

## REVIEW ARTICLE

# The nurses' occupational stress components and outcomes, findings from an integrative review

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**Abstract**

**Aim:** To identify, evaluate and summarize the components, factors and outcomes of nurses' occupational stress published between 2009–2019.

**Design:** Integrative literature review.

**Methods:** A literature search was conducted on PubMed, CINAHL and PsycINFO databases for articles published in English, between 2009–2019.

**Results:** The review included 132 studies. Most studies were conducted in the Confucian Asia and Anglo countries, but a growing number of studies were done in other countries. Almost all studies used a quantitative design, and changes in the use of scales indicated an increasing attention to career-related components. Factors were categorized into sociodemographic, work environment and personal resources. Sociodemographic factors were inconsistent across countries. Outcomes were categorized into health status, capability, affective and behavioural responses to work, and organizational performance with generally consistent results. Model validation studies showed the non-linear or non-direct associations between stress and outcomes.

**KEYWORDS**

exhaustion, integrative review, nurses, occupational health, occupational stress, strain, work environment

## 1 | INTRODUCTION

Nurses' occupational stress has long been the subject of research and has been shown to be important for occupational health and safety purposes, as well as providing quality, effective care to patients. Occupational stressors and related factors for nurses may change over time reflecting factors such as developments in health care, changes in consumer relations, policy and regulatory modifications. In addition, the increase in nursing research in recent years and its geographical and cultural expansion may indicate new findings. Examining the changes that reflect the context is necessary to establish measures to meet the needs of nurses.

## 2 | BACKGROUND

Occupational stress is an alarming worldwide phenomenon and has been a major public health problem. Occupational stress refers to the process by which stressors in the work environment lead to the development of psychological, behavioural or physiological strains that result in long-term health effects, and is also known as work- or job-related stress (Levy et al., 2017). An expert survey conducted by the International Labour Organization (ILO) revealed that occupational stress is a worldwide problem that causes adverse personal and organizational outcomes, and a major concern in specific sectors, particularly in health care, education, services, finance,

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retail, transport and construction, and the public sector in general (International Labour Organization, 2016). Nurses, in particular, are known to experience high levels of occupational stress. According to a study conducted in the United Kingdom, nurses were among the three most stressful occupational groups (Health & Safety Executive, 2020). Occupational stress is known to be associated with physical and psychological illnesses, decreased performance, absenteeism, high staff turnover and decreased job satisfaction (Atkinson, 2004; Clegg, 2001; Richardson & Rothstein, 2008).

Stress is defined in many ways. According to Selye (1976), "stress is the nonspecific response of the body to any demand made upon it." In this definition, "stress" denotes the reaction to stressful situations in biological terms. Later on, stress was addressed not only from a biological perspective but also from its psychological and social aspects; thus, its definition has been broader. Beehr and Newman (1978) defined occupational stress as "a situation wherein job-related factors interact with a worker to change (i.e., disrupt or enhance) his or her psychological and/or physiological condition such that the person (i.e., mind-body) is forced to deviate from normal functioning." In the present study, we defined "occupational stress" as working environments or job characteristics to which the individuals are exposed, while reactions to stressful situations will be defined as "outcomes."

Many studies on nurses' occupational stress have been carried out in specific clinical areas (Edwards & Burnard, 2003), demographics (Shirey, 2006) and types, such as post-traumatic stress (Chang et al., 2005; Lambert & Lambert, 2001). These studies provide concrete and practical knowledge on the sources of stress and effective coping strategies that mitigate the challenges faced by nurses who share similar attributes. However, findings common to nurses that can be obtained without limiting the participant's area of expertise (e.g., emergency settings) or the participant's sociodemographic backgrounds (e.g., nurse managers, male nurses) are also important. Studies that provide a comprehensive overview of stress are needed to accumulate data and synthesize results into generalizable knowledge that is common and applicable to large populations, which can be used by organizations and governments in making policies and taking measures to mitigate stress (McVicar, 2003; Richardson, 2017).

Several literature reviews on occupational stress (Clegg, 2001; McVicar, 2003) were conducted in the early 2000s. However, there was a dearth of studies on the subject for over a decade that may have affected the accumulation of knowledge on changes in the healthcare system. In 2016, the International Labour Organization reported that there was growing attention regarding the assessment and management of occupational stress, and the design of legislation, strategies, and policies at international, regional, and national levels (International Labour Organization, 2016). Occupational stress and related factors for nurses may change over time, reflecting factors such as developments in health care and changes in consumer relations. Furthermore, the increase in nursing research in recent years with geographical and cultural reach may indicate new findings. Thus, a review of the findings of recent studies is needed to determine the implications for clinical management and future research of nurses' occupational stress.

## 2.1 | Research question

This study aimed to identify, evaluate and summarize the components, factors and outcomes of nurses' occupational stress by reviewing studies published between 2009–2019. The guiding research questions were as follows: "What are the recently reported components, factors and outcomes of nurses' occupational stress? Is there a change from past findings in reported components, factors and outcomes, and, if so, what are the reasons for these changes?"

## 3 | THE STUDY

### 3.1 | Design

We adopted an integrative review approach that is the broadest type of research review. The aim of an integrated review is to understand a phenomenon of concern fully allowing for the simultaneous inclusion of experimental and non-experimental research (Whittemore & Knaf, 2005).

### 3.2 | Method

#### 3.2.1 | Search methods

In June 2019, a literature search was conducted on PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PsycINFO databases using combinations of the following controlled terms: "Occupational Stress" (PubMed, Medical Subject Headings [MeSH] term), "Stress, Occupational" (CINAHL and PsycINFO, Subject Heading), and "Nurse\*." Articles published in English from 2009–2019 that reported on occupational stressors of nurses were considered for inclusion in the study.

The inclusion criteria were as follows: (a) original studies and written in English, (b) focused on occupational stressors in nurses and (c) did not limit to participants with specific sociodemographic backgrounds (e.g. male nurses only, or new graduate nurses only). The exclusion criteria were as follows: (a) focused on areas other than nurses' occupational stressors, (b) the study was a literature review, (c) focused on participants working in specialties, (d) limited participants according to demographics, experience or positions, (e) duplicates, (f) grey literatures and (g) other reasons, such as not written in English.

#### 3.2.2 | Search outcomes

One researcher (MO) performed the original literature search and found 525 articles in PubMed, 1,510 articles in CINAHL and 1,051 articles in PsycINFO. Two researchers (MO and KS) further read and evaluated the titles of 2,611 articles after excluding duplicates. Subsequently, the abstracts of 373 articles were screened and matched against the inclusion criteria, resulting in 210 articles. After reviewing the full text of the

210 articles, 137 were identified and five were excluded based on the results of the quality appraisal; therefore, 132 articles were identified as relevant to the review. The list of articles was completed on 6 April 2020. Details of the screening process are shown in Figure 1.

### 3.2.3 | Quality appraisal

The methodological quality of each article was assessed by two research members (KS and YK) independently using Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a variety of fields (Kmet et al., 2004) known as a standard, empirically grounded quality assessment tool suitable for use with a variety of study designs in systematic review. A summary score to assess the quality of the article (range 0–1) where the higher the summary score, the better the quality of article was used for each article. The most common summary score for quantitative studies was in the 0.8 range, followed by the 0.9 range. The most common summary score for qualitative research was in the 0.6 range (Appendix 1). The inter-rater agreement between the two reviewers' results was 75.0%, and items where disagreement occurred were discussed to determine the summary scores. Five articles with a summary score of less than 0.6 were excluded.

### 3.2.4 | Data extraction and synthesis

Data from relevant articles were extracted by two researchers (MO and KS) in a tabular form under the following subheadings: name of

the author(s), geographical location of the study, year of publication, purpose of the study, study design, study participants, methods, scales and subscales, results, and notes. Only data pertaining to nurses were extracted from articles that included non-nurse occupations.

The data extracted were ordered, coded, categorized and summarized using a constant comparison approach, taking into account differences by region and country. The GLOBE study classification (House et al. 2004) was used to account for cultural and geographical differences. Initially, we planned to summarize the components, factors and outcomes of nurses' occupational stress, but because there were a number of studies that validated models that included mediators and moderators, we additionally summarized the structural associations. A longitudinal design was applied in only nine studies.

### 3.3 | Ethics

Ethical approval and patient consent was not required.

## 4 | RESULTS

### 4.1 | Methodological characteristics of the reviewed articles

Of the 132 articles Appendix 2, 129 were quantitative in nature, while two used qualitative approaches and one used a mixed method

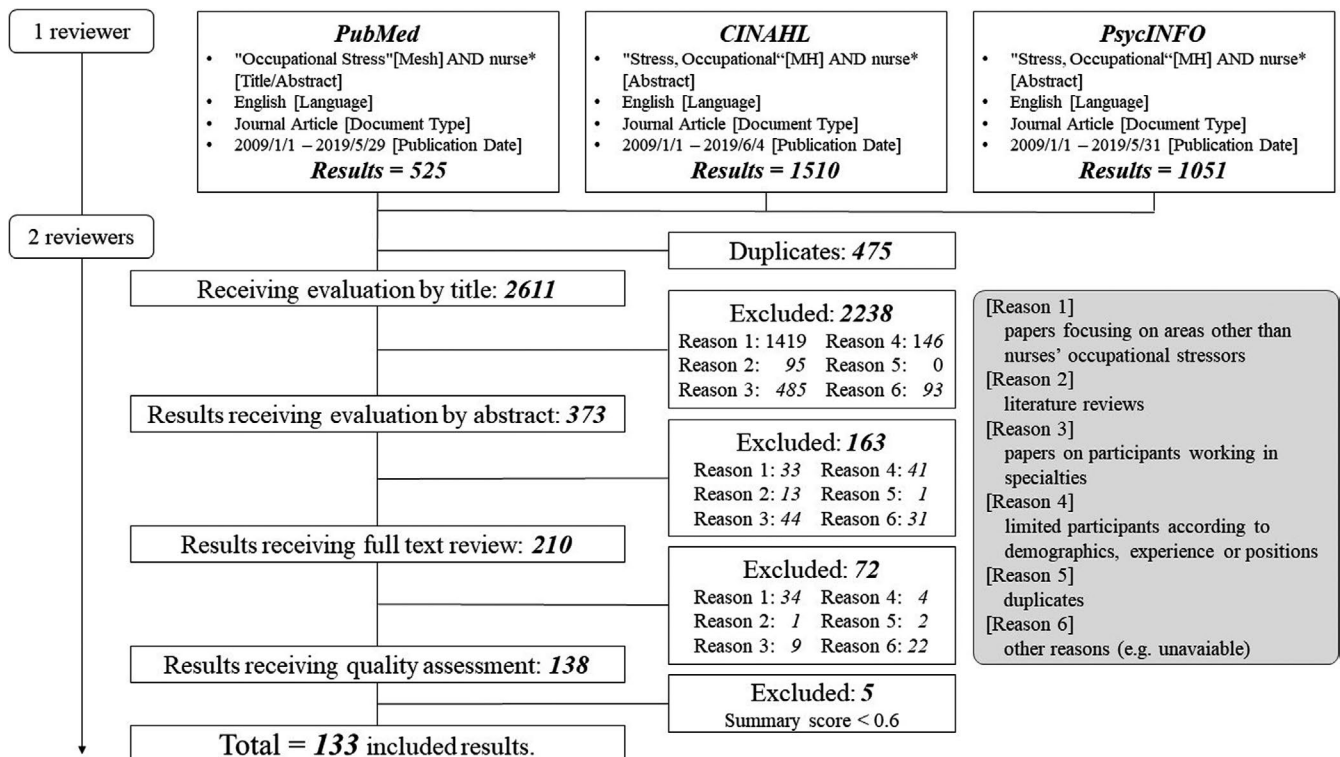


FIGURE 1 Flow chart of search

approach. Almost all quantitative studies were cross-sectional. A longitudinal design was applied in only nine studies.

## 4.2 | Geographical and chronological characteristics of the reviewed articles

Table 1 shows the distribution of studies by year of publication and by country/cluster based on the classification of the GLOBE study (House et al. 2004). The majority of studies were conducted in the Confucian Asia cluster (27.5%), followed by Anglo (22.9%), Southern Asia (13.0%), Latin Europe (7.6%), Nordic Europe (6.9%), Latin America (6.1%), sub-Saharan Africa (6.1%), Middle East (5.3%), Eastern Europe (2.3%) and Germanic Europe (1.5%). The overall number of studies on occupational stress among nurses is on the rise, attributed by the increased number of studies in Latin Europe, sub-Saharan Africa, and South Asia.

## 4.3 | Components of nurses' occupational stress

The components included in nurses' occupational stress could be read from quantitative studies that measured stress and qualitative studies that explored stress. Most studies quantifying occupational stress measured it using a defined, reliable and validated scale, whereas other studies used scales of the authors' own design. Table 2 shows the subscales of the measurement scales with the reliability and validity that were used in the included literature as components of occupational stress. The subscales were categorized based on the classification by the National Institute for Occupational Safety and Health. Of the 32 scales identified, approximately 20% were designed to measure occupational stress related to nursing or healthcare professionalism and contained components that reflected role and relationship characteristics. Scales that were not nursing-specific were sometimes used for the purpose of comparison with other professions.

Of the 32 scales used in the studies, 18 were developed before the year 2000. Their subscales were mainly classified as design of tasks, management style, interpersonal relationships and work roles. Moreover, subscales of the scale developed after the year 2000 included the career concerns classification in addition to the aforementioned four, reflecting the change in focus that the researcher aimed to measure.

Two qualitative studies were both conducted at a single institution and were intended to explore nurses' occupational stress related to the characteristics of a particular institution rather than to explore new components of nurses' occupational stress. These studies revealed focused or detailed stress and discussed context-specific stress and stress management.

## 4.4 | Factors and outcomes of nurses' occupational stress

Table 3 shows the factors influencing nurses' occupational stress. Three types of factors were identified in the review:

socio-demographics, work environment and personal resources. For most socio-demographics, the results were found to be inconsistent in relation to occupational stress. For work environment, results were generally consistent, but many overlaps were extracted with the components of the occupational stress measurement scales described. There were generally consistent results for personal resources, although the number of studies was small.

Table 4 shows the outcomes of nurses' occupational stress. The outcomes are broadly categorized into health status, capability, affective and behavioural responses to work, and organizational performance, and the results of the examination of their association with occupational stress were generally consistent. The most commonly reported outcomes of occupational stress were burnout, intention to leave or stay, anxiety and depressive symptoms, and job satisfaction.

## 4.5 | Structure of the relationship among concepts including nurses' occupational stress

Forty-five studies examined the structure of relationships among stress and two or more other concepts and contributed to providing a more complete picture of the phenomena surrounding nurses' occupational stress. These studies used statistical methods that could evaluate the entire model, such as structural equation modelling and tests for interaction effects.

Table 5 shows the relationships among stress and other concepts. The majority that positioned stress as an independent variable were broadly divided into two groups: those that included individual psychological characteristics as a moderator and assessed the buffering or accelerating effects on individual and organizational outcomes, and those that included stress response as a mediator and examined the process of influence on individual and organizational outcomes.

## 5 | DISCUSSION

This review revealed that there is considerable knowledge on the components, factors and outcomes of occupational stress among nurses. Although studies on occupational stress have been conducted for a long time, a number of studies over the past 10 years indicated that it continues to be a challenge in nursing practice. Nurses' occupational stress was found to be related to work characteristics and personal relationships, which reflects that nurses' work is complex, highly demanding, providing a combination of high levels of responsibility and low levels of authority (Sarafis et al., 2016). It is consistent with the job stress model (the National Institute for Occupational Safety & Health, 1999) that personal attributes are related to occupational stress and that occupational stress leads to deterioration of physical and psychological states. The stress outcomes of behavioural change and performance decline at work can be environmental factors of stress for others, which may lead to a vicious cycle. In addition, this review showed the expansion of research into areas where there has been little research, development of new

**TABLE 1** Geographical location and publication year of the studies reviewed

Location and cluster <sup>a</sup>	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total <sup>#</sup>
<b>Nordic Europe</b>												
Finland	1			1	1	1		2				6
Denmark									1	1		2
Norway						1						1
<b>Anglo</b>												
USA	2	1	3	1		2		5	1			15
Australia				3	2			1	1			7
UK				1				1	1		1	4
Ireland		1				1			1			3
Canada						1						1
<b>Germanic Europe</b>												
Germany					1							1
Belgium						1						1
<b>Latin Europe</b>												
Italy					2					1		3
Portugal			1					2				3
Israel				1			1					2
Spain					1		1					2
<b>sub-Saharan Africa</b>												
SouthAfrica				1			1	1	1			4
Ethiopia								1				1
Nigeria			1						1			2
Uganda			1									1
<b>Eastern Europe</b>												
Croatia	1											1
Greece								1				1
Poland									1			1
<b>Middle East</b>												
Turkey						1			1	1		3
Jordan	1		1									2
Palestine								1				1
Saudi Arabia										1		1
<b>Confucian Asia</b>												
China		1	3	1		1	1	3	2	3	1	16
South Korea			1		2			2	1		1	7
Taiwan			1			1	2	1	1	1		7
Japan			1		1	3						5
Singapore							2					2
<b>Southern Asia</b>												
Iran			1			3			2	2	2	10
India	1			1		1						3
Pakistan										2		2
Philippines									1		1	2
<b>Latin America</b>												
Brazil		1	1				2	2		1		7
Colombia		1										1
<b>Total<sup>b</sup></b>	<b>6</b>	<b>5</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>17</b>	<b>10</b>	<b>23</b>	<b>16</b>	<b>13</b>	<b>6</b>	<b>131</b>

Note: <sup>a</sup>Clusters were made based on the classification of the GLOBE study (House et al., 2004).

<sup>b</sup>One article with an unknown setting was excluded.

TABLE 2 Measuring instruments and components of occupational stress

Instruments	Nurse-specific	Citations <sup>a</sup>	Components (subscales) of scale <sup>b</sup>							
			The design of tasks	Management style	Interpersonal relationships	Work roles	Career concerns	Environmental conditions		
Role conflict and ambiguity scale (House et al., 1972)		2								
Job Diagnostic Survey [JDS] (Hackman et al., 1980)		1	-Skill variety -Task identity -Task significance -Feedback from the job/self	-Autonomy	-Feedback from agents -Dealing with others					
Nursing Stress Scale [NSS] (Grey-Toft et al., 1981)	X	17	-Workload		-Conflict with physicians -Conflict with other nurses -Lack of support	-Death and dying -Uncertainty concerning treatment -Patients' and families' irrational demands -Inadequate preparation				
Perceived Stress Scale [PSS] (Cohen, 1983)		10	(unidimensional)							
The Occupational Stress Indicator [OSI] (Cooper et al., 1988)		1	-Intrinsic to the job	-Organization structure/climate -Home/work interface	-Relationships with others	-Managerial role			-Career & achievement	
NASA-Task Load Index [TLX] (Hart et al., 1988)		1	-Mental demands -Physical demands -Temporal demands							
Nurse Stress Index [NSI] (Harris, 1989)	X	2	-Workload pressures related to insufficient time -Workload pressures owing to resources and conflicting priorities	-Organizational support and involvement -Home and work conflicts			-Dealing with patients and relatives -Confidence and competence in role			
Professional Life Stress scale [PLSS] (Fontana, 1989)		1	(unidimensional)							
Health and Safety Executive questionnaire [HSE] (UK's Health and Safety Industry, 1990)		1	-Control -Demands	-Change	-Relationships -Manager's support -Peer support					
Effort-Reward Imbalance questionnaire [ERI] (Siegrist, 1996)		11	-Effort	-Reward						

(Continues)

TABLE 2 Continued

Components (subscales) of scale <sup>b</sup>								
Instruments	Nurse-specific	Citations <sup>a</sup>	The design of tasks	Management style	Interpersonal relationships	Work roles	Career concerns	Environmental conditions
Taiwan Nurse Stress Checklist (Tsai et al., 1996)	X	2		-Incompleteness of personal arrangement	-Work concerns	-Work concerns -Competence		
Work-Related Strain Inventory [WRSI] (Revicki et al., 1998)		1	(undimensional)					
Job Content Questionnaire [JCQ] (Karasek et al., 1998)		16	-Psychological job demands -Decision latitude		-Supervisor and coworker support		-Job insecurity	
Nursing Job Stressor Scale [NJSS] (Higashiguchi, 1998)	X	1	-Quantitative workload -Qualitative workload		-Conflict with other nursing staff -Conflict with physicians/physicians' autonomy	-Nursing role conflict -Dealing with death and dying -Conflict with patients		
Occupational Stress Inventory-Revised [OSI-R] (Osipow, 1998)		1	-Role overload -Role insufficiency			-Role ambiguity -Role boundary -Responsibility		-Physical environment
Inter-personal Conflict at Work Scale [ICAWS] (Spector et al., 1998)		2	(undimensional)					
Quantitative Workload Inventory [QWI] (Spector et al., 1998)		1	(undimensional)					
Instrument for Stress-related Task Analysis [ISTA] (Semmer et al., 1999)		1	-Complexity -Variety -Control -Concentration/time pressure -Danger of accidents	-Problems in work organization	-Communication	-Uncertainty and responsibility		-Environment
Chinese Nurse Job Stressor Scale (Li et al., 2000)	X	6	-Workload and time pressure -Resource and environment problem		-Interpersonal relationships and management problems	- Patient care and interaction	-Professional and career issues	
Copenhagen Psychosocial Questionnaire [COPSOQ] (Kristensen, 2000)		3	-Type of production and tasks -Organization of work and job content		-Interpersonal relations and leadership			

(Continues)

TABLE 2 Continued

Instruments	Nurse-specific	Citations <sup>a</sup>	Components (subscales) of scale <sup>b</sup>					
			The design of tasks	Management style	Interpersonal relationships	Work roles	Career concerns	Environmental conditions
Brief Job Stress Questionnaire [BJSQ] (Shimomitsu et al., 2000)		1	-Job quantitative overload -Job control		-Support from supervisors and coworkers			
Workplace Incivility Scale [WIS] (Cortina et al., 2001)		1	(undimensional)					
Workplace Stress Scale [WSS] (the Marlin Company & the American Institute of Stress, 2001)		1	(undimensional)					
Areas of Worklife Scale [AWS] (Leiter et al., 2004)		1	-Workload -Control	-fairness -Values -reward	- community			
Job Stress Scale [JSS] (Alves et al., 2004)		1	-Control over work		-Social support	-Psychological demand of work		
Trier Inventory for Chronic Stress [TICS] (Schulz et al., 2004)		1	-Work overload -Work discontent -Excessive demands at work		-Social overload -Social tensions -Social isolation -Lack of social recognition			
Workplace Stress Scale [WSS] (Paschoal et al., 2004)		1	(undimensional)					
Korean Occupational Stress Score [KOSS] (Chang et al., 2005)		7	-Job demand -Insufficient job control -Lack of autonomy	-Organizational system -Occupational climate -Lack of reward	-Interpersonal conflict		-Job insecurity -Physical environment	
Sources of Work Stress Inventory [SWSI] (De Bruin et al., 2005)		1	-Workload -Lack of autonomy -Tools and equipment	-Work/home interface	-Relationships	-Role ambiguity	-Career advancement -Job security	
Nursing Stress Inventory [NSI] (Rothman et al., 2006)	X	1	-Job demands -Overtime (undimensional)		-Lack of support -Staff issues	-Patient care		
Questionnaire on Medical Workers' Stress [QMWS] (See et al., 2007)	(X)	1	(undimensional)					

(Continues)



TABLE 2 Continued

Instruments	Nurse-specific	Components (subscales) of scale <sup>b</sup>					
		Citations <sup>a</sup>	The design of tasks	Management style	Interpersonal relationships	Work roles	Career concerns
Stress Questionnaire for Health Professionals [SQHP] Gomes, Faria et al. (2016)	1	-Work overload	-Home-work interface	-Relationships at work	-Dealing with clients -Leading training activities	-Career progression and salary	

Note: -Design of tasks: Heavy workload, infrequent rest breaks, long work hours and shiftwork; hectic and routine tasks that have little inherent meaning, do not utilize workers' skills, and provide little sense of control

-Management style: Lack of participation by workers in decision-making, poor communication in the organization, lack of family-friendly policies.

-Interpersonal relationships: Poor social environment and lack of support or help from coworkers and supervisors.

-Work roles: Conflicting or uncertain job expectations, too much responsibility, too many "hats to wear."

-Career concerns: Job insecurity and lack of opportunity for growth, advancement, or promotion; rapid changes for which workers are unprepared.

-Environmental conditions: Unpleasant or dangerous physical conditions such as crowding, noise, air pollution, or ergonomic problems.

<sup>a</sup>In addition to the original version, translated, extended and shortened versions were also counted. Studies assessed as being the same project based on author overlap, study duration, study setting and ethics review registration number were considered as one citation.

<sup>b</sup>Components were categorized based on "Job Conditions That May Lead to Stress" (The National Institute for Occupational Safety & Health, 1999)

measures and constructs of stress, development of hypotheses and analyses leading to an increase in model testing, and emergence of intervention studies. These findings indicate that recent research on nurses' occupational stress is evolving to reflect cultural diversity and changes in healthcare research that may lead to improvements in practice.

McVicar (2003) reviewed articles on nurses' occupational stress published between 1985–2003. They identified workload, leadership and management, professional conflict, emotional labour, lack of reward, and shift work complications as significant sources of distress in nurses. Applying the categorization used in this review, major stressors can be categorized into task design, management style, interpersonal relationships and work roles. In the present review, the researchers included these categories as stressors to be measured, indicating that they continue to be considered major stressors. Additionally, the emergence of career concerns may be due to the increased recognition of occupational stress because of recent issues concerning workplace health (e.g., International Council of Nurses, 2007). Organizational administrators are particularly responsible for shaping a work environment that includes healthy career development. Thus, it is important to develop a short- and long-term vision for the organization and present it to staff.

A comparison of the present review with that of McVicar (2003) demonstrates an increasing interest in the effects of personality on stress perception. McVicar (2003) implicated that a possible relationship between personality and stress perception exists; however, it was not presented as evidence. In contrast, the present review indicated that personality is considered by today's researchers as a personal resource of stress management. Moreover, recent studies have shown that personality is included in conceptual models as an independent, moderating or mediating variable. This may have been influenced by the National Institute for Occupational Safety and Health Model of Job Stress (National Institute for Occupational Safety & Health, 1999), which showed the influence of individual factors on the relationship between stress and outcomes. In addition, the development of knowledge about personal resources has contributed to a general understanding of occupational stress among nurses. Some intervention studies included in this review found that the intervention programmes were effective in increasing personal resources (e.g., Hersch et al., 2016). Addressing these interventions in tandem with work improvements to reduce stressor may be effective in creating a healthy work environment.

Furthermore, this review showed inconsistent results for one factor, socio-demographics. Considering the expansion of the country in which the study was conducted, together with the fact that the results showed a certain trend due to classification based on cultural clusters, it is possible that the inconsistency of the results was due to diversification of the study context. For example, Nabirye et al. (2011) reported that higher education increases stress because of lack of clarity in the role and scheme of nurses with higher degrees in Uganda, which is different from previous studies. Thus, the nature and extent of the relationship between

TABLE 3 Factors influencing occupational stress

		Factors that significantly increase stress	Factors that significantly decrease stress
<b>Socio-demographics</b>			
Age	Nabirye et al. (2011), Uganda Cruz and Abellán (2015), Spain Sönmez et al. (2017), Turkey		Purcell et al. (2011), US Kikuchi et al. (2013), Japan Chin et al. (2015), Taiwan Chen et al. (2016), Taiwan Alenezi et al. (2018), Saudi Arabia
Gender - Female (vs. Male)	Abdollahi et al. (2014), Iran Moradniani et al. (2018), Iran		
Marital status - Married (vs. Unmarried)	Negeliskii and Lautert (2011), Brazil Salehi et al. (2014), Iran Sönmez et al. (2017), Turkey		Alenezi et al. (2018), Saudi Arabia
Number of children	Nabirye et al. (2011), Uganda		
High cost of living	Salehi et al. (2014), Iran		
Educational level	Nabirye et al. (2011), Uganda Qi et al. (2014), China		Abualrub et al. (2009), Jordan Golubic et al. (2009), Croatia Hamaideh and Ammouri, (2011), Jordan Salehi et al. (2014), Iran Pishgooie et al. (2019), Iran
Work experience	Nabirye et al. (2011), Uganda Qi et al. (2014), China Sönmez et al. (2017), Turkey		Salehi et al. (2014), Iran Chin et al. (2015), Taiwan Khammar et al. (2017), Iran
Position - Management (vs. general)	Alenezi et al. (2018), Saudi Arabia		Chin et al. (2015), Taiwan Sönmez et al. (2017), Turkey Yim et al. (2017), Korea
Employment - Full time (vs. Temporary)			Salehi et al. (2014), Iran Chin et al. (2015), Taiwan Qin et al. (2016), China
<b>Work Environment</b>			
Work settings - Public (vs. non-public)	Nabirye et al. (2011), Uganda Salehi et al. (2014), Iran		Jaradat et al. (2016), Palestine
Shift/night/weekend work (vs. Weekday daytime work)	Abualrub et al. (2009), Jordan Purcell et al. (2011), US Hamaideh and Ammouri (2011), Jordan Buja et al. (2013), Italy Karhula et al. (2013), Finland Kikuchi et al. (2013), Japan Kikuchi et al. (2014b), Japan Chin et al. (2015), Taiwan Qin et al. (2016), China Pishgooie et al. (2019), Iran		
Overtime / calling	Kikuchi et al. (2013), Japan Afsar et al. (2018), Pakistan Pishgooie et al. (2019), Iran		
Workload	Purcell et al. (2011), US Negeliskii and Lautert (2011), Brazil Karhula et al. (2013), Finland		

(Continues)

TABLE 3 (Continued)

	Factors that significantly increase stress	Factors that significantly decrease stress
	Salehi et al. (2014), Iran	
	Sharma et al. (2014), India	
	Cruz and Abellán (2015), Spain	
	Chen et al. (2016), Taiwan	
	Dagget et al. (2016), Ethiopia	
	Solomon et al. (2016), US	
	Qin et al. (2016), China	
Insufficient human resource	Sharma et al. (2014), India	
	Dagget et al. (2016), Ethiopia	
	Qin et al. (2016), China	
Low organizational support and empowerment	Negeliskii and Lautert (2011), Brazil	
	Teo et al. (2013), Australia	
	Dagget et al. (2016), Ethiopia	
	Guo et al. (2016), China	
	Mauno et al. (2016), Finland	
	Grover et al. (2017), Australia	
	Labrague et al. (2017), Philippines	
	Lawal and Idemudia (2017), Nigeria	
	Top and Tekingunduz (2018), Turkey	
Low salaries	Salehi et al. (2014), Iran	
	Sharma et al. (2014), India	
Poor interpersonal relationship	Peng et al. (2011), Taiwan	
	Salehi et al. (2014), Iran	
	Sharma et al. (2014), India	
	Dagget et al. (2016), Ethiopia	
	Lawal and Idemudia (2017), Nigeria	
Burden of emotional labour	Chen et al. (2016), Taiwan	
	Mauno et al. (2016), Finland	
	Solomon et al. (2016), US	
	Grover et al. (2017), Australia	
Aggression in workplace	Qi et al. (2014), China	
	Salehi et al. (2014), Iran	
	Sharma et al. (2014), India	
	Stecker and Stecker (2014), US	
	Oh et al. (2016), South Korea	
	Laeque et al. (2018), Pakistan	
Personal resources		
Psychological capital		Yim et al. (2017), Korea
Positive affectivity		Thian et al. (2015), Singapore
Stress resiliency		Larrabee et al. (2010), US
Hardiness		Abdollahi et al. (2014), Iran
Self-regulatory mode		Lo Destro et al. (2018), Italy
Sensitivity	Salehi et al. (2014), Iran	
Affective temperament	Jaracz et al. (2017), Poland	
Depressive temperament	Kikuchi et al. (2013), Japan	
	Kikuchi et al. (2014a), Japan	
Cyclothymic temperament	Kikuchi et al. (2014a), Japan	

TABLE 4 Outcomes of occupational stress

	Significantly increased outcomes	Significantly decreased outcomes
Health Status		
General physical health		Kane (2009), India Lin et al. (2014), Taiwan Chen et al. (2016), Taiwan Khamisa et al. (2016), South Africa Sarafis et al. (2016), Greece
Healthy behaviour		King et al. (2009), US Nahm et al. (2012), US Lin et al. (2014), Taiwan Portela et al. (2015), Brazil Calderwood and Ackerman 2016), US Su et al. (2015), Taiwan Gu et al. (2019), China
Overweight), weight gain), metabolic syndrome	Ribeiro et al. (2015), Brazil Vesterlund et al. (2017), Denmark Fang et al. (2018), Taiwan	
Injuries	Lanz and Bruk-Lee (2017), US	
Musculoskeletal symptoms	Lee, Kim, Kim et al. (2011), China Verma et al. (2012), India Barzideh et al. (2014), Iran Khamisa et al. (2015), South Africa	
Heart rate	Johnston et al. (2016), UK	
Methylation level	Alasaari et al. (2012), Finland	
General psychological health		Kane (2009), India Teo et al. (2012), Australia Khamisa et al. (2015 & 2016), South Africa <sup>a</sup> Gomes and Teixeira (2016), Portugal Sarafis et al. (2016), Greece
Anxiety and depressive symptoms	Wu et al. (2011), China Alasaari et al. (2012), Finland Dollard et al. (2012), Australia Lee et al. (2013), South Korea Mark and Smith. (2012), UK Lavoie-Tremblay et al. (2014), Canada Yoon and Kim. (2013), South Korea Kikuchi et al. (2014a), Japan Kikuchi et al. (2014b), Japan Sliter et al. (2014), US Chen et al. (2016), Taiwan He et al. (2018), China Gu et al. (2019), China	
Psychosomatic symptoms	Baethge and Rigotti, (2013), Germany Lavoie-Tremblay et al. (2014), Canada Jaradat et al. (2016), Palestine Gu et al. (2019), China	

(Continues)

TABLE 4 (Continued)

	Significantly increased outcomes	Significantly decreased outcomes
Burnout	Lorenz et al. (2010), Brazil Gandi et al. (2011), Nigeria Ohue et al. (2011), Japan Xie et al. (2011), China Alasaari et al. (2012), Finland Görgens-Ekermans and Brand. (2012), South Africa Günüşen et al. (2014), Turkey Andela et al. (2016), unknown Cruz and Abellán (2015), Spain Khamisa et al. (2015 & 2016), South Africa <sup>a</sup> Wang et al. (2015), China Guo et al. (2016), China Hong and Lee, (2016), South Korea Jaracz et al. (2017), Poland Lanz and Bruk-Lee, (2017), US Sun et al. (2017 & 2018), China <sup>a</sup> Laeque et al. (2018), Pakistan Yao et al. (2018), China Hosseinabadi et al. (2019), Iran	
Quality of life		Sarafis et al. (2016), Greece
Happiness, satisfaction		Abdollahi et al. (2014), Iran Sliter et al. (2014), US
Capability		
Stress coping		Laranjeira, (2012), Portugal Alkrisat, (2016), US Lo et al. (2018), Taiwan
Emotional intelligence		Hong and Lee, (2016), South Korea
Internal locus of control	Günüşen et al. (2014), Turkey	
Work ability		Golubic et al. (2009), Croatia Baethge and Rigotti, (2013), Germany
Affective and behavioural responses to work		
Job satisfaction		Abualrub et al. (2009), Jordan Larrabee et al. (2010), US Teo et al. (2012), Australia Baethge and Rigotti, (2013), Germany Teo et al. (2013), Australia Khamisa et al. (2015, 2016 & 2017), South Africa <sup>a</sup> Newton et al. (2016), Australia Hosseinabadi et al. (2018), Iran Hosseinabadi et al. (2019), Iran Lee et al. (2019), South Korea

(Continues)

TABLE 4 Continued

	Significantly increased outcomes	Significantly decreased outcomes
Affective and behavioural responses to work		
Work engagement		Fiabane et al. (2013), Italy Sliter et al. (2014), US Thian et al. (2015), Singapore Mauno et al. (2016), Finland Wang et al. (2017), China
Caring behaviour		Sarafis et al. (2016), Greece
Safety perception		Louch et al. (2017), UK
Moral distress	Alkrisat, (2016), US	
Deviance behaviour	Peng et al. (2011), Taiwan	
Sickness absence	Roelen et al. (2014), Norway Trybou et al. (2014), Belgium	
Intent to leave	Andrews and Wan, (2009), US Larrabee et al. (2010), US Li et al. (2010), China Gandi et al. (2011), Nigeria Lee, Kim, & Kim, (2011), South Korea Lavoie-Tremblay et al. (2014), Canada Hong and Lee, (2016), South Korea Oh et al. (2016), South Korea Lanz and Bruk-Lee, (2017), US Yim et al. (2017), Korea Laeque et al. (2018), Pakistan Lo et al. (2018), Taiwan Fasbender et al. (2019), England Lee et al. (2019), South Korea Pishgooie et al. (2019), Iran	
Organizational performance		
Patients infection risk	Virtanen et al. (2009), Finland	
Horizontal mobbing	Topa and Moriano (2013), Spain	

Note: <sup>a</sup>Studies that were assessed as having duplicate participants based on authors overlap, study duration, study setting and ethical review registration number are listed together in a single line.

stressors and attributes may differ depending on culture, practices, healthcare systems and healthcare resources, and should be kept in mind when designing the study. In contrast, a similar trend in stress outcomes was found regardless of context. Future research could be developed more efficiently by assuming some degree of generalizability.

Lastly, this review showed that there was a lot of overlap between one of the factors, the work environment, and the components of occupational stress. There are two possible reasons for this: first, the conceptual definitions and frameworks may not be sufficiently organized; and second, there may be researchers' focus on the linkages between the components. In either case, future research needs to examine the relationships among occupational stress and other concepts as a model rather than a single association. This is supported

by the model validation studies included in this review, which demonstrate a structure involving mediators and moderators and suggest the non-linear and non-direct associations between stress and outcomes. Although the majority of the articles included in the review were in the high-quality range, there were some articles in the medium- to low-quality range, and it is important to further improve the quality of future studies. This review, as in the previous literature reviews, had few qualitative studies. Nurses' occupational stress is likely changing due to enormous changes in the environment, such as the coronavirus pandemic, and qualitative studies exploring nurses' new stressors will be required. Furthermore, clarifying the association between improvement of nurses' stress and patient outcomes will ensure the link between worker's health and safety and quality patient care.

**TABLE 5** Structure of the relationship among concepts including occupational stress in a validated conceptual model

The role of occupational stress	Independent variable <sup>a</sup>	Mediator <sup>a</sup>	Moderator <sup>a</sup> (A: Accelerator, B: Buffer)	Dependent variable <sup>a</sup>	References <sup>b</sup>
Independent variable	Occupational stress		<i>Personal resource</i>		
			Cognitive/emotional resources (B)	Psychosomatic symptoms	Lavoie-Tremblay et al. (2014), Canada
			Cognitive/emotional resources (B)	Depressive symptoms	Lavoie-Tremblay et a. (2014), Canada
			Cognitive/emotional resources (B)	Intention to leave	Lavoie-Tremblay et al. (2014), Canada
			Mindfulness (B)	Depressive symptoms	Grover et al. (2017), Australia
			Mindfulness (B)	Job satisfaction (low)	Lee et al. (2019), South Korea
			Mindfulness (B)	Intention to leave	Lee et al. (2019), South Korea
			Emotional intelligence (B)	Burnout	Görgens-Ekermans and Brand (2012), South Africa
			Emotional intelligence (B)	Job satisfaction (low)	Newton et al. (2016), Australia
			Compassion (A)	Work engagement (low)	Mauno et al. (2016), Finland
			On-the-job embeddedness (A)	Intention to leave	Fasbender et al. (2019), UK
			Off-the-job embeddedness (B)	Intention to leave	Fasbender et al. (2019), UK
			Resilience (B)	Job-related negative affect	Lanz and Bruk-Lee, (2017), US
			Self-efficacy * (B)	Burnout	Yao et al. (2018), China
			Low self-efficacy * Neuroticism personality (A)	Burnout	Yao et al. (2018), China
			<i>Behavioural factors</i>		
			Physical activity (B)	Depressive symptoms	Sliter et al. (2014), US
			Physical activity (B)	Satisfaction (low)	Sliter et al. (2014), US
			Physical activity (B)	Work engagement (low)	Sliter et al. (2014), US
			<i>Genetic factor</i>		
			BDNF Val66Met	Depressive symptoms	He et al. (2018), China
			<i>Perception of the environment</i>		
			Coworkers/ Supervisors support (B)	Job satisfaction (low)	Abualrub et al. (2009), Jordan
			Work ethic feasibility (B)	Work engagement (low)	Mauno et al. (2016), Finland

(Continues)

TABLE 5 Continued

The role of occupational stress	Independent variable <sup>a</sup>	Mediator <sup>a</sup>	Moderator <sup>a</sup> (A: Accelerator, B: Buffer)	Dependent variable <sup>a</sup>	References <sup>b</sup>
		<i>Psychological reaction</i>			
		Emotional dissonance		Burnout	Andela et al. (2016), unknown
		Job-related negative affect		Burnout	Lanz and Bruk-Lee (2017), US
		Job-related negative affect		Intention to leave	Lanz and Bruk-Lee (2017), US
		Job-related negative affect		Injuries	Lanz and Bruk-Lee (2017), US
		Depressed mood		Intention to leave	Lo et al. (2018), Taiwan
		Job satisfaction (low)		Intention to leave	Lo et al. (2018), Taiwan
		<i>Personal resource</i>			
		Rational coping (low)		Depressive symptoms	Wu et al. (2011), China
		Effective coping (low)		Job satisfaction (low)	Teo et al. (2013), Australia
		Self-esteem (low)		Depressive symptoms	Lee, Kim, Yoon et al. (2011), South Korea
		Hardiness (low)		Happiness (low)	Abdollahi et al. (2014), Iran
		Internal locus of control		Burnout	Günüşen et al. (2014), Turkey
		Emotional intelligence (low)		Burnout	Hong and Lee (2016), South Korea
		Cognitive appraisal (low)		Psychological health (low)	Gomes, Faria et al. (2016), Portugal
		Psychological capital (low)		Intention to leave	Yim et al. (2017), Korea
		Psychological capital (low)		Work engagement (low)	Wang et al. (2017), China
		<i>Perception of the environment</i>			
		Social support (low)		Depressive symptoms	Wu et al. (2011), China
		Time pressure		Performance satisfaction (low)	Baethge and Rigotti (2013), Germany
		Mental demands		Performance satisfaction (low)	Baethge and Rigotti (2013), Germany
		<i>Health status</i>			
		Physical health (low)		Sickness absence	Roelen et al. (2014), Norway
		Mental health (low)		Sickness absence	Roelen et al. (2014), Norway

(Continues)



TABLE 5 Continued

The role of occupational stress	Independent variable <sup>a</sup>	Mediator <sup>a</sup>	Moderator <sup>a</sup> (A: Accelerator, B: Buffer)	Dependent variable <sup>a</sup>	References <sup>b</sup>
Dependent variable Mediator	Sense of calling (low)	Career commitment (low)		Occupational stress	Afsar et al. (2018), Pakistan
	Workplace violence	Occupational stress		Burnout	Laeque et al. (2018), Pakistan
	Workplace violence	Occupational stress		Intention to leave	Laeque et al. (2018), Pakistan
	Psychosocial safety climate (low)	Occupational stress		Burnout	Dollard et al. (2012), Australia
	Supervisor feedback environment (low)	Occupational stress		Deviance	Peng et al. (2011), Taiwan
	Stress resiliency (low)	Occupational stress		Job satisfaction (low)	Larrabee et al. (2010), US
	Stress resiliency (low)	Occupational stress		Intention to leave	Larrabee et al. (2010), US
	Temperament (depressive/cyclothymic)	Occupational stress		Depressive symptoms	Kikuchi et al. (2014a), Japan
Moderator	Spirituality (low)		Occupational stress (A)	Depressive symptoms	Batalla et al. (2019), Philippines

Note: <sup>a</sup>In order to align the representation of the dependent variable as negative outcome, some of the positive and negative directional representations of the association have been changed.

<sup>b</sup>There is some overlap in references, because complex models with multiple paths are disaggregated.

## 5.1 | Limitations

This review has a limited database and does not include grey literature, which may result in missing reports of non-significant findings. However, the strength of this review is the large number of studies, which allowed us to extract trends over time and geography of the results, despite the limited period of 10 years.

## 6 | CONCLUSION

A synthesis of the results of the literature presented components, factors and outcomes of nurses' occupational stress, and identified recent changes such as a focus on career-related components of stress, regional differences in factors, and the non-linear or non-direct associations between stress and outcomes. It was also shown that research on nurses' occupational stress has developed in terms of both quality and quantity due to a recent increase in the number of studies, expansion of research settings, development of hypotheses and analysis, and enrichment of scales. Nursing managers can consider these changes in the work environment to reduce nurses'

occupational stress and at the same time provide interventions to foster personal resources that act as a buffering moderator. In addition, nursing researchers will be able to design future research to contribute to clinical practice, in light of the recent trends presented in this study.

## ACKNOWLEDGMENTS

We would like to thank Dr. Maiko Noguchi-Watanabe for her great support. This research received no grant from any funding agency in the public, commercial or not-for-profit sectors.

## CONFLICT OF INTEREST

There are no conflicts of interest to declare.

## AUTHOR CONTRIBUTION

Design of the work: MO, KS; data collection: MO, KS; data analysis: MO, KS, YK; interpretation of data for the work: MO, KS, YK, drafting the work or revising: MO, KS, YK. All authors approved the final version for submission.

## DATA AVAILABILITY STATEMENT

No data available.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

**How to cite this article:** Okuhara M, Sato K, Kodama Y. The nurses' occupational stress components and outcomes, findings from an integrative review. *Nurs Open*. 2021;8:2153–2174. <https://doi.org/10.1002/nop2.780>