

SYSTEMATIC REVIEW

Protecting Those Who Protect Us: A Review of Psychosocial Factors and Musculoskeletal Disorders in Police Officers

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ABSTRACT

Introduction: Musculoskeletal Disorders (MSDs) are a common occupational health problem among police officers. This systematic review aimed to estimate the association between psychosocial factors and MSDs in this population. **Design:** A systematic search was conducted using the Scopus database to identify studies that assessed the psychosocial risk factors for MSDs in police officers. **Results:** Fourteen studies were included in the review. The findings suggest that exposure to job satisfaction, working type, job demands, shift work, working hours, job control, equipment, organisational structure, job support, work cooperation, workplace inequalities, parenthood, social support, and psychological factors were linked to the presence of pain in the back, neck, shoulder, arm, and legs among police officers. **Conclusions:** This review highlights the importance of addressing psychosocial risk factors to improve the quality of life of police officers. Specific interventions to reduce these risk factors might include changes in organizational structure, job design, and work schedules, as well as targeted programs to promote stress management, coping skills, and work-life balance. Addressing these factors can help to prevent or reduce the presence of MSDs in this population, promoting healthier and more productive workplaces. Future studies are recommended to investigate this association further by considering the utilization of longitudinal study designs.

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INTRODUCTION

Musculoskeletal disorders (MSDs) are a significant health problem worldwide, with 1.71 billion people suffering from these conditions according to the Global Burden of Disease (28). MSDs include conditions like rheumatoid arthritis, osteoarthritis, low back pain, neck discomfort, fractures, and other ailments. Among these, low back pain is the primary cause of musculoskeletal diseases overall, with 570 million prevalent cases worldwide and contributing to 7.4% of the world's years lived with disability (YLDs). This is also the case in Malaysia, where the National Occupational

Accident and Disease Statistics 2021 show that there were 1.43 occupational injuries for every 1000 workers, with 201 cases of occupational MSDs being the third most common disease reported, behind disease brought on by biological agents and occupational noise-related hearing disorders (29).

Police officers are particularly vulnerable to MSDs due to the physical demands of their work. Research shows that all body parts, including the upper, lower, and back, are susceptible to the effects of different risk factors and may result in the occurrence of Work-related Musculoskeletal Disorders (WMSDs) in traffic police (5). These injuries can be caused by a range of factors, including repetitive motions, prolonged sitting or standing, awkward body postures, and heavy lifting. Personal and work-related aspects have been identified as causes of WMSDs, including stress, a

psychological risk factor that can have a major impact on WMSDs through a variety of mechanisms, potentially turning them into long-term conditions that recur repeatedly (5).

The impact of WMSDs can be seen through the contribution of absenteeism among the officers who reported lower back pain (3,20). Furthermore, these disorders can have an unfavourable impact on officer well-being, job performance, and overall quality of life. In addition to physical risk factors, psychosocial factors can also contribute to the development of MSDs (24,21). Factors such as job control, job demand, job satisfaction, and social support have been found to be important predictors of MSDs in other occupational groups. Due to their nature of work, police officers are under too much stress, hence anger is a reaction to stress brought on by a range of personal and organisational factors (1). In the context of police officers, these can include work-related stress, exposure to traumatic events, shift work, and lack of support from colleagues or superiors. These factors can have an unfavourable impact on their mental health, leading to burnout, depression, and other mental health issues (14).

Chronic exposure to stress and traumatic events can lead to changes in posture, muscle tension, and other physical symptoms, which can contribute to the development of low back pain. Poor ergonomic conditions, such as the use of heavy equipment and awkward postures, can exacerbate the effects of psychosocial stress and increase the risk of MSDs (12).

The psychosocial factors that contribute to the development of MSDs have been categorized into various criteria by researchers. Leka and Jain (16) have categorised the psychosocial factors into job content, workload & work pace, work schedule, control, environment & equipment, organisational culture & function, interpersonal relationship at work, role in the organisation, career development, and home-work interface. Examples of psychosocial factors can include a combination of psychological and social resources, such as social integration, emotional support, perceived control, self-esteem, sense of coherence and trust, and psychological risk factors, such as cynicism, vital exhaustion, hopelessness and depressiveness (27).

While physical factors such as heavy lifting, awkward postures, and repetitive motions are known risk factors for MSDs, the contribution of psychosocial factors in the development of MSDs is less well understood. The relationship between psychosocial factors and MSDs in police officers is not well established.

The purpose of this review paper is to examine the literature on the relationship between psychosocial factors and MSDs in police officers. By identifying the psychosocial factors that are most strongly associated

with MSDs in this population, this review paper can inform the improvement of interventions to minimize the risk of MSDs among police officers.

MATERIALS AND METHODS

Search strategy

To conduct this review, an electronic search was performed on the Scopus database. The search strategy was designed to include different characteristics of this review by combining three blocks of keywords: (i) the outcome (prevalence and incidence of MSDs), (ii) the study population (police officers), and (iii) exposure (psychosocial risk factors, including psychological aspects; stress, role emotional and burnout) (16,27,10). The search terms used for each block were as follows: for study population “(traffic police OR traffic cop OR police cop OR police OR cop)”; AND for psychosocial factors “(psychosocial OR ergonomics OR factors OR hazard OR prolong standing OR prolong sitting OR stress OR working hours OR awkward posture)”; AND for musculoskeletal disorder “(musculoskeletal disorders OR back pain OR repetitive motion injuries OR strain injuries OR overuse injuries)”.

Study selection eligibility criteria

After conducting a comprehensive literature search of the Scopus database, relevant literature was identified using the aforementioned keywords in the eligibility criteria. Studies that were observational studies (cohort, case-control or cross-sectional), experimental studies, full text available, published in English without limiting the year of publication (up to 2022), were included if they assessed the association between psychosocial factors and MSDs at the workplace among police officers. Studies were excluded if they were in a language other than English, if police officers were not the study population, if they were inaccessible, if they were irrelevant to the keywords or if data for police officers were not analysed separately in a study that had a wide range of occupational settings.

Study selection process

After removing duplicates, a total of 111 citations were obtained from the electronic search. All citations were reviewed by title, and if necessary, by abstract. Out of the 94 potential articles that were identified, all of them were assessed in full text format. Those studies that met the inclusion criteria, which were psychosocial factors, MSDs, and police officers, were included in this review. Fourteen articles were finalised as eligible and are presented in Fig. 1.

RESULTS

In the review, 14 articles were included and categorized as in Table I. Ten articles had a cross-sectional design (9,3,11,17,6,4,7,8,15), two cohort

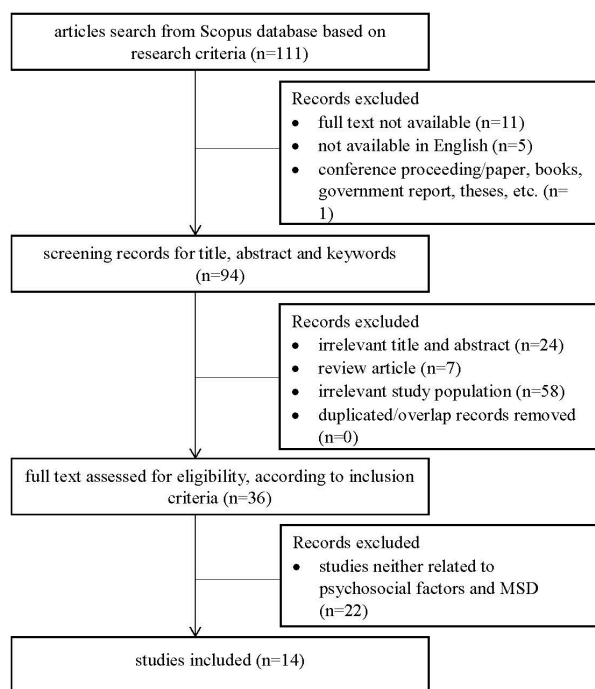


Fig. 1 : Flowchart of the review flow.

studies (18,13), one qualitative study (22) and one case study (23). Most studies (n=7) were conducted in Western countries, specifically Canada and the United States, while the rest of the countries were from the United Kingdom (n=2), Sweden (n=2) and South Korea (n=3). The number of participants in the included studies ranged from 16 to 92,545, with an overall mean age ranging between 19 and 59 years old. Eleven studies focused on police officers, and three studies included other public officers.

The incidence rate of MSDs per 10,000 workers in the United States was 26.9 in 2020, while it was 1.43 per 1,000 workers in Malaysia in 2021 (29,31). Western countries have recognised the severity of the problem of MSDs among workers, which affects them and the industries in terms of productivity among which requires a long period of days away from work (30).

Different instruments were used to assess psychosocial factors and MSDs. Two studies used Nordic Musculoskeletal Questionnaire (NMQ), and one study used the Body Part Discomfort Questionnaire (BPDQ) to measure MSDs. Some instruments used to measure psychosocial factors included the Psychosocial Aspects of Work (PAW) (3), the 14 items Beehr et al's Police Stress Questionnaire (11), the Brief Index of Affective Job Satisfaction (BIAJS) (7,8), the Karasek model (18), and the Swedish Work Environment Survey (SWES) (15). The majority of studies (86%) recorded the back area as the anatomical site that was affected by the exposures.

On the other hand, the studies found that the

psychosocial factors most frequently associated with MSDs were job satisfaction (n = 5), shift work (n = 5), stress (n = 4), sleep issues (n = 4), social support (n = 2), psychological distress (n = 2), and working hours (n = 2). When integrated with the Leka and Jain (16) classification, the job description, work schedule, home-work interface, psychological workload, and work pace are the main contributors to MSDs development in police officers.

DISCUSSION

A total of 14 studies met the inclusion criteria outlined for this systematic review paper. The studies were conducted in a variety of countries, including the United States, Canada, the United Kingdom, Sweden and South Korea. The prevalence of MSDs in police officers ranged from 33% to 99%, with the highest rates reported in the lower back. Based on the findings, psychosocial factors are more likely to be associated with MSDs in police officers. Specifically, exposure to job satisfaction, working type, job demands, shift work, working hours, job control, equipment, organisational structure, job support, work cooperation, workplace inequalities, parenthood, social support, and psychological factors were found to be associated with pain in the back, neck, shoulder, arm, and legs.

The relationship between psychosocial factors and MSDs in police officers is complex and multifaceted. The findings of this review paper indicate that exposure to any of the psychosocial factors is associated with an increased risk of MSDs in police officers. This is consistent with previous research in other occupational groups, which has found that high levels of psychosocial demands can lead to physical health problems (2).

The psychosocial factors gathered from the review findings were proceeded with the classification based on Leka and Jain (16) categories. Psychological factors were also included as one of the psychosocial factors in this review.

Job content

Four articles (18,22,7,26) found job satisfaction as one of the psychosocial factors which contribute to the occurrence of MSDs. This can be further explained by Douma et al. (7) following a study on Quebec police officers where they found that higher levels of job satisfaction were one of the factors linked to higher Role Emotional (RE) scores which can lead to LBP and CLBP. At the same time, higher work satisfaction, and changing duties were associated with higher Mental Health (MH) ratings.

Similar findings from Ramstrand and Larsen (22) stated job satisfaction is one of the most prominent factors perceived by the police that contributes to

Table 1 : Characteristics of included studies and association between exposure to psychosocial factors at work and musculoskeletal disorders among police officers.

Study ID, Country	Design, Follow-up period, Response rate	Study participants, Sample size, Mean age	Measure (psychosocial factors and MSDs)	Outcome measured	Analysis, Adjustment variables	Exposure variables	Anatomic sites	Prevalence of MSDs
Finkelstein (1995) Canada	Cross-sectional	Municipal fire fighters and police officers Ontario n=129 fire fighters; 346 police officers 19-59 years	Questionnaire	Complaints of back pain	Conditional logistic regression Matching age strata	Number of children	Back	33% of men police officers complained of back pain
Burton et al. (1996) UK	Cross-sectional Early 1995 77.5% RUC; 62.5% GMP	Royal Ulster Constabulary (RUC) and Greater Manchester Police (GMP) n=2000 RUC; 600 GMP 38.3 years RUC; 37.5 years GMP	Psychosocial Aspects of Work (PAW) GHQ-12 Questionnaire	Experience of LBT and related duties and activities for each preceding 6 years Work loss	Cox proportional hazard	Job satisfaction Social support Mental stress Psychological distress	Low back	Lifetime prevalence of LBT: 69.2% of RUC; 62.9% of GMP
Gershon et al. (2002) US	Cross-sectional 70%	Police officers n=1880 53 years	14 items Beehr et al's police stress questionnaire 11 items National Institutes for Occupational Safety and Health work stress scale 10 item Beehr et al and Billings and Moos Questionnaire	Chronic back problems	Logistic regression	Critical incidents Poor cooperation Perceived inequality Organizational structure Stress Emotional focused Negative behaviors Burnout	Back	62.8%
Mohr et al. (2003) US	Cross-sectional 66%	Police officers n=1200 37.1 years	Michigan Alcoholism Screening Test (MAST) Critical Incident History Questionnaire (CIHQ) Pittsburgh Sleep Quality Index (PSQI) Somatization Subscale of the Symptom Checklist-90-R (SCL-90-R) Questionnaire	Complaints of lower back pain and heavy feelings in arms or legs during the previous week	Logistic regression	Alcohol abuse Critical incidents Sleep problems	Back Arms Legs	-

Nahit et al. (2003) UK	Prospective cohort One year 77% (86% police officers)	Industries with high rate of MSDs n=1081 (38 police officers)	Karasek model 12 item GHQ Questionnaire	Pain experienced at low back, shoulder, forearm or knee during the past month that lasted for 24 hours	Generalised estimating equations Adjusted for age and gender	Work demands Job control Social support from colleagues Job satisfaction Psychological distress	Low back Shoulder Forearm Knee	32% police have LBP; 21% police have shoulder pain; 8% police have knee pain
Ramstrand and Larsen (2012) Sweden	Qualitative November 2009 to February 2010 100%	Police officers n=33 33.5 years	Focus group interview	Police perceptions of the most common types of musculoskeletal injury	Comparing the rank ordered	Working hours Shift work Fatigue Job satisfaction Sleep problems	Low back Neck Shoulder Hip Knee	-
Cho et al. (2014) South Korea	Cross-sectional March 2013 to May 2013	Police officers n=353 52.92 years	Questionnaire	Data from National Police Hospital	Cross analysis	Shift work Working type	Leg/foot	76.8% pain in more than one area; 26.1% foot/leg pain
Rhee et al. (2015) South Korea	Case study secondary data January 1, 2009 to December 31, 2010	Police officers n= 27,340 outpatients and 13,623 inpatients from 2009, and 32,571 outpatients and 15,613 inpatients from 2010	Secondary data	Seoul police hospital	Descriptive	Shift work	Knee Lumbar	-
Cardoso et al. (2017) Canada	Cross-sectional 75%	Police (patrol) officers n=16 35.1 years	Health and lifestyle questionnaire (H&L) Body part discomfort questionnaire (BPDQ)	Perceived of body parts discomfort during patrol duty	Pearson correlation	Working hours Shift work Job satisfaction	Neck Low back Upper back Buttocks Mid back Thigh	66.7% suffer lower back pain
Han et al. (2018) South Korea	Cohort 2002 to 2014	Public officers n= 860221 (police officer=92545) 39.55 years	Secondary data from National Health Insurance Service (NHIS)	Diagnosed with lower back pain	Cox proportional model Adjusted for age and gender	Sleep disorder Traumatic stress	Low back	-

Author(s)	Study Design	Sample Size	Age	Measures	Outcome	Analysis	Findings
Douma et al. (2018) Canada	Cross-sectional May to October 2014 91.3%	Police officer n= 3589 35.8 years		Brief Index of Affective Job Satisfaction (BIAJS) Chronic Pain Sleep Inventory (CPSI) 4-item Perceived Stress Scale (PSS- 4) Nordic Musculoskeletal Questionnaire (NMQ)	Presence of LBP in the last 12 months	Pearson correlation	Job satisfaction Seniority Post-trauma Sleep quality Exposed to public complains and critics Stress Shift work Working hours Alcohol abuse Psychological support Low back 68.8% have acute LBP and CLBP
Douma et al. (2019) Canada	Cross-sectional May to October 2014 98.6%	Police officer n=3639 38.5 years		Mental HRQOL Brief Index of Affective Job Satisfaction Nordic Musculoskeletal Questionnaire	Presence of LBP in the last 12 months	Linear regression	Seniority Job satisfaction Alcohol consumption Role emotional Mental health Post-trauma Sleep problems Exposed to public complains and critics Low back 67.6% have acute LBP and CLBP
Sengupta et al. (2019) US	Cross-sectional	Security staff and police officer n=39		Standard shiftwork index Questionnaire	Frequency of pain in various body locations	ANOVA	Shift work Sleep problem Working hours Job satisfaction Back Arm/wrist -
Larsen et al. (2019) Sweden	Cross-sectional February/March 2013 57%	Uniformed active duty police n=3899 25-39 years		Swedish work environment survey (SWES) Questionnaire	Complaints of musculoskeletal pain in the last three months	Binomial logistic regression Adjusted for age, sex, physical workload factors, physical exercise and tobacco use	Job demand Job control Job support Exposure to physical workload Upper back or neck Shoulders or arms Lower back Hips, legs, knees or feet 99.3% reports multi-site pain

musculoskeletal injuries. The reason was that those officers stated that there is not enough rest between shifts. They further state that was due to the current working arrangement, which forced police to work an additional two shifts over six weeks or overtime. If an officer worked overtime the day before, they were not given the required 8 hours off between shifts. In terms of the occurrence of MSDs, the most frequent injury is lower back pain while at least two groups mentioned hip and knee discomfort, neck and shoulder pain, and back pain.

Even so, an article reported no correlation between psychosocial factors and MSDs among police officers. Burton et al. (3) used the Psychosocial Aspects of Work (PAW) to measure psychosocial factors among police officers in the UK where they found that between LBT groups, the Psychosocial Aspects of Work (PAW) scores; that includes job satisfaction did not significantly differ. However, when comparing those who wear body armour with those without during driving a vehicle, there was a slight increase in job satisfaction among those without.

Workload & work pace

Three articles (6,23,13) highlight working type while four (18,7,8,15) indicates job demands as the psychosocial factors related to MSDs in police officers. A study by Cho et al. (6) believed that working type and the existence of chronic diseases can influence the risk of having leg/foot pain among Korean police officers. Compared to those without chronic conditions, corporals had a 1.78 times risk higher of developing a shoulder injury due to the nature of the task which involves repetitive motion. Notwithstanding the previous findings, Rhee et al. (23) found that almost all of the radiologic examinations on Korean police personnel involved the knee and lumbar spine, and one of the reasons for lumbar spine disorders was due to working triple- or quadruple-shift schedules, standby for emergency, investigation and patrol duties that place a long-term burden on the spine.

Meanwhile, a cohort study conducted by Han et al. (13) found that compared to national and regional government officers (NRGs), both police officers and firefighters had more vulnerable to an admission for injuries, lumbar disc herniation, low back pain, and soft disease around the shoulder area, with the firefighters had the highest analysed HRs for all of these disorders. This is because police officers and firefighters have a high job demand and workload compared to NRGs.

Similarly, Douma et al. (8) study on Quebec police officers has shown that a lower prevalence of acute/subacute LBP was linked to more repeated post-traumatic treatments (psychological assistance) after facing a challenging circumstance at work (adjusted

OR: 0.609; IC95%: 0.410-0.907). On top of that, more often experiencing lower back pain when driving a police car was the only occupational/ergonomic factor found to be linked with a greater incidence of acute/subacute LBP (adjusted OR: 3.008; IC95%: 2.170- 4.168).

Compared to jobs classified as low strain, jobs classified as high strain and active were linked to higher odds ratios for multi-site discomfort (15). This highlights the importance of managing workload and providing adequate rest breaks to minimize the risk of MSDs.

Work schedule

Six articles (17,22,6,23,4,26) found shift works while two articles (22,26) found working hours to be the psychosocial factors that associated with MSDs. Police officers have been implementing a shift work system which leads to them having sleep problems that can exacerbate their health (17).

Ramstrand and Larsen (22) conducted a study on Swedish police perception of workplace musculoskeletal injuries in which they found that one of the most prominent factors perceived by the police that contributes to musculoskeletal injuries was work hours. The issue was that the police complained that there wasn't enough downtime between shifts. Meanwhile, Cho et al. (6) findings showed that shift work increased the risk of pain in the leg/foot by 1.66 times compared to those without shift work, and chronic diseases increased risk by 2.24 times compared to those without. Not to mention that throughout their working hours, their duties involved a high job demand.

Sengupta et al. (26) performed a study where they found that the frequency of "Pain in Arm/Wrist" was shown to differ significantly between the 8 hours morning and 8 hours afternoon shifts. The mean score recorded for the 8 hours morning shift was 1.3, and the mean score for the 8 hours afternoon shift was 1.0. The 12 hours group reported a mean "back or lower back discomfort" frequency that was substantially higher (mean 2.66) than the 8 hours group (mean 1.78). Workers on the 8 hours afternoon shift were less happy with their shift pattern than those on the 8 hours morning shift. Cardoso et al. (4) also reported the night shift was associated with more neck pain than the other shifts, which was the only difference in reported physical discomfort between day and night shifts among patrol duties police officers in Canada which this may be associated with cognitive fatigue and awkward posture from patrol duty.

Control

One article (15) highlights job control as one of the psychosocial factors related to MSDs. Larsen et al. (15) reported a higher odds ratio for multi-site

musculoskeletal discomfort was linked to poor control in work among Swedish uniformed active duty police. There was evidence that a high level of social support was linked to a lower odds ratio for multi-site musculoskeletal discomfort.

Environment & equipment

Three articles (3,23,8) found that equipment is one of the psychosocial factors linked to MSDs. Similarly, Rhee et al. (23) found the reasons for lumbar spine disorders were because of wearing police gear on their body throughout their duty hours. That is giving excessive force exerted on the knee and lumbar spine.

The only job-related or ergonomic component that was connected to a higher prevalence of acute or subacute LBP was driving a police car, according to a study by Douma et al. (8). The nature of patrol duty requires a long hour of driving in a certain posture that leads to pain on the body.

However, according to another paper, there is no connection between psychosocial factors and MSDs among police personnel from the study conducted by Burton et al. (3) in 1996. Nonetheless, there was a marginally higher level of job satisfaction among those who did not wear body armour when operating a vehicle as compared to those who did.

Organisational culture & function, interpersonal relationship at work and career development

One article (11) had shown organisational structure, work cooperation, and workplace inequalities as the psychosocial factors related to MSDs. Another article (18) showed job support as the psychosocial factor that can cause MSDs.

Gershon et al. (11) found that some detrimental health (such as foot problems and chronic back pain) and behavioural effects among police officers are correlated with the presence of a lack of cooperation, workplace inequalities, and poor organisational structure. However, their findings also indicated that those factors were not significantly correlated with perceived work stress.

Home-work interface

Parenthood (9) and social support (15) were considered as the psychosocial factors related to MSDs. The earliest article that studies psychosocial factors and MSDs was by Finkelstein (9) which looked into the relationship between back pain and parenthood among firefighters and police officers in Ontario, Canada. He found that men who worked as police officers reported back pain in 33% of cases with fathers' risk of experiencing back problems increasing as the number of children increases. Parenting and recreational activities that include kids are most likely responsible for this (9). However, it must be noted that differentiating between back pain caused by

occupational and non-workplace factors can be quite challenging.

Psychological

Sleep problems (26,13,17,22,7), mental illness (13,11,7), mood disorders (13,7), stress (11,18,7), maladaptive coping behaviour (11), burnout (11), critical incidents/post-trauma (11,17), fatigue (22,4) are the factors that contribute to MSDs in police officers.

One of the most prominent factors perceived by the police that contribute to musculoskeletal injuries was fatigue, and sleep problems (22). Officers complained that there wasn't enough time for rest in between shifts, which was the main factor. Lower back pain is the most common injury associated with MSDs, whereas at least two groups also noted hip and knee pain, neck and shoulder pain, and back pain.

Sengupta et al. (26) found that mean sleep problem indicators for 8- and 12-hour shifts were examined, and two sleep disorders showed a statistically significant difference. Workers who worked 12-hour shifts considerably outperformed those who worked regular 8-hour shifts in terms of sleep deprivation ($p = 0.015$) and the detrimental effects of shift type on sleep ($p = 0.082$). These findings provide evidence for the claim that working longer shifts are linked to more severe sleep problems. A cohort study conducted by Han et al. (13) also found that compared to NRGs, both firefighters and police officers had a higher risk of mental illnesses, mood disorders, and sleep problems, but public education officers (PEOs) had a reduced chance of occurrence.

Gershon et al. (11) found that some detrimental health and behavioural effects among police officers are correlated with the presence of perceived work stress. Apart from that, adverse physical health indicators and risk behaviours were also associated with higher levels of work stress. At the same time, perceived work stress is associated with mental health, burnout, chronic back pain, critical incidents, and maladaptive coping behaviours.

Sleep problems have been a drawback among police officers and Mohr et al. (17) indicated that sleep disturbances meet the criteria as a complete mediator of the link between traumatic stress symptoms and health functioning accounting for a significant proportion of the remaining variance ($\Delta R^2 = 0.152$, $X^2 = 79.2$, $p < .0001$).

According to the research by Douma et al. (7) on Quebec police personnel, there are statistically significant differences between the study groups (no-LBP, acute/subacute LBP, and CLBP), with the CLBP group having the lowest RE score. The CLBP group had the lowest MH score when the research groups

were compared based on the mental health (MH) domain. Higher levels of depression and anxiety, higher levels of perceived stress, living alone, and changing employment or responsibilities because of LBP during a person's lifetime were all significantly associated with lower RE scores. Higher RE scores were associated with characteristics including greater sleep quality and improved general health. Higher levels of perceived stress, more depression, more anxiety, and being a woman are all associated with lower MH scores. Higher MH ratings were linked to both general health and sleep quality.

Contrary according to another paper by Burton et al. (3) in 1996, their research, however, revealed a higher level of psychological discomfort (GHQ) among people with a history of LBT. Officers who had recently missed work were notably more depressed, even though PAW scores and job loss did not significantly correlate with one another.

Strength and limitation

This review paper is the first of its kind to analyse the association between exposure to psychosocial factors and the presence of MSDs among police officers. The studies included in this review employed various validated instruments to assess variables related to psychosocial risk factors and MSDs. Despite the potential for self-administered bias, self-rated health remains a good indicator of health status, as noted in previous research (19).

However, it is important to highlight some limitations of this review. Most of the included studies were cross-sectional studies, meaning that causality cannot be determined. Additionally, the lack of a Standardized Quality Scale method for selecting articles raises the possibility of selection bias. Another limitation is the inconsistency in the definition and measurement of psychosocial factors across studies. Although job demands, job control, social support, and job satisfaction were the most commonly studied factors, differences in definitions and measurements make it difficult to draw firm conclusions about their relationship with MSDs in police officers.

Despite these limitations, the findings from the studies included in this review consistently show an association between exposure to psychosocial risk factors and MSDs among police officers. This can be attributed to the long hours spent in awkward postures and the high job demands that are common in this profession (25).

Before performing a study in another country with a different cultural background, it should be kept in mind that the majority of studies were carried out in Western countries, where cultural differences should be seen as the primary issue. However, a study that

looked at the relationship between psychosocial factors and MSDs in Australia and South Korea concluded that, despite the cultural differences between the two countries, their findings appeared to be generalizable across cultures. They discovered no difference in the frequency of developing neck pain between the two groups. They added that there is no unique sensitivity due to culture alone to the effects of physical and psychosocial factors on the development of neck pain (32).

Overall, this review highlights the importance of investigating psychosocial risk factors in the development of MSDs among police officers. Further research using longitudinal designs and standardized measurements is needed to more accurately assess the relationship between these factors and MSDs. In the meantime, interventions should be developed and implemented to mitigate the risks associated with psychosocial factors and to improve the occupational health and well-being of police officers.

CONCLUSION

In conclusion, the results of this review provide consistent evidence, with the majority (13 out of 14) of studies showing an association between exposure to psychosocial risk factors and MSDs among police officers. This suggests that psychosocial factors play a crucial role in the development of MSDs and should be taken into consideration to lower the risk of occupational health issues among police officers. Future studies should investigate this association further, as there is a lack of research in this area, with longitudinal study designs being particularly useful for providing more accurate assessments of exposure to psychosocial risk factors. Interventions are needed to assess the efficacy of preventive measures aimed at lowering the incidence of MSDs in police officers. These interventions should not only focus on ergonomics, but also consider organizational aspects of the workplace.

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REFERENCES

1. Aytac S. The sources of stress, the symptoms of stress and anger styles as a psychosocial risk at occupational health and safety: a case study on Turkish police officers. *Procedia Manufacturing*. 2015 Jan 1;3:6421-8.

2. Bernal D, Campos-Serna J, Tobias A, Vargas-Prada S, Benavides FG, Serra C. Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: a systematic review and meta-analysis. *International journal of nursing studies*. 2015 Feb 1;52(2):635-48.
3. Burton AK, Tillotson KM, Symonds TL, Burke C, Mathewson T. Occupational risk factors for the first-onset and subsequent course of low back trouble: a study of serving police officers. *Spine*. 1996 Nov 15;21(22):2612-20.
4. Cardoso M, Girouard M, Callaghan JP, Albert WJ. An ergonomic evaluation of city police officers: an analysis of perceived discomfort within patrol duties. *International journal of occupational safety and ergonomics*. 2017 Apr 3;23(2):175-84.
5. Chavda D, Soni N, Bhatt U. Work related musculoskeletal disorders in traffic police of asian countries-a review. *International Journal of Recent Scientific Research*. 2020 Dec 28;11(12):40244-40248.
6. Cho TS, Jeon WJ, Lee JG, Seok JM, Cho JH. Factors affecting the musculoskeletal symptoms of korean police officers. *Journal of physical therapy science*. 2014;26(6):925-30.
7. Douma NB, Côté C, Lacasse A. Quebec Serve and Protect Low Back Pain Study: What About Mental Quality of Life?. *Safety and health at work*. 2019 Mar 1;10(1):39-46.
8. Douma NB, Côté C, Lacasse A. Occupational and ergonomic factors associated with low back pain among car-patrol police officers: findings from the Quebec serve and protect low back pain study. *The Clinical Journal of Pain*. 2018 Oct 1;34(10):960-6.
9. Finkelstein MM. Back pain and parenthood. *Occupational and Environmental Medicine*. 1995 Jan 1;52(1):51-3.
10. García-Alcaraz JL, García Rivera BR, Olguin Tiznado JE, Aranibar MF, Ramirez Baron MC, Camargo Wilson C. Burnout Syndrome in Police Officers and Its Relationship with Physical and Leisure Activities. *Instituto de Ingeniería y Tecnología*. 2020 Aug 3.
11. Gershon RR, Lin S, Li X. Work stress in aging police officers. *Journal of occupational and environmental medicine*. 2002 Feb 1:160-7.
12. Habibi E, Zare M, Haghi A, Habibi P, Hassanzadeh A. Assessment of physical risk factors among artisans using occupational repetitive actions and Nordic questionnaire. *International Journal of Environmental Health Engineering*. 2013;1(1):1-6.
13. Han M, Park S, Park JH, Hwang SS, Kim I. Do police officers and firefighters have a higher risk of disease than other public officers? A 13-year nationwide cohort study in South Korea. *BMJ open*. 2018 Jan 1;8(1):e019987.
14. Irniza R, Saliluddin SM. Are Malaysian police really stressed? Understanding their potential stress factors. *International Journal of Public Health and Clinical Sciences*. 2015 Nov 4;2(5):45-53.
15. Larsen LB, Ramstrand N, Fransson EI. Psychosocial job demand and control: multi-site musculoskeletal pain in Swedish police. *Scandinavian Journal of Public Health*. 2019 May;47(3):318-25.
16. Leka S, Jain A. Health impact of psychosocial hazards at work: an overview. *World Health Organization*. World Health Organization; 2010.
17. Mohr D, Vedantham K, Neylan T, Metzler TJ, Best S, Marmar CR. The mediating effects of sleep in the relationship between traumatic stress and health symptoms in urban police officers. *Psychosomatic Medicine*. 2003 May 1;65(3):485-9.
18. Nahit ES, Hunt IM, Lunt M, Dunn G, Silman AJ, MacFarlane GJ. Effects of psychosocial and individual psychological factors on the onset of musculoskeletal pain: common and site-specific effects. *Annals of the rheumatic diseases*. 2003 Aug 1;62(8):755-60.
19. Palmer KT, Reading I, Linaker C, Calnan M, Coggon D. Population-based cohort study of incident and persistent arm pain: role of mental health, self-rated health and health beliefs. *Pain*. 2008 May 1;136(1-2):30-7.
20. Paudel L, Manandhar N, Joshi SK. Work-related musculoskeletal symptoms among Traffic police: A Review. *International Journal of Occupational Safety and Health*. 2018 Dec 31;8(2):4-12.
21. Rahman HA, Abdul-Mumin K, Naing L. Psychosocial factors, musculoskeletal disorders and work-related fatigue amongst nurses in Brunei: structural equation model approach. *International Emergency Nursing*. 2017 Sep 1;34:17-22.
22. Ramstrand N, Larsen LB. Musculoskeletal injuries in the workplace: perceptions of Swedish police. *International Journal of Police Science & Management*. 2012 Dec;14(4):334-42.
23. Rhee HY, Cho JH, Seok JM, Cho TS, Jeon WJ, Lee JG, Kim SK. Prevalence of musculoskeletal disorders among Korean police personnel. *Archives of Environmental & Occupational Health*. 2015 Jul 4;70(4):177-88.
24. Roberg RR, Kuykendall JL, Novak K. *Police management*. Los Angeles: Roxbury Publishing Company; 2002.
25. Rufai AA, Oyeyemi AL, Maduagwu SM, Fredrick AD, Aliyu SU, Lawan A. Work-related musculoskeletal disorders among Nigerian police force. *Nigerian Journal of Basic and Clinical Sciences*. 2019 Jul 1;16(2):127.
26. Sengupta A, Aydin Z, Lieber S. Differential Effects of 8 and 12 Hour Non-rotating Shifts on Alertness, Sleep and Health of Public Safety Workers. In *Proceedings of the 20th Congress of the International Ergonomics Association (IEA 2018) Volume II: Safety and Health, Slips, Trips and Falls 20 2019* (pp. 522-531). Springer International Publishing.

27. Thomas K, Nilsson E, Festin K, Henriksson P, Lowén M, Löf M, Kristenson M. Associations of psychosocial factors with multiple health behaviors: a population-based study of middle-aged men and women. *International journal of environmental research and public health*. 2020 Feb;17(4):1239.
28. World Health Organization. Musculoskeletal conditions [Internet]. Who.int. World Health Organization: WHO; 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>
29. Institute for Labour Market Information and Analysis (ILMIA). National Occupational Accident 2021 [Internet]. Department of Statistics Malaysia. Available from: <https://www.ilmia.gov.my/index.php/en/bda-noa>
30. The National Institute for Occupational Safety and Health (NIOSH). National Occupational Research Agenda: Disease & Injury [Internet]. U.S. Department of Health & Human Services. CDC. Available from: <https://www.cdc.gov/niosh/docs/96-115/diseas.html#:~:text=Occupational%20hearing%20loss%20is%20the,risk%20from%20other%20ototraumatic%20agents>
31. U.S. Bureau of Labor Statistics. Injuries, Illnesses, and Fatalities [Internet]. United States Department of Labor. Available from: <https://www.bls.gov/iif/>
32. European Agency for Safety and Health at Work, Graveling R, Smith A, Hanson M. Musculoskeletal disorders – Association with psychosocial risk factors at work : literature review. Publications Office of the European Union; 2022. Available from: doi/10.2802/20957