadav *et al.*⁴⁴⁾, who sought to identify how police officers of varying chronotype are influenced when working in or out of phase. Indian police officers, separated into 'poor' and 'good' sleepers from a larger sample volunteered for the study that lasted 12 d and rotated between in and out of phase shifts. They were also assessed using the ESS, FSS, an ambulatory BP monitor and provided a wrist-borne actigraph to measure their sleep-wake cycle. Of the original 85 police officers recruited, only nine were found to have high daytime sleepiness levels, with another 24 falling into the moderate category and the remaining 52 in the low range.

When considering fatigue, a number of articles either assessed its prevalence or sought to determine associations and consequences upon police officer wellbeing. However, fatigue can vary in definition, particularly with respect to manifestations. For example, one study aimed to identify the impact of induced fatigue on pistol-shooting performance⁴⁵⁾, and indicated that despite subjects achieving personal exhaustion, neither accuracy nor precision were significantly different after exercise. That said the majority of articles included in this review discussed fatigue in a mental context; one study sought to identify the symptoms resulting from occupational exposure to a forest fire in Israeli firefighters and police officers found fatigue to be the second most common complaint after eye irritation⁴⁶⁾. Similarly, the study from Radun *et al.*⁴⁷⁾, identified fatigue to be a common concern for police officers, especially as a consequence of night work and the resulting motor-vehicle accident risk⁴⁷⁾. These concerns were further built upon by another cross-sectional study which identified individual shift work tolerance as being an important factor influencing fatigue development⁴⁸⁾; when comparing Dutch police officers based on a subjective self-perception as intolerant, medium-tolerance and tolerance to shift work, the primarily related variables included sleep quality, need for recovery and fatigue⁴⁸⁾. Another study involving Korean police officers also sought to investigate the variables impacting police officer health by studying job and psychosocial stress, as well as fatigue⁴⁹⁾. There were no relationships found between officers' fatigue and their age group, marital status, education level, service length or rank, however ordinary and shift working officers were

found to be at a high risk of fatigue. Further, smokers had a much higher risk of fatigue than non-smokers, with non-exercisers and exercisers also experiencing different fatigue risks. Finally, Violanti *et al.*⁵⁰⁾, presented findings from the comprehensive Buffalo Cardio-Metabolic Occupational Police Stress study and offered insight into the incidence of injury of police officers. The authors found that midnight shift workers are at a significantly higher risk of injury compared to those who predominantly work during the day or afternoon; and proposed a large number of recommendations that would improve sleepiness and fatigue based on these findings⁵⁰⁾.

Three studies addressed both sleepiness and fatigue directly. Overall sleep quality and fatigue were of great concern in the study from Bell *et al.*⁵¹⁾; officers working the longer shift experienced significant decreases in hours of sleep, sleep quality, concentration, cognitive processing and quality of life. The same group also experienced significant increases in fatigue, daytime dysfunction, reaction time, anticipatory errors and complaints. Most interestingly, upon returning to their regular 10 h shifts (for two months), all variables returned to pre-study levels, and officers overwhelmingly preferred the 10 h shift system⁵¹⁾. Similarly, Elliott and Lal⁴³⁾ also found poor sleep quality and fatigue severity was pervasive in the police officers working 12 h shifts. Most interestingly, despite accounting for age, sex and lifestyle risk factors, overall sleep quality was significantly negatively associated with post-shift systolic blood pressure (SBP), as well as pre and post-shift diastolic blood pressure (DBP). Further, fatigue severity was also found to significantly negatively correlated to both pre and post-shift SBP and DBP⁴³⁾. Finally, Yadav *et al.*⁴⁴⁾, study found that ‘poor’ sleepers had improved sleep quality and heart rate when working an in-phase shift, while ‘good’ sleepers were not affected significantly when working either in or out-of-phase. Furthermore, only about a third of police officers were found to have high fatigue severity, although authors acknowledge the small sample size may have affected their findings⁴⁴⁾.

Only three of the relevant articles assessed possible strategies or existing policies with respect to fatigue. After a mindfulness-based intervention, Christopher *et al.*⁵²⁾, identified a significant decrease of subjective fatigue in a cohort of police officers, as assessed by the fatigue subscale of the Patient Reported Outcomes Measurement Information System (PROMIS). With regards to applicable policies, two similar studies used a combination of subjective surveys and qualitative interviews to assess current departmental attitudes to managing fatigue^{2, 4)}. Fifteen

law enforcement agencies were involved, with one study identifying the reality of a tired workforce, and unwillingness among agency chiefs to implement fatigue reduction policies. Both studies stressed the importance of limiting secondary employment and mandatory overtime⁴⁾, and that the current informal monitoring of fatigue by superiors may fail to ensure employee safety²⁾.

These studies identify sleepiness and fatigue as concerns, which may be exacerbated by the inherent occupational risks of police officers, and the need for suitable interventions and policies to address this. Further, the relatively low number of studies suggests that additional research must be performed examining risk of sleepiness and fatigue and the subsequent ramifications in police officers.

Interventions, suggestions & recommendations

The only study to assess an intervention was conducted by Christopher *et al.*⁵²⁾. Whilst they associated “fatigue” with their ‘health outcome’, their intention was to examine the viability and effectiveness of the novel Mindfulness-Based Resilience Training (MBRT) program, which was completed by 43 American police officers over 8 weeks. Statistically significant improvements were found for the following outcomes; mindfulness, resilience, police and perceived stress, burnout, emotional intelligence, mental health, physical health, sleep disturbance and fatigue. While apparently effective, the authors note the utilised fatigue measure, the PROMIS, has relatively low estimates of internal consistency. Finally, the authors suggested briefer protocols, acknowledging the practical limitations of limited police funding for wellness programs⁵²⁾.

Furthermore, 8 of the included studies offered recommendations or suggestions to ensure police officer wellbeing, with respect to fatigue or sleepiness. Three studies all briefly suggest improved roster systems could lead to significant benefits, including reduced sleep debt and less circadian disturbances⁴⁴⁾, with two of them mentioning the need for planned ‘rest time’ or napping strategies if considering extended shift work^{43, 51)}. One study suggested motor vehicle accident risk could be ameliorated by fatigue risk management strategies like those within the military or transportation industries⁴²⁾. By comparison, Radun *et al.*⁴⁷⁾, suggest employers could offer transport so as to avoid fatigue related motor vehicle accidents and subsequent civil liability claims. Another study suggested that policy changes accounting for the influence of consecutive work hours and secondary employment should be made²⁾. This was later corroborated in a suc-

cessive paper⁴⁾, although it is only mentioned in passing. Finally, Violanti *et al.*⁵⁰⁾, offered the largest number of recommendations, namely to design shift work systems that seek to minimize injury risk; which may be enabled by implementing prediction models to determine times of greatest injury risk, or by rotating officers to reduce fatigue. Further, police departments should aim to create a culture wherein information about healthy sleep habits and the inherent risks of fatigue and shift work are available⁵⁰⁾.

Conclusions

Mental disorders remain prevalent in law enforcement workers, and can have detrimental effects on officers' health and performance; however it is important to note that a portion of this research is observational and correlative and not necessarily causative. Moreover, of the reviewed literature a limited number of studies assessed the effects of intervention programs to address these issues, however, many make recommendations regarding both treatments and interventions; it should be noted that articles in languages other than English were excluded from the present review, limiting the scope of literature covered. Additionally, literature does report the benefits of using psychosocial interventions such as education and return to work programs, training under duress, resilience strategies and advanced coping processes, etc. to address such issues in police officers; notably literature also demonstrates the practical impact of these interventions with respect to both prophylactic intervention, and retroactive amelioration. Most importantly, literature notes that these interventions must be ongoing to ensure continued benefit.

Even though the present review indicates that police officers can benefit from interventions that address work related stress and other psychological disorders they may experience, larger, more rigorous and controlled studies are required to further clarify the benefits of psychosocial intervention (both conventional and novel) in law enforcement officers, especially as some research has indicated that PTSD and burnout prevalence in law enforcement may be no different to any other diverse occupation. Furthermore, future research should account for a number of factors including family history of substance abuse and mental disorders, resiliency, years and location of service so as to identify whether the psychosocial benefits of such interventions are effective across all law enforcement, and to guide any proposed management strategies.

Finally it is evident that research regarding the utility and effectiveness of interventions targeted towards the

prevention and/or management of psychological disorders in law enforcement is of the utmost importance, and can have significant and meaningful clinical impact on mitigating these negatives experiences in law enforcement officers. Furthermore, research would do well to assess any current or proposed interventions using more rigorous study design i.e. randomised controlled trials, if such interventions are to be truly useful and implemented in a law enforcement environment.

Declaration

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Appendix 1.

The following search terminology was applicable to the database EMBASE.

	No. of Results
1. police.ti	(3,627)
2. law enforcement.ti	(600)
3. law officer.ti	(0)
4. 1 or 2 or 3	(4,211)
5. Fatigue.ab,ti. (Search term in step 5 was replaced multiple times)	(104,377)
Sleepiness.ab,ti.	(18,322)
Anxiety.ab,ti.	(191,098)
PTSD.ab,ti.	(20,887)
6. 4 and 5 (where 5 was:)	
Fatigue.ab,ti.	(36)
Sleepiness.ab,ti.	(14)
Anxiety.ab,ti.	(75)
PTSD.ab,ti.	(109)
7. Limit 6 to (yr="2009–Current" and article)	
fatigue.ab,ti.	(14)
Sleepiness.ab,ti.	(3)
Anxiety.ab,ti.	(36)
PTSD.ab,ti.	(50)

Appendix 2.

The following search terminology was applicable to the database PsycINFO.

	No. of Results
1. TI police	(5,693)
2. TI law enforcement	(1,000)
3. TI law officer	(202)
4. S1 or S2 or S3	(6,472)
5. TI fatigue OR AB fatigue. (Search term was replaced multiple times)	(24,693)
Sleepiness	(4,687)
Anxiety.	(163,084)
PTSD	(30,103)
6. S4 and S5	
Fatigue	(77)
Sleepiness	(6)
Anxiety	(146)
PTSD	(183)
a. The limiters applied were: Publication Year 2009–2015; Publication Type: Peer Reviewed Journal	
Fatigue	(34)
Sleepiness	(5)
Anxiety	(46)
PTSD	(61)