SMART

Design for Care

Risk factors associated with psychological injury among Healthcare and Social Assistance workers in non-hospital settings: Systematic scoping review

Summary report
14 June 2022

CENTRE FOR TRANSFORMATIVE WORK DESIGN
Curtin University FUTURE OF WORK INSTITUTE
THE UNIVERSITY OF SYDNEY
Healthy Working Lives
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Preface

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Design for Care is a collaborative research project led by Curtin University's Centre for Transformative Work Design in collaboration with University of Sydney, Monash University and a range of industry partner organisations, with funding support from icare NSW.

The research aims to understand and improve workplace mental health and well-being in Australia's Healthcare and Social Assistance (H&SA) industry by developing evidence-based work design interventions to prevent psychological injury, which include but not limited to burnout and sustained work stress.

At the heart of Design for Care is the prevention of psychological injury through good work design.

For more information, visit **transformativeworkdesign.com/smart-design-for-care**

S M A R T

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Design for Care is funded by icare Insurance and Care NSW

KEY MESSAGES

- A broad range of occupational, organizational, individual and health related factors were found to be associated with psychological injuries among Health and Social Assistance industry workers (HSA) workers in non-hospital settings.
- A large volume of occupational and organisational factors, such as high job demands, low job control level, low level of support from colleagues and supervisor, lack of role clarity, and poor organisational justice, were found to be associated with psychological injury claims among HSA workers.
- These findings will assist in the development of psychological injury prevention programs and workplace design strategies for mentally healthy workplaces in the HSA industry.
- Early identification and prevention of these risk factors is important to reduce the burden of psychological injuries in HSA settings.
- The development of workplace psychological health guidelines and adequate preventive procedures for work-related psychological injuries must be a growing priority for many employers and organisations in non-hospital health care settings.
- An integrated approach targeting high job demands, low job control, poor leadership and organisational injustice in the workplace such as SMART design for care, may be advisable to address the psychological wellbeing of HSA workers.

Risk factors associated with psychological injuries among Healthcare and Social Assistance Industry workers.

Psychological injury is a **major cause** of morbidity and disability in working-age adults worldwide

60 STUDIES INCLUDED

The included studies involved a ***total*** of

34,466

HEALTHCARE AND SOCIAL ASSISTANCE (HSA) INDUSTRY WORKERS.

Approximately ***half*** of the studies (29 of 60)

were conducted in **aged care** settings/ **nursing homes**

40 OF THE INCLUDED **STUDIES** WERE CONDUCTED AMONG **NURSES** AND **NURSING ASSISTANTS**

BURNOUT
30 STUDIES

*The most **commonly** reported symptoms*

STRESS
14 STUDIES

The factors are classified into **4 major** categories:

PERSONAL	HEALTH RELATED	OCCUPATIONAL	ORGANISATIONAL
Older age	**Medical history** Increased body mass index	High job demand	Inadequate care coordination
Females	Poor physical health	Low levels of job control	Poor staff handling
Married/cohabiting	Previous history of chronic illness, sleep dissatisfaction, insomnia, obstructive sleep apnoea	Low job satisfaction	Managerial pressure/domination
Divorced/widowed	**Psychological** Professional self-doubt	Lack of recognition/reward Insufficient resources	Lack of recognition/feedback
Low educational level	Negative attitude about their profession	Having job strain	Organizational injustice
Low financial income	Negative emotions in different situations	Not having enough vacation	Fear of infection
Lack of outside work support	Stress of conscience and perceptions of conscience	Less work-experience	Exposure to suicides
Problems with family members	Emotional strain	Work status -Being a full-time worker	The fear of death of others
		Having a fixed schedule	Conflicts with others
		Night work	*Lack of:* Information client support co-worker support social relations at work supervisor support support from the manager
		Working more than 40 hours/week	

Conclusions on ***work-related*** psychological injuries

The ***large*** majority of factors are ***occupational/organizational*** in nature, and are ***modifiable,*** implying opportunities for ***intervention*** to reduce these work-related injuries.

Future research should incorporate intervention strategies to optimize the management of psychological injuries.

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EXECUTIVE SUMMARY

Background and purpose

Many workers within the healthcare and social assistance (HSA) industry may be exposed to workplace hazards that can affect their psychological health. While many studies have described the prevalence and nature of psychological injury experienced by HSA workers, few have examined the determinants of these injuries. Further, most prior research in this field have focused on hospital settings and there have been no prior systematic reviews of workers in other, non-hospital settings. The purpose of this review was to systematically evaluate and better understand the risk factors associated with psychological injuries among healthcare and social assistance industry workers in the non-hospital settings.

Method: Rapid systematic review. Searches were conducted in three bibliographic databases, and supplemented by backwards and forward citation searches. Included studies focused on workers in non-hospital settings in the HSA industry, and reported a statistical association between psychological injury and a personal, health, occupational, or organisational factor. Quantitative studies published in English between 2000 and 2021 were included. Quality appraisal was undertaken using the JBI critical appraisal checklist.

Findings: Sixty studies involving a total of 34,466 workers were included. Studies were from a diverse array of nations, industrial settings and occupations. Sample sizes ranged from N=20 and N=3471; and in 49 studies the majority of participants were female. Study quality was highly variable, and all studies were cross-sectional. Twenty-three studies linked psychological injury with occupational factors, and more specifically for aspects of job design including low job control, high job demands and low job satisfaction. Thirteen observed an association between work environment and psychological injury, and a further eleven between workplace social support and psychological injury. Fewer studies have examined the relationship between psychological injury and other risk factors such as worker medical history, personal and family relationships and demographic characteristics such as age and gender.

Conclusion: The findings of this review suggest that job and workplace level factors are significantly associated with psychological health among workers in the healthcare and social assistance industry, in non-hospital settings. Importantly, these aspects of job design, work environment and workplace relationships are modifiable, suggesting an opportunity for work design interventions to improve worker psychological health and reduce the prevalence of psychological injury in this sector.

BACKGROUND AND PURPOSE

Psychological injury is a major cause of morbidity and disability in working-age adults worldwide (1). Psychological injuries impact both mental and physical functioning and can have deleterious effects on work performance. The term psychological injury is used commonly within occupational health and workers' compensation settings to describe mental health problems ranging from burnout and job stress to diagnosed mental health disorders such as major depression and anxiety (2–6).

The Healthcare and Social Assistance (HSA) industry is one of the world's largest and fastest-growing industries (7,8). In Australia in 2021 there were over 1.8 million people employed in this industry, over 75% of whom were female, with employee numbers growing at ~3% per annum (9). There is a growing body of research regarding the prevalence and impact of psychological injury within the HSA industry (2–5). Many workers within the HSA industry may be exposed to workplace hazards that can affect their psychological health, including for instance high physical demands and traumatic events (12,14). Impaired psychological health of HSA workers has also been associated with medical errors and decreased work performance, and these may have flow-on impacts to patients' health outcomes (15). Psychological injury can be costly in terms of lost time and productivity as well as costs of rehabilitation and compensation (16). Workers in the HSA industry have been particularly affected by increased job demands and changes to work environments during the COVID-19 pandemic, which may have contributed to a higher than usual rate of psychological injury in this group (17–21)

While many studies have described the prevalence and nature of psychological injuries experienced by HSA workers, fewer have examined the determinants of these injuries (22,23).

Further, most prior research on determinants of psychological injury in HSA industry workers have focused on hospital settings (22,24–27), including a series of recent studies on psychological injury during the COVID-19 pandemic (17–21).

The HSA industry extends well beyond hospital settings, into settings such as community-based health care (e.g., general practice, allied healthcare), residential care of the aged or people living with disabilities, child-care, and social care provision in people's homes or other community settings. There is a need to examine psychological injury in HSA workers in these settings, in which work environments and job demands, patient populations and their needs, funding structures, human resource management, and workforce characteristics can differ substantially from in-hospital settings. Working in non-hospital settings can involve intensely stressful and emotional situations associated with caring for the sick, unique pressures imposed by relationships with patients, family members, and employers, and working conditions that include demanding physical work, and the risk of injury associated with patient handling and long shifts (28,29). The determinants of psychological injuries among HSA workers in other settings is not well described. To our knowledge there has been no prior systematic summary of the literature in the field. Such information is important to develop preventive and treatment strategies for psychological injuries among HSA workers. Identifying psychological injury risk factors is important for identifying modifiable risks that may then be changed, as well as non-modifiable risks that can support identification of high-risk groups for health promotion, prevention, job design, work environment, counselling or other interventions.

PROJECT OBJECTIVES

The purpose of this rapid review was to systematically identify and appraise current evidence on the risk factors associated with psychological injuries among HSA workers in non-hospital settings.

RESEARCH METHODS

This is a rapid systematic review. Reporting is structured according to the Preferred Reporting Items for Rapid Reviews and Meta-Analyses (PRISMA) checklist (30).

Search strategy

A comprehensive search of empirical studies examining risk factors associated with psychological injuries in HSA workers was performed in October 29 2021, using Ovid MEDLINE, Scopus, and PsycINFO electronic databases. The search strategy included a combination of controlled vocabulary (Medical Subject Headings of the National Library of Medicine) and free text terms. The search terms included four domains: (1) the population of interest (e.g., nurses, physicians, allied health professionals, social workers, paramedics); (2) psychological injuries (e.g., depression, anxiety, burnout, stress, post-traumatic stress disorder); (3) risk factors (e.g., determinants, associated factors, predictors, causes); and (4) settings (e.g. aged care centres, residential care centres, child care centres, disability service centres). The specific search used for OVID Medline is presented in Appendix 1. The other searches were based on this strategy but modified to suit each database. The search was limited to studies published since 2000. The reference lists from all included studies were also searched (backward citation search), and forward citation searches were carried out on included articles using Google Scholar.

Eligibility criteria

Studies were included if they described a psychological injury as an outcome, and examined statistically the association between that outcome and a demographic, social, occupational, organisational, psychological or personal risk factor. Psychological injuries were defined

broadly and included concepts such as stress, burnout, emotional fatigue, work stress, psychological distress as well as diagnosed mental health disorders such as major depression, anxiety disorders or post-traumatic stress disorder. Psychiatric disorders including schizophrenia and bipolar disorder were excluded. Healthcare and community service providers working in different settings including residential, primary care, community, child care, aged care and disability care services were included. Studies in hospital settings were excluded. Studies were included if they described workers in the following occupations: Doctors/physicians, Nurses, Psychologists, Social workers, Physiotherapists, Occupational therapists, Nursing assistants and midwives, Physician assistants, Paramedics, Ambulance officers. Quantitative studies including prospective and retrospective cohort studies, cross-sectional studies and controlled trials were included. Qualitative studies were excluded, as were review papers, commentaries and case studies. Peer-reviewed and full text articles, written only in English were eligible for inclusion. Studies on adults, aged 18 years and above, were included. Studies published between 1 January 2000 and October 29, 2021 were included.

Study selection

All identified studies were uploaded to Covidence (Rapid review software, Covidence, Melbourne, Australia) for screening. The titles and abstracts were screened by two reviewers (AYG and AC), with disagreements that arose between the reviewers at each stage of the selection process resolved through discussion. Any titles/abstracts clearly not meeting the inclusion criteria were excluded. Full-text screening was completed by one reviewer (AYG) for all studies, and 10% of the included and 10% of the excluded studies were checked by the other reviewer (AC) with consensus reached.

Methodological quality of included studies

Quality appraisal of studies selected for inclusion was completed using the JBI critical appraisal checklist for analytical cross-sectional study tool (31). The tool includes six domains and eight questions: inclusion/exclusion criteria (one question), study subjects and setting (one question), risk factor measurement (one question), outcome measurement (two questions), study confounding (two questions), and statistical analysis and reporting (one question). One author (AYG) performed methodological quality assessment on each included study.

Data extraction

One review author (AYG) used a checklist to extract the following information: author, year of publication, country, study setting, study design, sample size, demographic characteristics (age, sex) of the participants, study outcomes (such as stress, burnout, anxiety) and risk factors). A second author (AC) reviewed the checklist and provided feedback on items to extract. Information on the measurement instruments that were used to assess burnout, stress, PTSD, anxiety and depression was also extracted.

Data synthesis

Two authors (AYG and AC) agreed to categorise the extracted data into the following higher-level risk factor categories due to the breadth of the evidence captured in the included studies: personal factors, health-related factors, occupational factors and organisational factors. Personal factors comprised (a) sociodemographic indicators such as age and sex/gender and (b) social factors including household and family circumstances, and indicators of economic advantage/disadvantage or urbanity. Health related factors include (a) medical history and (b) psychological characteristics such as self-efficacy, emotions and self-belief. Occupational factors reflect the nature of the persons job and were classified into two categories: (a) job demands, control, and satisfaction; and (b) other job characteristics such as experience/tenure, shift work or working hours. Organizational factors are operational characteristics, processes, or conditions that exist within an organisation

reflecting aspects of the work environment, and were also classified into two categories: (a) management factors and (b) work environment (physical and psychological) factors. The results of data synthesis were summarised in a table 3.

RESULTS

The search identified a total of 734 published articles. Following title and abstract screening, 593 articles were excluded. Of the remaining 137 articles, 77 articles were excluded based on full text review, leaving 60 articles for inclusion in data extraction and synthesis. A summary of the results of the literature search is presented in Appendix 2 (PRISMA flow-chart).

Study characteristics

The summary of findings is presented in Table 1. All 60 studies selected for the review were cross-sectional studies. Fifteen were conducted in the USA (11,32–45), eight in Spain (46–53), six in Australia (28,54–58), four in China (59–62), four in Germany (63–66), three in Brazil (67–69), three in Canada (70–72), two in France (73,74), two in Netherlands (75,76), two in Switzerland (77,78), one in Austria (79), one in Iceland (80), one in Ireland (81), one in Israel (82), one in Italy (83), one in Norway (84), one in Poland (85), one in Sweden (86), one in Taiwan (87) and one in Turkey (88).

Table 1: characteristics of included studies and summary of findings

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
1	(Rafnsdottir et al., 2004)	Iceland	Aged care settings	Cross-sectional	1515	4.0	18-79	Nurses and Nursing assistants	Burnout	• Time pressure (OR=3.4 (2.6, 4.3) • Dissatisfaction with the hierarchy at work (OR 2.7) • Dissatisfied with flow of information at work (OR=1.9 (1.4, 2.4) • Difficult to harmonise demands and expectations (OR=2.3 (1.8, 3.0) • Not praised for good work (OR=1.7 (1.3, 2.2) • Low professional support (OR=1.7 (1.3, 2.1) • Little job security (OR=1.7 (1.3, 2.3) • Lack of solidarity at work (OR=1.9 (1.4, 2.4) • Harassment, violence or threats at work (OR=2.7 (1.7, 4.1)
2	(Goehring et al., 2005)	Switzerland	Primary care settings	Cross-sectional	1784	83.6	18-55+	Physicians	Burnout	• Sex: male • Age: older than 45 years old • Administrative workload • Medical care uncertainty

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Difficulties to balance professional and private life • Practicing in rural areas
3	(Lloyd et al., 2005)	Australia	Public mental health settings	Cross-sectional	304	18.8	NR	OTs, Social workers, Nurses, Psychologists	Stress	• lack of resources • Workload • relationships and conflicts with other professionals • Professional self-doubt
4	(C. Muntaner et al., 2006)	USA	Aged care settings	Cross-sectional	395	4.3	NR	Nursing assistants	Depression (57%)	• managerial pressure • Age (β=-1.2, P<0.05) • Financial strain • work place emotional strain (β=1.5, P<0.05)
5	(Carles Muntaner et al., 2006a)	USA	Aged care settings	Cross-sectional	241	2.9	NR	Nursing assistants	Depression	• Age (β=-0.01, P<0.05) • Emotional strain related to providing direct care to elderly and disabled client (β=0.28, P<0.05) • The income inequality or the wealth inequality client (β=0.05, P<0.05)
6	(Carles Muntaner et al., 2006b)	USA	Aged care settings	Cross-sectional	482	2.9	NR	Nursing assistants	Depression	• Age (β=-0.09, P<0.05) • Emotional strain related to providing direct care to elderly

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										and disabled client (β=6.42, P<0.05) • Aged care ownership type: for profit ownership (β=8.00, P<0.05) • The income inequality or the wealth inequality client (β=0.05, P<0.05)
7	(Hsu et al., 2007)	Taiwan	Aged care settings	Cross-sectional	110	3.6	21-51+	Nursing assistant	Work related stress	• Having an unfixed schedule (β= 0.8, P<0.05) • Night scheduling (β= 0.2, P<0.05) • heavy physical burden caused by moving residents • Inconvenient facility • equipment problems (β= 0.2, P<0.05) • lack of enjoyment of the job (β= 0.7, P<0.05) • lack of help from co-workers
8	(Lapane and Hughes, 2007)	Ireland	Aged care settings	Cross-sectional	1283	NR	NR	Nurses and Nursing assistants	Stress	• not having enough staff • having too much work to do • interruptions in the middle of work • having non–health professionals determine how to do their job

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• poor pay and being responsible for patient outcomes
9	(McGilton et al., 2007)	Canada	Long-term care facilities	Cross-sectional	71	5.6	44.2 (9.1)	Nurse and nurse supervisors	Job related stress	• Lack of support from the director of care • Lack of supervisory support
10	(Juthberg et al., 2008)	Sweden	Aged care settings	Cross-sectional	146	0.4	22-65	Nurses, Nursing assistants	Burnout	• *Stress of conscience (stress related to troubled conscience)* (r=0.7, p<0.05) • *Perceptions of conscience* (r =0.6, p<0.05)
11	(van den Berg et al., 2008)	Netherlands	Aged care and diabetes specialist nursing setting	Cross-sectional	1408	NR	NR	Nurses	Burnout	• Environmental uncertainty • Low social support at work • Increased work load • Lack of autonomy at work • Role ambiguity and conflict
12	(Silva and Menezes, 2008)	Brazil	Primary care settings	Cross-sectional	141	7.8	38.9 (11.4)	Doctors, Nurses and nurse assistants	Burnout (24.1%) Common mental disorders (43.3%)	• Sex: Being male (OR:0.3 (0.1-0.9)) • Age: aged 41-50 (OR: 0.4 ((0.1-0.9) and age over 50 (OR: 0.2 ((0.1-0.5)) • Having low financial income • Household crowding • People living with the individual (>=4)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
13	(Gandoy-Crego et al., 2009)	Spain	Aged care centres	Cross-sectional	42	16	31 (5.7)	Nurses	Burnout	• Arguments with a family member • Disapproval from a superior • Arguments with a co-worker Arguments with a resident
14	(Rodwell et al., 2009)	Australia	Aged care settings	Cross-sectional	168	6.5	NR	Nurses	Psychological distress	• Job control (r=-0.3, p<0.05) • Supervisor support (r=-0.3, p<0.05) • Procedural justice (r=-0.3, p<0.05) • Distributive justice (r=-0.3, p<0.05) • Informational justice (r=-0.4, p<0.05) • Job satisfaction (r=-0.4, p<0.05) • Organisational commitment (r=-0.3, p<0.05) • Overall wellbeing (r=-0.7, p<0.05) • Interpersonal justice (β=0.4, p<0.05) • job demand (β=0.2, p<0.05) • Co-worker support (β=-0.2, p<0.05)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Increased work experience (β=0.17, p<0.05)
15	(Craig and Sprang, 2010)	USA	Community mental health centres	Cross-sectional	532	34	50.6	Social workers, Psychologists	Compassion fatigue, and burnout	• Age (β =-0.29, p < 0.01) • having no special trauma training (β =-0.15, p < 0.01) • having an increased percentage of individuals on the caseload with PTSD (β =0.18, p < 0.01) • using evidence-based practices (β =-0.10, p < 0.01)
16	(Franz et al., 2010)	Germany	Aged care centres Psychiatric clinic	Cross-sectional	123	35.8	18-50+	Nurses, social workers and Others II	Anxiety and stress	• Experience with violence and aggressive behaviour (both physical and verbal) (OR 2.7 (1.1, 6.4) • The lack of social support (OR 2.8 (1.2, 6.6)
17	(Nubling et al., 2010)	Germany	Aged care centre	Cross-sectional	889	11	NR	Nurses	Stress Burnout Cognitive stress	• low amount of social relations at work
18	(Schmidt, 2010)	Germany	Residential aged care setting	Cross-sectional	242	17.4	20-59	Nurses	Burnout	• Perceived mismatch between personal and organizational goals • Self-control demands

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
19	(Sorgaard et al., 2010)	Norway	Community mental care settings	Cross-sectional	196	16.9	40.8 (10.4)	Nurses	Burnout	• Social relations at work • feelings of not being able to influence a work situation • great demands and insufficient resources
20	(McHugh et al., 2011)	USA	Aged care settings Community health settings Ambulatory care settings	Cross-sectional	Un known	NR	NR	Nurses	Burnout	• Lack of managerial support for nursing • Responsiveness of management to correcting problems in care • Low professional relations
21	(Shen et al., 2012)	China	Primary care settings	Cross-sectional	451	39.2	37.8 (11.1)	Doctors	Anxiety Depression	• Age: aged 30-39 years old compared with aged less than 30 (OR: 2.0 (1.1-3.9)) • Marital status: Married/cohabited (OR: 2.4 (1.2-4.9)) and divorced/widowed (OR: 5.7 (1.7-24.0))
22	(Kubicek et al., 2013)	Austria	Outpatient care organisations and aged cares	Cross-sectional	1498	12	18-50+	Nurses and Nursing assistants	Burnout	• Sex: Females • Increased job demand

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
23	(de Veer et al., 2013)	Netherlands	Aged care and nursing homes	Cross-sectional	356	6.0	48 (8.0)	Nursing assistants and nurses	Moral distress	• Low job satisfaction • Complying with families' wishes for patient care even though the patient disagrees • complying with the physician even though the nurse disagrees • Working with staffing levels perceived as unsafe • Perceived time pressure (Not having enough time for patient care) • Leadership styles that focus on tasks, setting boundaries, standards, and formulating targets compared to leadership styles focussing on people and relationships
24	(Hegney et al., 2015)	Australia	Public and private sectors Aged care centres	Cross-sectional	1743	7.9	NR	Nurses and nursing assistants	Burnout Depression Stress Anxiety Compassion fatigue	• Increasing age has negative effects (r=-0.14 for stress, -0.17 for anxiety and burnout, p<0.01) • Trait negative affect (disposition to experience negative feelings and states) (r=-0.70 for stress, -0.60 for anxiety and burnout, p<0.01)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Individual psychological resilience • Years of experience
25	(Koch et al., 2015)	Germany	Child care centre	Cross-sectional	199	13.1	18-50+	Others II	Burnout	• Subjective Noise Exposure (OR: 4.4 (1.6–12.3) • Increased workload β: 0.14, p: 0.04) • Overcommitment (OR: 3.4 (1.5–7.8)
26	(Muntaner et al., 2015)	USA	Aged care centre	Cross-sectional design	868	2	NR	Nursing assistants	Depression	• Private for-profit ownership and higher managerial domination (OR: 2.4 (1.2-5.0) • No seniority-based wage increases (OR: 1.8 (1.1–3.2) • Emotional strain (OR: 1.7 (1.1–2.7))
27	(Pelissier et al., 2015)	France	Aged care centre	Cross-sectional	1943	8	NR	Nursing assistants and nurses	Stress	• confusion of tasks and responsibilities • Verbal abuse (RR: 2.5 (1.5-4.3)) • Physical attack (RR: 1.4 (1.03-1.8)) • Mental retardation of elderly patients (RR: 3.5 (2.3-5.4)) • Physical deterioration of elderly patients (RR: 3.1 (1.8-5.4))

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
28	(Silva et al., 2015)	Brazil	Primary care settings	Cross-sectional	194	16.5	44.9 (10.5)	Doctors, Nurses, Social assistants	Burnout (7%)	• Increasing age • Working more than 40 hours/week • Unhealthy environment and hardship of the work in the Primary Healthcare Network
29	(da Silva et al., 2016)	Brazil	Primary health care setting	Cross-sectional	2940	9.5	36.7 (9.6)	Community health workers, nursing assistants, nurses, and physicians	Depression and depressive symptoms (36.3%)	• longer duration of employment in primary care • a high job strain (OR:6.7(4.6, 9.7) • lack of supervisor feedback regarding performance (OR: 1.4 (1.1,1.7) • low social support from colleagues and supervisors (OR: 3.0 (2.2, 4.2)
30	(Dhaini et al., 2016)	Switzerland	Aged care centre	Cross-sectional	3471	7.6	NR	Nurses and nurse assistants	Burnout	• Increased workload (OR: 2.0 (1.6,2.3) • Lack of job preparation (lack of appropriate job-related education) (OR: 1.4 (1.1, 1.7) • Conflict among colleagues and lack of recognition (OR: 1.7 (1.4,2.1)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
31	(Spinelli et al., 2016)	USA	Primary care settings	Cross-sectional	467	9.4	NR	Physicians, Nurses, Mental health professionals Assistants and Others ‖	Burnout	• High workload • Low job control • Being a full-time worker than a part-time worker
32	(Chamberlain et al., 2017)	Canada	Aged care centres	Cross-sectional	1194	7.5	NR	Nurse's assistants	Burnout	• Perception of fewer staffing resources (β = -0.15, p < 0.01) • Insufficient space to discuss resident care needs (β = 0.18, p < 0.01) • Job satisfaction (β = -0.20, p < 0.01) • Lower mental health (β = -0.05, p < 0.01) • Lower physical health (β = -0.06, p < 0.01) • Resident responsive behaviours¶ (β = 0.10, p < 0.01)
33	(Elliott et al., 2017)	Australia	Aged care facilities	Cross-sectional	173	NR	18-50+	Nurses	psychological distress and depression	• low levels of job control • high job demand • Lack of outside work support

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Lack of co-worker support • Lack of supervisor support • Lack of informational justice (B=0.31 for depression and 0.33 for psychological distress (P<0.05 for both)
34	(Gu et al., 2017)	China	Rural medical and health Care centres	Cross-sectional	616	73.4	46.2 (10.8)	Others ‖	Depressive symptoms (27.4%)	• body mass index (OR=1.1 (1.03, 1.3) • Poor physical health (OR=4.3 (1.6, 11.1) • low educational level (high school or under) (OR=1.6 (1.1, 2.6) • negative coping styles (OR=1.1 (1.1-1.3)
35	(Lee and Jang, 2017)	USA	Aged care and disability care centres		150	14.0	47.5 (14.6)	Others ‖	Depression	• work/family conflict (β = .46, p < .001) • lack of client support • lack of peer support • lack of supervisor support • lack of organizational support
36	(Stensland and Landsman, 2017)	USA	Hospice care	Cross-sectional	244	8.0	18-54+	Social worker, Nurses and Others ‖	Burnout	• working full-time and working in a large hospice agency • Increased empathic concern

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Higher role ambiguity/role conflict
37	(Edwards et al., 2018)	USA	Primary care setting	Cross-sectional	777	NR	18-50+	Physicians, Nurses, Physician assistants	Burnout (35%)	• Being delegated for tasks • (Task reliance) (OR, 1.83 (1.33, 2.5)
38	(Gallego-Alberto et al., 2018)	Spain	Aged care centres	Cross-sectional	101	15.8	NR	Nurses, Assistants, ots, pts, Physicians	Anxiety	• Sex: Females (B=-1.6, p<0.01 • Difficulties in daily contact with family (B=3.2, P<0.01) • Guilt feeling regarding inability to provide care (B=3.1, P<0.01) • Caregiving burden (B=3.2, P<0.01) • Depersonalisation (B=3.1, P<0.01)
39	(Kandelman et al., 2018)	France	Aged care cares	Cross-sectional	132	10	20-70	Others ‖	Burnout	• Antecedent of bullying by a resident (OR=5.3 (1.1, 27.0)
40	(Samson and Shvartzman, 2018)	Israel	Home-based Palliative care units and primary care settings	Cross-sectional	241	16	50.5 (9.4)	Physicians and nurses	Burnout secondary traumatic stress	• Exposure to the death and dying of others

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
41	(Straud et al., 2018)	USA	Fire department	Cross-sectional	125	86.4	18-40	Firefighter paramedics	PTSD	• Exposure to traumatic events • Lower resiliency
42	(Li et al., 2019)	China	Primary care settings	Cross-sectional	951	34.9	NR	Doctors, nurses and public health workers	Burnout	• lack of perceived work support and autonomy • Perceived excessive workload (OR: 6.6 (3.5-9.7) • Lack of perceived work support
43	(Kosan et al., 2019)	Turkey	Primary Care setting	Cross-sectional	385	64.2	30.5 (5.1)	Family physicians	Burnout (24.5%)	• Increasing age (r=-0.2& P = 0.01) • Home or car ownership (no association quantity reported) • Negative thoughts about the profession (OR: 10.1 (3.9-2.6) • Regularly having vacation (OR: 2.1 (1.2-3.6)
44	(Osborn et al., 2019)	USA	Primary care settings	Cross-sectional	312	23	NR	Physician assistants	Burnout	• Sex: Females (r=0.2, P< 0.01) • Increased age (r=-0.1, P< 0.01) • Increased professional experience (r=-0.1, P< 0.01) • Working in primary care (r=0.2, P< 0.01) • Satisfaction with profession (r=-0.5, P< 0.01) • Satisfaction with current position (r=-0.6, P< 0.01)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
45	(von Hippel et al., 2019)	Australia	Community mental health work setting	Cross-sectional	349	22.9	30-60+	Mental health workers	Burnout	• Feelings of an inability to help clients, and that clients are making limited progress in treatment
46	(Aldrich and Cerel, 2020)	USA	EMS	Cross-sectional	266	NR	NR	Mental health professionals	Depression Anxiety PTSD	• Personal exposure to suicide • The suicide of a colleague • Number of occupational suicide exposures
47	(Apaydin et al., 2020)	USA	Primary care setting	Cross-sectional	160	42	30-60	Physicians, Nurse, Physician assistants	Burnout	• Difficulty of working with administrative call centre (OR:3.2 (1.1-9.8) • Difficulty of reviewing and responding to electronic health record alerts (OR:6.7 (1.9-24.4) • Inadequate care coordination (OR:7.5 (2.1-28.0) • Coordinating with specialists (OR:8.3 (3.5-19.3) • Difficulty of managing unscheduled visits (OR:7.5 (2.1-28.0) • Difficulty of reviewing and answering patient e-mail (OR:10.8 (3.5-33.6)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Difficulty of achieving adequate panel support from pharmacists (OR:9.5 (2.7-34.0)
48	(Gómez-García et al., 2020)	Spain	Community social services and Specialised social services	Cross-sectional	947	9.1	39.45 (8.9)	Social workers	Burnout	• Working on community social services compared with working in specialised social services (β= 2.6, p<0.001) • Full-time employment (β= 1.8, p<0.001) • Being on sick leave in the preceding year (β= 3.5, p<0.001) • Suffering from a chronic illness (β= 2.4, p<0.001) • Working in public administration compared with working in private sector (β= 1.3, p<0.001)
49	(Khan et al., 2020)	Australia	Community settings	Cross-sectional	134	45.8	39.1 (12.1)	Paramedics	Anxiety Depression Stress PTSD	• Insomnia (β=0.4, p<0.05) • Fatigue (β=0.3, p<0.05) • Shift work sleep disorder

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• Sleep cycle and circadian rhythms • BMI (β=0.3, p<0.05)
50	(Kshtriya et al., 2020)	USA	Community settings (mixed settings)	Cross-sectional	895	59.2	37.2 (12.1)	Mmedical technicians and paramedics	PTSD Depression Anxiety	• Informing family and friends that their relatives have died or been severely injured • Heavy workload • long working hours • Threats to personal safety and Inadequacy of resources
51	(Riello et al., 2020)	Italy	Residential nursing care homes	Cross-sectional	1071	14.6	NR	Health care workers	Anxiety (22%) PTSD (39%)	• Sex: Females (OR:2.2 (1.4-3.3 with anxiety) and (OR:1.6 (1.1-2.5 with PTSD) • Contact with COVID (OR:1.7 (1.1-2.6) for anxiety and PTSD
52	(Wang et al., 2020)	China	Primary care settings	Cross-sectional	1148	35.3	30-50+	Physicians, Nurses, Public health providers	Burnout	• Low job satisfaction (r=-0.52, P<0.05)
53	(Vagni et al., 2020)	Italy	EMS	Cross-sectional	236	41.1	43.2 (11.1)	Doctors, nurses, psychologist	Stress PTSD	• Sex: Females • The fear of contracting the virus of COVID-19 and infecting others
54	(Blanco-Donoso et al., 2021)	Spain	Aged care setting	Cross-sectional	228	19.7	36.3 (10.3)	Doctors, Nurses,	Traumatic stress	• increasing age (β = .33, p < .01) • Workload (β = .44, p < .001)

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
								Nurse assistants, Social workers, Psychologists, OTS and pts		• Social pressure from work (β = .37, p < .001) • lack of staff and PPE (β = .47, *p* < .001) • Minimal supervisor support (β = .37, p < .01) • contact with death and suffering (β = .17, p < .05)
55	(Fusco et al., 2021)	Canada	Wellness service centres	Cross-sectional	68	27.9	18-60+	Nurses, Psychologists, Social workers and OTS	PTSD (17.2%) Depression (7.7%) Anxiety (7.4%) Stress (7.4%)	• Personal experience/exposure with traumatic events (both workplace and non-work exposures) (OR:9.5 (2.7-34.0)
56	(Londono-Ramirez et al., 2021)	Spain	Primary care settings	Cross-sectional	78	28.2	51 (11)	Doctors, nurses, others‖	Anxiety	• Sex: Females (OR:2.4 (1.2-4.7)) • Perception of anxiety related to the protection measures (OR:5.1 (3.1-9.9)) • Perception of COVID-19 infection threat (OR:3.7 (2.1-6.5))
57	(Martínez-López et al., 2021)	Spain	Primary care settings	Cross-sectional	304	11.7	NR	Social workers	Anxiety	• Sex: Females (OR:2.4 (1.1-5.4)) • Fear of death of others • Fear of the process of dying of others • Lack of PPE (OR:2.3 (1.3-4.1))

	Author/year	Country	Study setting	Study design	Study participants				Psychological injury (prevalence)	Type of risk /associated factors with psychological injury *(Reported OR, RR, β, r) with 95% CI))*
					Total population (n)	Sex (Male (%))	Age in years a. range b. Mean (SD)	Occupations		
										• subjective perception of needing psychological/psychiatric treatment because of COVID-19 (OR:2.5 (1.3-4.5))
58	(Piotrowski et al., 2021)	Poland	EMS	Cross-sectional	74	15.5	38.9 (8.2)	Paramedics	occupational stress	• Lower resilience at workplace
59	(Vallejo Andrada et al., 2021a)	Spain	Aged care centre	Cross-sectional	90	15.5	33.9 (7.4)	Social worker, Nurses, pts, Doctors and Psychologists	Burnout Depression Anxiety Stress	• Disenfranchised grief after patient death: a grief that is not openly acknowledged, socially validated or publicly observed
60	(Vallejo Andrada et al., 2021b)	Spain	Aged care centre	Cross-sectional	90	15.5	33.9 (7.4)		Burnout	• Years worked in aged cares (β=0.7, P<0.05) • Working part-time (β=6.5, P<0.05) • disenfranchised grief (β=1.5, P<0.05

β= beta coefficient (Linear regression coefficient); CI = confidence interval; EMS=Emergency Medical Setting; NR=Not Reported; OT= occupational therapists; OR= odds ratio; PPE= Personal Protective Equipment; PTSD =Post-Traumatic Stress Disorder; PWDs= People With Disabilities; PTs= physiotherapists; r= correlation coefficient; RR= relative risk;

‖other staffs= Dentists, child care workers, home health workers, care givers, Village doctors, laboratory, radiology, administrative, and business staffs

The included studies involved a total of 34,466 HSA industry workers. The study sample sizes ranged between N=20 and N=3471. In 49 of 60 studies, the majority of participants were females, with the proportion of females ranging from 54.2% to 99.6%. However, the proportion of males was higher than that of females in five of the included studies (37,43,60,77,88). Six studies did not report the gender distribution (28,32,35,39,76,81). Twenty one studies did not report either the range or the mean age of participants (11,32,39–42,44,47,51,54–56,61,65,70,73,76,78,81,83,89). In 22 studies, the mean (SD) age of participants ranged from 33.9 (7.4) years (53) to 50.5 (9.4) years (82). The remaining 17 studies indicated a range of ages between 18 and 79 (28,33,35,43,45,57,59,63,64,66,71,74,77,79,80,86,87).

Approximately half of the studies (29 of 60) were conducted in aged care settings/nursing homes (38–42,46–48,52–54,56,63,65,66,70,73–76,79–81,83,86,87,89). Twenty two studies were conducted in primary care/community service settings (11,33–35,37,39,44,49–51,57–59,61,62,67–69,77,82,84,88). Other settings included three studies in emergency medical services (32,85,90), two in disability care settings (38,63), two in hospice/palliative care centres (45,82), and single studies each in wellness centres (71), rural medical and health care centre (60), long-term care facilities (72), ambulance care (39), child care centre (64) and a fire department (43).

Forty of the included studies were conducted among nurses and nursing assistants (33,35,39–42,44–48,50,52–56,59,61,63,65–73,75,76,78–82,84,86,87,90). Doctors were included in 19 studies (33,35,44,46,47,50,52,53,59–62,67–69,77,82,88,90), while social workers were included in 10 (34,45,46,49,51–53,55,63,71). Psychologists were included in seven studies

(34,46,52,53,55,71,90), occupational therapists in four (46,47,55,71), physiotherapists in four (46,47,52,53), and paramedics in four (37,43,58,85). Other occupational groups including public health providers, mental health professionals, emergency medical technicians, physician assistants and laboratory and radiology technicians, were included in at least one study (11,32,33,35,37,38,44,45,57,59–61,63,64,67,69,74).

Quality of included studies

Supplementary Table 1 shows the quality of included studies. Key characteristics of the study participants such as age ranges and proportions of females to males were not adequately described in 23 of the studies (11,28,32,35,39–42,44,47,51,54–56,61,65,70,73,76,78,81,83,89). Low response rate (<75%) of the study participants were observed in twenty five studies (11,34,35,40,42,44,45,54–56,58,63–66,74–77,79,81–84,89). Fifteen studies selected their study participants non-randomly (32,37,44–46,58,60,62,66,68,69,84,86,90,91) and twenty-one reported a small sample size (11,28,33,38,39,43,45,47,48,51,56,63,66,68,71,72,74,75,82,85,87). None of the selected studies included a matched comparison group to determine the relative risk of psychological injury. Not studies were excluded based on quality assessment however it should be noted that the quality of included studies was mixed.

Psychological injuries

The most commonly reported injury in the included studies was burnout, reported in 30 studies (11,33–36,39,44,45,48,49,53,54,57,59,61,64–66,68–70,74,76–79,82,84,86,88), followed by stress (both traumatic and non-specific) reported by 14 studies (46,55,58,63,65,71–73,81,82,85,87,90,92)). Anxiety and/or Depression was reported in 13

studies (28,32,37,38,40–42,47,50–52,54,58,62,63,67,71,83), and PTSD in six studies (32,37,43,58,83,90). Compassion fatigue was reported in two studies (34,54). Distress (occupational, psychological or moral) was reported in three studies (28,56,75). Fourteen studies reported more than one psychological injury outcome (28,32,34,37,53,54,58,62,63,65,71,82,83,90).

Outcome measurement tools

Table 2 describes the outcome measurement tools used to quantify psychological injury. A total of 36 different measurement tools were used across the 60 included studies. The most commonly used tool was the Maslach Burnout Inventory, used in 23 studies. All other tools were used in between one or three studies.

Table 2. List of outcome measurement tools reported in included studies

Outcome	Measurement tool
Anxiety	Generalized Anxiety Disorder-7 score (32,71,83)
	Staff Observation Scale Revised (63)
	The Profile of Moods State questionnaire (47)
	Depression, Anxiety, and Stress Scale (54)
	Beck Depression Inventory-Short Form (58)
	Zung Self-rating Anxiety Scale (62)
	Collett and Lester death anxiety scale (51)
	Hospital Anxiety and Depression
	(HAD) scale (50)
Burnout	Maslach Burnout Inventory (11,35,36,39,44,45,48,52,59,61,66,68,69,74,76–79,84,86,91,93)
	30-item ProQOL-III (34)
	Professional Quality of Life Scale-IV (54)
	Copenhagen Burnout Inventory (57,64)
	The Shirom–Melamed Burnout Measurement (82)
Compassion fatigue	30-item ProQOL-III (34)
Depression	Patient Health Questionnaire-9 (32,94)

Outcome	Measurement tool
	The Centre for Epidemiological Studies Depression Scale (38,40–42,60)
	Depression, Anxiety, and Stress Scale (54)
	Beck Depression Inventory-Short Form (58)
	Zung Self-rating Depression Scale (62)
PTSD	The Short Screening Scale for PTSD (32)
	the 22-item impact of event scale-revised (83)
	Posttraumatic Stress Disorder Checklist–Civilian(43)
Stress	Depression, Anxiety, and Stress Scale (54)
	work stress scale (87)
	Perceived Stress Scale (58)
	Health Professional Stress Inventory (81)
	Secondary Traumatic Stress Scale (90)
	Mental Health Professionals Scale (55,84)
	The ProQoL V scale (82)
	The Sense of Stress Questionnaire (85)
	Siegrist questionnaire (73)
	Expanded Nursing Stress Scale (72)
Traumatic stress	Secondary Traumatic Stress Questionnaire (46)
Psychological distress	the Kessler Psychological Distress Scale (28)
	Kessler Psychological Distress Scale (56)
Moral distress	Moral distress questionnaire (75)

Risk factors associated with psychological injuries among HSA workers

A broad range of risk factors associated with psychological injuries were reported. Table 3 provides an overview of the evidence for the risk factors among the included studies. The greatest number of included studies reported on the relationship between occupational factors and psychological injury, specifically on job demands, job control and job satisfaction. There were also a large number of studies examining the relationship between psychological injury, work environment and workplace social support.

1. Individual level/Personal factors

1.1. Sociodemographic factors

The association between sociodemographic factors and psychological injuries was examined in 12 studies. The most commonly studied sociodemographic factors were age and sex (11,34,41,50,54,62,68,69,77,79,83,90). Seven studies observed a positive association with older age and higher levels of psychological injury (11,41,54,62,68,69,77). One study found an association between younger age and compassion fatigue and burnout among HSA workers (34). Seven studies observed that women reported higher levels of psychological injury than men (11,47,50,68,79,83,90). One exception is a study of physicians, which found male doctors had higher risk of burnout than females (77).

There were fewer studies on other demographic factors. One study reported that being married/cohabiting and divorced/widowed was associated with an increased risk of anxiety and depression in doctors as compared to being single (62). Low educational level, low financial income, lack of home or car ownership, household crowding and having more number of family members (e.g. people living with the individual (4+)) and working a rural area were also associated with burnout (41,68,77).

1.2. Personal relationships and social support

Six studies assessed associations between personal relationships or social support and psychological injuries (28,38,47–49,75). Arguments with workers' own family members and poor relationship with families of clients/patients were associated with anxiety and burnout (47,48). In one study the workers' perception of work/family conflict was associated with depression (38).

2. Health related factors

2.1. *Medical History*

Three studies examined worker medical history and psychological injury. Increased body mass index, poor physical health, and a history of chronic illness were statistically associated with depression and burnout (49,60). Insomnia and obstructive sleep apnoea were associated with anxiety, depression, stress, and PTSD in one study (58).

2.2. Psychological factors

Nine studies examined the association between worker psychological factors and psychological injury (41–43,54,55,85,86,88,89). Low levels of resilience and higher emotional stress/strain were the main psychological traits that were associated with psychological injuries (43,54,55,60,85,86). Negative attitudes of workers towards their profession and professional self-doubt (54,55,88), as well as stress caused by exposure to ambiguous moral situations or ethically challenging situations at work, were linked to an increased risk of burnout, depression, anxiety, compassion fatigue, occupational distress, and PTSD (43,54,55,60,85,86).

3. Occupational factors

3.1. Job Demands, control, and satisfaction

Twenty-three studies examined the link between job demands, job control and job satisfaction with psychological injury (11,28,33,35,37,44,47,50,55,56,59,61,64,67,70,75–77,79,80,84,88,95). High job demand was found to be associated with stress, anxiety, moral distress, and burnout in 17 studies (21,28,33,35,37,44,47,50,55,56,64,70,76,77,79,80,95). In nine studies, low levels of job control was associated with burnout, psychological distress, and depression (28,44,56,67,76,80,84,88,95). Five studies found an association between low job

satisfaction and psychological injury (11,56,59,70,75). Psychological injuries have also been linked to a lack of recognition/reward, insufficient resources, job strain, and insufficient vacation time (67,78,84,88). Role issues such as role ambiguity and conflict were associated with burnout in nurses (45,73,76,84).

3.2. Other occupational factors

Seven studies considered the association between other job characteristics and psychological injuries (11,34,44,54,60,78,80,87,94). Three studies observed that greater job experience, such as a longer term of employment in primary care, was associated with greater psychological injuries (11,54,94). One study reported that less work experience is associated with compassion fatigue and burnout (34). In two studies, full-time work was found to be significantly associated with a higher prevalence of psychological injuries than part-time work (44,94). Working on a fixed schedule and at night (87) were also linked to an increased prevalence of work-related stress among nursing assistants. Working more than 40 hours per week were associated with psychological injuries (80,94). Job insecurity was associated with burnout (80). Lack of job preparation such as having no special trauma training and less working experience were associated with burnout and depression respectively (34,60,95).

4. Organisational factors

4.1. Management factors

Eight of the included studies have found that organisational management factors were associated with psychological injuries (33,41,42,56,67,75,80,95). Inadequate patient care coordination and poor staff handling (33,80), and leadership styles that focus on tasks, setting boundaries, standards and formulating targets compared to leadership styles focusing on

people and relationships were associated with higher prevalence of psychological injuries (75). Managerial pressure/domination was associated with depression among nursing assistants (41,42). Lack of performance feedback and lack of recognition were associated with depression (67,95). Lower organizational justice at work (such as procedural, distributive, interpersonal, and informational justice) was associated with psychological distress among nurses (56). In one study, private for-profit ownership of healthcare and community service organisations was also a predictor of depression (42), and this was attributed by the study authors to management features such as managerial dominance.

4.2. Work environment and working conditions

The link between work environment and working conditions with psychological injury was evaluated in thirteen studies (32,46,50,51,64,69,71,73–76,80,90). Three studies looked at the 'fear' of COVID-19 and psychological injuries (46,51,90). Specifically, the fear of death of others, fear of the process of dying of others, fear of being infected and infecting others by COVID-19 and lack of personal protective equipment (PPE) were associated with stress and PTSD (46,51,90). Unhealthy working conditions, which include noise, poor communication, unprofessional or dishonest behaviour and/or strained relationships between employees and the office leadership, were associated with burnout (64,69,75). Occupational stressors such as traumatic exposure, occupational exposure to one or more suicides, such as losing a co-worker to suicide, has been linked to psychological injuries such as depression, anxiety, and post-traumatic stress disorder (PTSD) (32,71). Subjective perception of needing psychological/psychiatric treatment because of COVID-19 was associated with anxiety and PTSD (51). Perceptions of COVID-19 infection threat, protection measures (such as the use of

Personal Protective Equipment), and management were associated with anxiety (50). Environmental uncertainty such as the perceived lack of information about key dimensions of the environment was associated with burnout in nurses (76).

4.3. ***Workplace social support***

Eleven studies found a negative association between the quality of workplace relationships and psychological injuries among HSA workers (28,38,39,46,55,56,65,67,72,76,84). Poor social relations at work and conflicts with other professionals were associated with stress and burnout (39,55,65,76,84). Lack of supervisor support from the director was associated with work stress (46,72), psychological distress and depression (38,56,67). Lack of co-worker support was associated with stress (28), depression (38,56,67) and psychological distress (56). Social conflicts in the workplace such as verbal abuse, physical attack and bullying was associated with stress and burnout (73,74). Conflict among colleagues was associated with burnout (95).

Table 3: Overview of risk factors for psychological injury observed in included studies.

Factor	Number of articles	Direction of association	Citation
Individual level/Personal factors			
Sociodemographic factors			
Age	8		
Younger age	1	negative	(77)
Older age	7	positive	(11,41,42,54,62,68,69)
Gender	8		
Male	1	Positive	(68)
Female	7	Positive	(11,50,51,79,83,90,96)
Marital status	1		
Married/cohabiting	1	Negative	(62)
Divorced/widowed	1	Positive	(62)
Educational level	2		
Low educational level		Positive	(41,68)
Financial issues	3	Positive	
Low financial income	2	Positive	(41,68)
Home or car ownership	1	Negative	(91)
working in rural and remote area	1	Positive	(77)
Personal relationships and social support	6		
Lack of outside work support	3	Positive	(28,38,63)
Problems with family members	4	Positive	(38,48,75,96)
2. Health related factors	3		
Medical history	3		
Increased body mass index	1	Positive	(60)
Poor physical health	1	Positive	(60)
Previous history of chronic illness	1	Positive	(91)
sleep dissatisfaction, insomnia, obstructive sleep apnoea	1	Positive	(58)
Psychological factors	10		
Professional self-doubt	1	Positive	(55)
Negative attitude about their profession	1	Positive	(88)
Negative emotions in different situations	1	Positive	(54)
stress of conscience and perceptions of conscience	1	Positive	(86)

Factor	Number of articles	Direction of association	Citation
Emotional strain	3	Positive	(41,42,89)
Lower resilience at work place	3	Positive	(43,54,85)
Occupational factors			
Job Demands, control, and satisfaction	22		
High job demand	17	Positive	(21,28,33,35,37,44,50,55,56,64,70,76,77,79,80,95,96).
Low levels of job control	9	Positive	(28,44,56,67,76,80,84,88,95)
Low job satisfaction	5	Positive	(11,56,59,70,75),
Lack of recognition/reward	1	Positive	(95)
Insufficient resources	1	Positive	(84)
Having job strain	1	Positive	(67)
Not having enough vacation	1	Positive	(88)
Other job characteristics	7		
Less work-experience	1	Positive	(34)
More work-experience such as longer duration of employment in primary care	3	Positive	(11,54,67)
Work status -Being a full-time worker than a part-time worker	2	Positive	(44,67)
Having a fixed schedule	1	Positive	(87)
night work	1	Positive	(87)
working more than 40 hours per week	1	Positive	(69,80)
Organizational factors			
Management-related factors	8		
Inadequate patient care coordination	1	Positive	(33)
Poor staff handling	1	Positive	(33)
Leader styles that focus on tasks, setting boundaries, standards and formulating targets	1	Positive	(75)
Managerial pressure/domination	2	Positive	(41,42).
No feedback regarding performance and lack of recognition	3	Positive	(67,80,95).
Organizational injustice at work (such as procedural, distributive, interpersonal, and informational injustice)	2	Positive	(56,80).
Private for-profit ownership of organisation	1	Positive	(42)

Factor	Number of articles	Direction of association	Citation
Work environment and working conditions	13		
Perception of COVID-19 infection threat	4	Positive	(46,50,51,83) .
Lack of personal protective equipment (PPE)	1	Positive	(51)
Occupational exposure to one or more suicides	1	Positive	(32)
The fear of death and dying of others	3	Positive	(51,83,90)
Lack of information about key dimensions of the environment	1	Positive	(76)
Unhealthy working environment			
(aggression, physical attack, bullying, verbal abuse)	7	Positive	(63,64,69,74,75,80)
Workplace social support	11	Positive	
Lack of / minimal client support	1	Positive	(38)
Lack of co-worker support	3	Positive	(28,38,50,76)
Low amount of social relations at work and conflicts with other professionals	5	Positive	(28,38,56,61,65,78)
Lack of supervisor support	4	Positive	(28,46,67,80)
Lack of support from senior managers	3	Positive	(28,39,56)

DISCUSSION

This rapid review aimed to synthesise the evidence on risk factors for psychological injury among healthcare and social assistance industry workers in non-hospital settings. A total of 60 studies were identified that statistically examined the relationship between personal, health, occupational or organisational factors and psychological injury among HCWs across a broad range of occupations, and working in a range of settings. This review identified that the greatest volume of evidence linking psychological injury with occupational factors, and more specifically for aspects of job design including job control, job demands as well as the workers level of job satisfaction. The next largest volume of evidence was for the relationship between psychological injury, work environment and workplace social support, followed by sociodemographic factors such as age and gender. A smaller volume of studies have examined the relationship between psychological injury and other risk factors. While the quality of studies is mixed and all of the included studies are cross-sectional, the findings of this review suggest that job and workplace level factors have a substantial impact on the psychological health of workers in the healthcare and social assistance industry, working in non-hospital settings. Importantly, these aspects of job design, work environment and workplace relationships are modifiable, suggesting an opportunity for work design interventions to improve worker psychological health and reduce the prevalence of psychological injury in this sector.

There was considerable evidence of a link between job demand, job control, and job satisfaction and psychological injuries among HSA workers in this review. Prior reviews and longitudinal evidence on psychological injury risk factors in a variety of industries also confirmed that individuals with jobs that require a high level of demands are more likely to claim psychological injuries (24,97–101). For example, Nieuwenhuijsen et al reported that high job demands and low job control

predicted the occurrence of stress-related psychological injuries (24). The mechanisms by which job demands, control, and satisfaction are associated with psychological injuries remain unknown. However, there are numerous hypotheses on this topic in the psychological literature. High workloads or time constraints, for example, can lead to emotional strain, such as sadness, anxiety, or frustration, which can lead to burnout and psychological distress(102,103). Control over one's job provides a motivating mechanism that can aid in the reduction of burnout. It could also be likely related to the presence of additional risk factors, such as time constraints, a scarcity of resources, and job strain (97).

One of the other findings to emerge from this review is that there were numerous examples of association between organisational factors and psychological injuries among HSA workers. There is mounting evidence that organisational elements such as job characteristics, managerial issues, and workplace factors and working conditions all contribute to the risk of work-related psychological injuries (104,105). Managers, supervisors, and employers in the HSA industry may benefit from training on psychological injury risk factors to help prevent, identify, and manage psychological health and safety issues. Creating a mentally healthy work environment and identifying early warning signs of psychological injuries such as increased unplanned absences, withdrawal or deteriorating work performance in the work place will be able to help prevent psychological injuries.

Our review also found a significant association between psychological injuries among HSA workers and social aspects of the workplace, work environment, and working condition. This finding broadly supports the work of other studies in this area linking workplace social support and psychological injuries in different occupational settings (99,100,106,107). These results provide further support for the hypothesis that poor relationships with supervisors, interpersonal conflict and violence and lack of social support at workplace are an important modifiable risk factor for psychological injuries.

The majority of studies that examined the relationship between age and psychological injuries in HSA employees reported that older adults were more likely than younger adults to sustain psychological injuries. This outcome could be explained by the fact that older workers have simply spent more time in HSA than younger workers. Three investigations supported up this argument, finding that more employment experience was linked to more psychological injuries (11,54,94). Older HSA workers who work in unsatisfying or stressful work environments may have fewer job transfer opportunities than younger workers, as they are frequently perceived as more expensive workers or as being too old to obtain the necessary education for the new job, which may increase their risk of psychological injuries such as burnout (108).

Out of the seven total studies that treated gender as a risk factor in their analyses, the majority reported that women were more likely than men to sustain psychological injuries. There are several possible explanations for this result. Biological and psychosocial factors may contribute to men and women's varied vulnerability to psychological injuries (109). Gender differences in vulnerability to psychological injuries may be caused by the effects of sex chromosome genes and sex hormone fluctuations. These fluctuations may result in an intermittently increased susceptibility to psychological distress, as well as negative emotions, non-adaptive behaviours, and poor sleep quality in females leading to psychological injuries (109–111). The gender differences in job roles, social support, and social roles may contribute to higher vulnerability to psychological injuries in women (109–111). For example, women may experience more harassment, bullying, workplace stress, interpersonal conflict and gender based violence than men (112–114). Furthermore, women are less likely to work in managerial roles, and are more likely to work in lower-level and front-line positions, which may result in lower income and job dissatisfaction (109–111). Another possible

explanation for this is that because the HSA sector consists of female employees on a large-scale, psychological injuries may affect a disproportionate number of women.

The findings of this review are consistent with some current conceptual models which explain the relationship between work design and workers health. For example, the SMART work design model developed by Parker and colleagues provides a practical and parsimonious framework to understand the effects of work design on psychological injury (115). The SMART model identifies five key themes (i.e. Stimulating, Mastery, Agency, Relational, and Tolerable Demands) that result in positive outcomes at the individual-, team-, and organisation-level across jobs and industries. The Stimulating dimension encompasses work characteristics such as possibilities for development, skill variety, and task variety. The Mastery dimension is all about providing clarity and feedback to workers. The importance of autonomy, control, and impact on work is addressed in the agency component. Control over work scheduling and procedures, as well as participation in decision-making, are elements of agency. The SMART work solution includes relational components of work such as social contact, client connections, supervisor and peer support and being part of a team. In addition, workload and pressure must be tolerable, according to the "T" component of SMART work design.

The findings of this review are consistent with the components of the SMART work design model. For example, prolonged employment in primary care and a lack of job preparation (lack of appropriate job-related education and special training), both of which can be considered criteria for unstimulating jobs according to the SMART work design model, were associated with a variety of psychological injuries such as burnout, stress and depression (34,67,95). We found that role conflict /role ambiguity and a lack of supervisor feedback on performance, both of which are characteristics of low-mastery occupations according to the SMART model, were associated with psychological

injury (45,67,73,76,95). Harassment, violence, or threats at work, and unsatisfactory communication with supervisors (which are characteristics of poor relation), lack of supervisor feedback on performance (which is a characteristics of poor mastery), and disapproval from a supervisor at work and lack of job control (which are characteristics of low agency jobs) were all associated with psychological injuries. (28,44,56,66,80). Jobs that are less relational, as described by the SMART model, are more likely to involve a lack of social support at work, which was identified as a primary risk factor for psychological injuries in this review (28,33,38,39,46,56,61,63,65,72,76,94). Increased job demand is another noteworthy finding of this study, which is a basic criterion for a job with intolerable demands according to the SMART model of care (33,35,37,44,47,50,55,56,61,64,67,70,75–77,79,80,84,95).

Evidence gaps, strengths and limitations.

This review critically examined the existing evidence base on risk factors associated with psychological injuries in the HSA sectors. The findings are expected to help shape the design of future longitudinal studies, and also intervention studies seeking to modify workplace, job or other characteristics in order to reduce the prevalence or impact of psychological injury. However, there are numerous gaps in the evidence base. We did not identify any intervention studies designed to prevent psychological injury in non-hospital-based HSA workers. This is a significant limitation but also suggests an opportunity for new knowledge generation. The included studies also lacked comparison groups of non-injured participants. Without appropriate comparison groups, such as with the general population, these findings should be interpreted with caution, particularly where the HSA sample recruited is not representative of the wider population of interest.

There were fewer studies in some occupational groups including paramedics, physiotherapists, occupational therapists and social workers; and fewer studies in some industry settings including

child care centres, disability care centres, palliative care centres and ambulance care settings. Many studies were in older cohorts of workers, with the median age approaching 50 years. Fewer studies were in younger workers, despite psychological problems being more prevalent in younger people (46,48,52,53,88).

All included studies were cross-sectional in nature, meaning that we are only able to describe associations between predictors and outcomes, and cannot make conclusions about causality. It is possible that psychological injuries contribute to negative "perceptions" of occupational, workplace and social factors. It may also be possible that a poor occupational, workplace and social factors contribute to psychological injuries; or that a complicated reciprocal relationship exists between psychological injuries and occupational, workplace and social characteristics. Additionally, we do not know if the psychological impairment occurred during or as a result of work or arose from other factors or experiences in the workers life. Longitudinal studies would provide stronger evidence of causal relationships between personal, occupational, workplace and social factors and psychological injury outcomes.

Another limitation of this review is that the sampling and analytic techniques used in the included studies were quite diverse. Most of the included studies used small sample sizes and bivariate correlational analyses without adjusting for confounding variables, restricting their ability to study complex interactions between risk factors and outcomes. Self-report surveys alone cannot be used to correctly identify and quantify the risk factors associated with psychological injuries. The response rate of the majority of included studies were low too, which may limit the generalisability of the study findings. Studies using an observer reported data (such as a clinician evaluation) would have allowed us to better determine the magnitude and associated factors of psychological injury and HSA providers

Future studies including comparison groups, long-term longitudinal follow-up, and pre-injury data on traumatic experiences, psychological issues, and health-related quality of life may be necessary to better understand the risk factors for psychological injuries among HSA workers. The outcomes used in the included studies were exclusively self-reported, which could be a source of bias. Outcomes on self-reported questionnaires are not equivalent to diagnosed psychological disorders, such as anxiety, major depression or PTSD. Studies using alternative observer reported data, such as a clinician evaluation, would be valuable.

Implications

The results of this rapid review have several implications for employers, workers and governments. First, the greatest volume of evidence shows a consistent relationship between job characteristics and psychological injury. Health and community sector workers in non-hospital settings reporting high job demands, low job control or low job satisfaction are more likely to report psychological injuries including burnout, stress, anxiety and depression. This replicates a substantial evidence base in other industries such as humanitarian aid, the construction industry, transport industry, farming industry and telecommunications industry, and also within hospital-based workers (116–120). For example, several systematic reviews describe the relationship between job demands and control in hospital-based nursing cohorts (121–123). This finding suggests that interventions that reduce psychological injuries in these other occupational and industry settings, or aspects of those interventions, may be transferrable to non-hospital-based HSA workers in settings such as aged care and disability care. Based on our findings, it is feasible to suggest that interventions targeting job control, demand, and satisfaction will have an influence on preventing psychological injuries among HSA employees. This would include, for example, multimodal interventions that focused on job

design, the work environment and working conditions (124,125). Use of tools such as the SMART work design model may support effective intervention design (115).

Second, we also identified many studies showing an association between relationships and behaviours in the workplace and psychological injury. These included relationships with co-workers and supervisors, the behaviour of management towards workers, and the extent of workplace social support experienced by workers. This finding shows that these interpersonal aspects of HSA experiences at work are very important for psychological health. There is a substantial evidence base on workplace culture and the importance of workplace supports and behaviours in other industries and settings (106,126,127). As with the evidence on job design and control, this evidence may provide a crucial starting point for the design of interventions to enhance workplace relationships and behaviours in ways that can reduce psychological injury. By reducing the influence of workplace risk factors and increasing the impact of potential coping mechanisms such as a positive mental attitude, venting negative emotions, problem-solving, and seeking help, psychological injuries to HSA workers may be minimised. Workplace modifications and ongoing support in preventing psychological injury, including a more favourable organisational culture can equip HSA workers with the necessary support and resources to offer high-quality treatment to their clients (128). Workplace policies and practices promoting higher levels of communication, interaction and coordination among employees, employees and supervisors, and other colleagues may improve HSA well-being (129,130).

Third, we identified that factors across a range of occupational, organisational and managerial domains were significantly related to psychological injury. This finding is consistent with the evidence that healthy healthcare workplaces have features of a 'whole-system' approach, including identification and response to local staff needs, engagement of staff across all levels of the

organisation, and the engagement and leadership of senior management. A systematic review of 'whole-system' interventions suggests that they are at least partially effective in improving the psychological health of HSA workers (131). Health care institutions and professionals should consider evidence-based management ways to modify and prevent the factors associated with psychological injuries in HSA workers. An integrated prevention strategy such as workplace design (for example, SMART work design) that addresses multiple elements jointly is more likely to be successful than a strategy that focuses exclusively on one aspect, such as the organisational/management (132).

Early detection, prevention, and treatment of factors linked with psychological injuries in HSA workers may be important for reducing psychological injury and improving HSA workers' psychological health. Organisational strategies aimed at preventing the factors associated with psychological injury among HSA workers are needed. Interventions at the workplace level, such as giving structural resources to staff, enhancing the work environment's culture (both physical and psychosocial environment), and addressing reactive/challenging behaviours (such as violence, aggression and bullying at work), may help prevent psychological injuries. Implementing strategies to communicate information about work authority and responsibility, allowing employee input into their work role, facilitate feedback to employees, and ensure that issues raised are resolved or referred on properly will help to prevent psychological injuries. Staff support strategies, such as briefings before and after tasks, counselling options, and peer personal assistant initiatives, may aid in the prevention of psychological injuries.

SUMMARY OF THE FINDINGS

This review identified a broad range of risk factors for psychological injury in non-hospital- based HSA workers. While some of these factors are personal in nature (e.g., sociodemographic and health-related issues) and thus difficult to modify, the overwhelming majority are occupational and organisational factors and are modifiable, suggesting opportunities for intervention to reduce psychological injury. Research on risk factors of psychological injuries among HSA workers has overwhelmingly relied on cross-sectional design and survey data. Prospective, longitudinal studies will help to examine the risk factors of psychological injuries among HSA workers more precisely. Future research on psychological injuries should also consider incorporating intervention strategies to optimize management of psychological injuries.

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APPENDICES

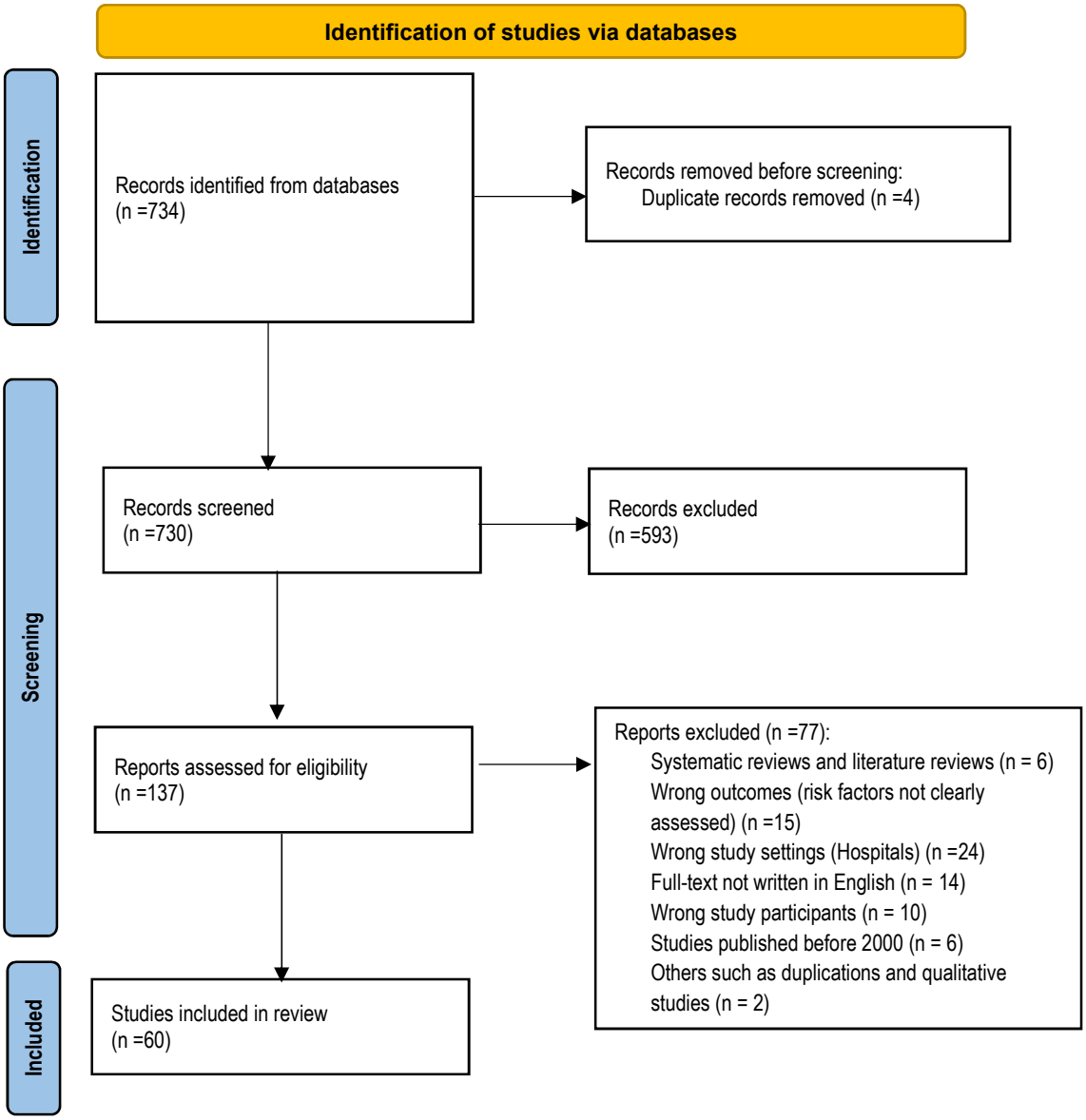
Appendix 1: search strategy for the rapid review

	Ovid MEDLINE(R) <1946 to October 29, 2021>	
NO	**Search terms**	**Results**
1.	psychological problem$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	5461
2.	Psychological injury.mp.	104
3.	exp psychological distress/	5103
4.	psychological distress.mp.	20382
5.	"trauma and stressor related disorders"/ 112	
6.	psychological harm.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	322
7.	mental illness.mp.	27330
8.	mental health condition*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2898
9.	exp Anxiety/	97149
10.	anxiety.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	232082
11.	stress.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	885417
12.	exp Depression/	134067
13.	depression.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	389703
14.	exp Burnout, Psychological/	14721
15.	burnout.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	17885
16.	"mental stress".mp.	3145
17.	"occupational stress".mp. or Occupational Stress/	4570
18.	"job stress".mp.	1950
19.	exp Burnout, Professional/	14301
20.	exp post-traumatic stress/ or post-traumatic stress.mp.	12592
21.	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 7or 8.mp. or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20	1265255
22.	exp Nurses/ or nurses.mp.	264801
23.	general practicioner$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	52

24.	doctors.mp.	75370
25.	healthcare professionals.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	21369
26.	allied health personnel/ or community health workers/ or dental auxiliaries/ or emergency medical technicians/ or home health aides/ or licensed practical nurses/ or nursing assistants/ or physical therapist assistants/ or physician assistants/ or health personnel/ or occupational therapy assistants/	88425
27.	"home care workers".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	269
28.	"out of home care workers".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	38
29.	"aged care worker".mp.	64
30.	"aged care provider".mp.	22
31.	disability service provider.mp.	24
32.	physiotherapists.mp. or Physical Therapists/	6412
33.	occupational therapists.mp. or Occupational Therapists/	4268
34.	paramedics.mp.	3736
35.	ambulance officers.mp.	71
36.	ambulance workers.mp.	38
37.	social workers.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	
38.	exp psychologists/ or psychologists.mp.	76284
39.	22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38	500589
40.	risk factors.mp. or Risk Factors/	1068061
41.	associated factors.mp.	21078
42.	determinants.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	156004
43.	predictors.mp.	228193
44.	psychosocial factors.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	12234
45.	work-related factors.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	941
46.	Occupational factors.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	1633
47.	40 or 41 or 42 or 43 or 44 or 45 or 46	1385372

48.	aged care cent$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	36
49.	nursing home$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	46653
50.	exp Home Nursing/	9490
51.	exp Child Care/	20855
52.	Child Day Care Centers/ or child care center.mp.	5273
53.	disability center.mp.	640
54.	disability cent$.m_titl.	230
55.	"primary care cent$".mp.	2583
56.	community care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	4519
57.	child care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	10907
58.	disability care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	117
59.	disability service.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	170
60.	aged care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2887
61.	primary care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	113846
62.	social care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	5892
63.	48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62	215206
64.	21 and 39 and 47 and 63	734

Appendix 2: PRISMA flow diagram for article selection process



Appendix 3: supplementary materials 'risk factors associated with psychological injury among healthcare and social assistance industry workers: evidence review'

Supplementary Table 1. Quality of included studies usingThe Joanna Briggs Institute Critical Appraisal tools for use in JBI Systematic Reviews

No	Author/year	Appropriate sample frame to address the target population (Yes /No/unclear)	Study participants sampled in an appropriate way (Yes/No/unclear)	Adequate sample size (Yes/No/unclear)	Study subjects and the setting described in detail (Yes/No/unclear)	The data analysis conducted with sufficient coverage of the identified sample (Yes/No/unclear)	Valid methods used for the identification of the condition (Yes/No/unclear)	The condition was measured in a standard, reliable way for all participants (Yes/No/unclear)	There was appropriate statistical analysis (Yes/No/unclear)	Adequate response rate (Yes/No/unclear)	Overall appraisal (Include/ Exclude)
1	(Rafnsdottir et al., 2004)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
2	(Goehring et al., 2005)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
3	(Lloyd et al., 2005)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
4	(C. Muntaner et al., 2006a)	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Include
5	(C. Muntaner et al., 2006b)	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Include
6	(Carles Muntaner et al., 2006)	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Include
7	(Hsu et al., 2007)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
8	(Lapane and Hughes, 2007)	Yes	No	No	No	No	Yes	Yes	Yes	No	Include
9	(McGilton et al., 2007)	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Include
10	(Juthberg et al., 2008)	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Include
11	(van den Berg et al., 2008)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
12	(Silva and Menezes, 2008)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include

No	Author/year	Appropriate sample frame to address the target population (Yes /No/unclear)	Study participants sampled in an appropriate way (Yes/No/unclear)	Adequate sample size (Yes/No/unclear)	Study subjects and the setting described in detail (Yes/No/unclear)	The data analysis conducted with sufficient coverage of the identified sample (Yes/No/unclear)	Valid methods used for the identification of the condition (Yes/No/unclear)	The condition was measured in a standard, reliable way for all participants (Yes/No/unclear)	There was appropriate statistical analysis (Yes/No/unclear)	Adequate response rate (Yes/No/unclear)	Overall appraisal (Include/ Exclude)
13	(Gandoy-Crego et al., 2009)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
14	(Rodwell et al., 2009)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
15	(Craig and Sprang, 2010)	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Include
16	(Franz et al., 2010)	Yes	No	No	No	No	Yes	Yes	Yes	No	Include
17	(Nubling et al., 2010)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
18	(Schmidt, 2010)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
19	(Sorgaard et al., 2010)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
20	(McHugh et al., 2011)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
21	(Shen et al., 2012)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
22	(Kubicek et al., 2013)	Yes	No	No	No	No	Yes	Yes	Yes	No	Include
23	(de Veer et al., 2013)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Include
24	(Hegney et al., 2015)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
25	(Koch et al., 2015)	No	No	No	No	No	Yes	Yes	Yes	No	Include
26	(Muntaner et al., 2015)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
27	(Pelissier et al., 2015)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
28	(Silva et al., 2015)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
29	(da Silva et al., 2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
30	(Dhaini et al., 2016)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
31	(Spinelli et al., 2016)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Include
32	(Chamberlain et al., 2017)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include

No	Author/year	Appropriate sample frame to address the target population (Yes /No/unclear)	Study participants sampled in an appropriate way (Yes/No/unclear)	Adequate sample size (Yes/No/unclear)	Study subjects and the setting described in detail (Yes/No/unclear)	The data analysis conducted with sufficient coverage of the identified sample (Yes/No/unclear)	Valid methods used for the identification of the condition (Yes/No/unclear)	The condition was measured in a standard, reliable way for all participants (Yes/No/unclear)	There was appropriate statistical analysis (Yes/No/unclear)	Adequate response rate (Yes/No/unclear)	Overall appraisal (Include/ Exclude)
33	(Elliott et al., 2017)	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Include
34	(Gu et al., 2017)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
35	(Lee and Jang, 2017)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
36	(Stensland and Landsman, 2017)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
37	(Edwards et al., 2018)	Yes	Unclear	No	Yes	Yes	Yes	Yes	Yes	No	Include
38	(Gallego-Alberto et al., 2018)	Unclear	No	No	No	Yes	Yes	Yes	Yes	Yes	Include
39	(Kandelman et al., 2018)	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Include
40	(Samson and Shvartzman, 2018)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
41	(Straud et al., 2018)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
42	(Li et al., 2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
43	(Kosan et al., 2019)	Yes	No	No	Yes	Unclear	Yes	Yes	Yes	Yes	Include
44	(Osborn et al., 2019)	Yes	No	No	NO	NO	Yes	Yes	Yes	No	Include
45	(von Hippel et al., 2019)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
46	(Aldrich and Cerel, 2020)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
47	(Apaydin et al., 2020)	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Include
48	(Gómez-García et al., 2020)	Yes	No	Yes	No	Unclear	Yes	Yes	Yes	Yes	Include
49	(Khan et al., 2020)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Include

No	Author/year	Appropriate sample frame to address the target population (Yes /No/unclear)	Study participants sampled in an appropriate way (Yes/No/unclear)	Adequate sample size (Yes/No/unclear)	Study subjects and the setting described in detail (Yes/No/unclear)	The data analysis conducted with sufficient coverage of the identified sample (Yes/No/unclear)	Valid methods used for the identification of the condition (Yes/No/unclear)	The condition was measured in a standard, reliable way for all participants (Yes/No/unclear)	There was appropriate statistical analysis (Yes/No/unclear)	Adequate response rate (Yes/No/unclear)	Overall appraisal (Include/ Exclude)
50	(Kshtriya et al., 2020)	Yes	No	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	Include
51	(Riello et al., 2020)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Include
52	(Wang et al., 2020)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Include
53	(Vagni et al., 2020)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Unclear	Include
54	(Blanco-Donoso et al., 2021)	Yes	No	Unclear	Yes	No	Yes	Yes	Yes	Yes	Include
55	(Fusco et al., 2021)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
56	(Londono-Ramirez et al., 2021)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
57	(Martínez-López et al., 2021)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
58	(Piotrowski et al., 2021)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
59	(Vallejo Andrada et al., 2021a)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include
60	(Vallejo Andrada et al., 2021b)	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Include

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