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Prevalence and related factors of compassion fatigue among registered nurses and nursing students during the internship: a systematic review and meta-analysis

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Abstract

Background Compassion fatigue impacts nurses' well-being and work efficiency. Extensive research has explored its prevalence, but evidence regarding related factors is broadly categorized and lacks descriptive data. There's also a lack of systematic reviews on compassion fatigue among nursing students during internships.

Objectives To synthesize evidence on the levels and factors of compassion fatigue among nurses and nursing students during internships.

Methods This systematic review is registered with PROSPERO (ID CRD42023444173). Literature searches were conducted in five databases (Cochrane Library, PubMed, EMBASE, CNKI, and WanFang) up to November 30, 2022, with updates planned until January 17, 2024, if necessary. Inclusion criteria covered studies reporting data on the prevalence and related factors of compassion fatigue or its dimensions, burnout and secondary traumatic stress, among registered nurses or nursing students during internships. Independent study selection, quality assessment, and data extraction were performed. The Agency for Healthcare Research and Quality tool was used for critical appraisal of study quality. Random-effects model analyses were conducted using Stata 17.0 to pool data on prevalence rates and mean scores of compassion fatigue. When comprehensive data on compassion fatigue were unavailable, its dimensions were analyzed for both prevalence and mean scores.

Results Our review included 196 studies (73,034 nurses and 4,551 nursing students). For nurses, pooled mean scores for burnout and secondary traumatic stress were 26.81 (95% CI 26.28 to 27.35) and 25.88 (95% CI 25.39 to 26.37), respectively. For nursing students during internships, pooled mean scores were 29.16 (95% CI 26.95 to 31.37) and 25.64 (95% CI 20.95 to 30.34), respectively. Subgroup analyses revealed that post-COVID-19 pandemic, nurses exhibited higher compassion fatigue, especially in ICU or emergency departments. Evidence from 93 studies suggested that nurses' burnout and secondary traumatic stress are both influenced by work environment, social support, job satisfaction, workload, and psychological capital (moderate to low-certainty evidence). For nursing students, psychological capital plays a significant role (moderate to low-certainty evidence).

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Conclusions Both registered nurses and nursing students experience moderate compassion fatigue. Work environment, social support, job satisfaction, workload, and psychological capital are key factors associated with burnout and secondary traumatic stress in registered nurses. For nursing students, psychological capital plays a similarly significant role. Given that this is the first systematic review to explore these factors among nursing students, further research is essential to deepen understanding and develop effective interventions.

Keywords Compassion fatigue, Nursing student during the internship, Nurse, Related factors, Meta-analysis

Introduction

In nursing practice, compassion is widely recognized as a cornerstone of high-quality care [1]. It facilitates effective communication with patients, enabling nurses to better identify and respond to the physiological and psychological needs of those under their care, thereby playing a crucial role in enhancing overall care outcomes [2]. However, when stress management is inadequate or professional boundaries are compromised, the quality of compassion can predispose nurses to a specific occupational hazard known as compassion fatigue [3]. Compassion fatigue refers to the biological, physiological, and social exhaustion and dysfunction that result from prolonged exposure to the pain and suffering of others [4, 5]. This phenomenon is widely regarded as a “cost of caring” and is a key factor contributing to the depletion of compassion in healthcare settings [6]. According to Stamm, burnout and secondary traumatic stress are two integral components of compassion fatigue [7]. Burnout emerges as a result of work-related stressors, marked by feelings of unhappiness, disconnection, and insensitivity towards the work environment [4, 8–10]. Secondary traumatic stress is characterized by a negative emotional response, fueled by fear and work-related trauma [4, 11].

The development of compassion fatigue can adversely affect nurses’ ability to experience sympathy and empathy at work, thus impeding the provision of safe, competent, and ethical care [12, 13]. Many nurses may suffer from conditions such as depression, anger, headaches, ineffectiveness, insomnia, and gastrointestinal distress, which can lead to impaired well-being, reduced job satisfaction, diminished job performance, and increased staff absenteeism and turnover [14–16]. Nursing students, as an important reserve force of professional nursing personnel, are a high-risk group for compassion fatigue during clinical internships due to the need to adapt to new clinical environments, acquire unfamiliar clinical skills, and manage the added burden of academic responsibilities [17–20]. Studies have shown that high levels of compassion fatigue or burnout are linked to an increased risk of leaving their education programs and actual attrition [21–26].

Compassion fatigue is prevalent among nursing professionals [27–29]. Research on the prevalence of compassion fatigue among clinical nurses is extensive [27]. A systematic review involving 28,509 clinical nurses revealed that levels of compassion fatigue have increased over time, particularly with more severe symptoms among clinical nurses in Asian regions [29]. However, to our knowledge, existing reviews on the factors influencing nurses’ compassion fatigue have predominantly focused on specific ward types like intensive care units [30, 31], distinct nursing professionals (e.g. mental health and oncology nurses [32, 33], and specific time periods (e.g., during the pandemic). The evidence on factors related to compassion fatigue in clinical nurses from various wards was published in 2018 [34, 35]. In the existing meta-analyses, the authors grouped specific factors into high-level categories, such as age and gender under demographics. Also, the authors only included studies that had analyzable data for quantitative synthesis but excluded studies that had data in other formats such as narrative results. The evidence requires updating using appropriate data analysis strategies. These limitations prevent us from fully understanding the key influencing factors of compassion fatigue and its two dimensions, thereby hindering the development of targeted interventions. To date, there is a lack of systematic review regarding the prevalence and influencing factors of compassion fatigue among nursing students during their internships.

This systematic review and meta-analysis aims to synthesize evidence on the levels of compassion fatigue and its dimensions (burnout and secondary traumatic stress) among nurses and nursing students during their internships, and to identify factors influencing the development of these constructs.

Methods

We conducted this systematic review utilizing standard Cochrane methods and reported it in accordance with the Meta-analysis of Observational Studies in Epidemiology checklist (Supplementary File 5) [36] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Supplementary File 6). The review protocol was registered with the PROSPERO (CRD42023444173).

Literature searches

We conducted searches in electronic databases including the Cochrane Library, PubMed, EMBASE, CNKI, and WanFang, covering the period from their inception up to November 30, 2022. We only updated the literature

search for nursing students during their internships up to January 17, 2024. This was an arbitrary but pragmatic decision. Our considerations were that (1) there is well known evidence regarding registered nurses in this area, but limited evidence for nursing students during their internships; and (2) evidence related to nurses has been well-represented, but more updated evidence for nursing students during their internships is needed in this area. Our search strategies utilized a combination of MeSH terms and free-text words. Initially, a search strategy was developed for PubMed and was subsequently adapted for use in the other databases (see Supplementary Table 1). In addition, we screened the reference lists of relevant articles and reviews to identify any potentially eligible studies.

Eligibility criteria

We included studies published in English or Chinese that reported data on the prevalence and related factors of compassion fatigue or its dimensions (burnout and secondary traumatic stress) among registered nurses or final-year nursing students during their clinical internship in various care settings. We excluded studies that included health professionals other than nurses, such as midwives or social workers. We focused on including studies that utilized validated tools for measuring compassion fatigue and/or its dimensions (burnout and secondary traumatic stress). We selected studies that employed the Compassion Fatigue Short Scale (CFSS) and the Professional Quality of Life Scale - Version 5 (ProQOL-5) to measure compassion fatigue. The CFSS was chosen because it directly measures the level of compassion fatigue. The ProQOL-5 measures compassion fatigue in two aspects: burnout and secondary traumatic stress, which is in line with the view of Stamm [7], considering secondary traumatic stress and burnout as the two components of compassion fatigue. Both scales demonstrate high reliability and validity, ensuring their scientific rigor in evaluating compassion fatigue [37–40]. However, only studies that used both the 'burnout' and 'secondary traumatic stress' subscales of the ProQOL-5 for measurement were included, as our aim was to identify research providing a comprehensive assessment of these constructs.

We included cross-sectional studies that could report data on point, period, or lifetime prevalence of compassion fatigue and its dimensions (burnout and secondary traumatic stress) [41]. To be included in the synthesis of factor-related evidence, eligible studies were required to use multivariate analysis methods such as multiple regression, logistic regression, and structural equation modeling to adjust for multiple variables. We excluded qualitative studies, case reports, editorials, conference abstracts, letters, notes, protocols, reviews, as well as studies that focused on examining interventions or mitigation strategies.

To guarantee the validity of the data included, we excluded studies of low quality as assessed by the criteria detailed below. In addition, we excluded studies with insufficient information, specifically those from which additional data could not be obtained from the authors to calculate mean or median scores, or to determine the prevalence of compassion fatigue and its dimensions (burnout and secondary traumatic stress).

Study selection and data extraction

We managed search results using EndNote X7 (Thomson Reuters, New York, USA). Duplicates were removed, and two review authors (YLJ and HSW) independently screened titles and abstracts to identify potentially relevant studies. Full texts of selected studies were retrieved and examined by both authors. Disagreements were resolved by consulting a third reviewer (TX). One author (YLJ) used a predetermined data extraction form to extract data from the included studies, which was verified by two independent reviewers (LMQ and LY). When assessing the relevant factors for nurses and nursing students during internships, we extracted the following data items: first author, publication year, country, sampling methods, single-center or multi-center, sample size, number of male and female participants, average age, tools used for measuring compassion fatigue and its dimensions (burnout and secondary traumatic stress), reported data on compassion fatigue and its dimensions, and related factors. For the nurse group, we specifically extracted information about the department they worked in. For the nurse intern group, we additionally extracted information on their educational level and internship duration. For studies with multiple publications, the most comprehensive one was used.

Critical appraisal of included studies

Two review authors (YLJ and CL) independently assessed the quality of the included studies using the Agency for Healthcare Research and Quality tool [42]. This tool comprises 11 items related to data sources, research design, participants, variables, data, bias, sample size, quantitative variables, statistical analysis, measurements, and follow-up. Each item was scored as 0 ('No' or 'Unclear') or 1 ('Yes'), with a total score of ≥8 indicating 'high' quality, 4–7 as 'medium,' and <4 as 'low.' Disagreements were resolved through discussion with a third reviewer (MFJH).

Data analysis

We described the characteristics of the included studies and summarized their data using descriptive statistics such as frequencies, percentages, medians, and ranges.

When appropriate, we performed meta-analyses to pool prevalence rates and mean scores for compassion fatigue and its dimensions (burnout and secondary traumatic stress).

In the meta-analysis, we used a random-effects model to account for heterogeneity. We assessed heterogeneity between the included studies using Cochrane's Q test and the I [2] statistic, considering an I^2>75% as indicative of substantial heterogeneity. We noted that meta-analysis of prevalence data typically exhibits substantial heterogeneity. We performed subgroup analyses for three pre-specified factors to explore sources of heterogeneity: recruiting from multiple hospital wards, publication year, and hospital ward types.

We conducted all analyses using Stata 17.0 and presented pooled results with 95% CI and *p*-values. Where relevant, we narratively synthesized evidence on factors related to compassion fatigue or its two dimensions.

The certainty of evidence assessment

We systematically applied the Grading of Recommendations Assessment, Development and Evaluation (GRADE) principles to assess the certainty of the evidence. Initially, all evidence were considered high certainty, and then, where applicable, downgraded to be moderate, low, or very low certainty based on factors such as study limitation, inconsistency, imprecision, indirectness, and publication bias. To ensure the quality of the included studies, we only selected those that met predefined high standards, excluding low-quality studies; therefore, additional risk of bias was not considered. Inconsistency was evaluated by analyzing the consistency of study results. In this process, we adopted a qualitative and conservative approach: if more than 75% of the studies were consistent, no downgrading was applied; if 60–75% were consistent, the evidence was downgraded by one level; and if less than 60% were consistent, the evidence was downgraded by two levels. For imprecision, due to insufficient meta-analysis, we could not assess optimal information size. According to GRADE guidelines, studies with a sample size of fewer than 400 were considered small and were downgraded by one level. Indirectness was assessed based on the generalizability of the evidence to the broader nursing population; downgrading was applied if the evidence was limited to specific subgroups (e.g., specific wards or age groups). To evaluate publication bias, we performed pre-planned funnel plots; if significant bias was detected, the evidence was downgraded.

Results

Search results

We identified 3,469 articles through searching electronic databases and an additional 5 articles from the reference lists of relevant studies. In this review, we included 197 studies published between 2010 and 2023 (see Fig. 1).

Characteristics of the included studies

In this review, the 196 included studies involved 73,034 clinical nurses and 4,551 nursing students during the internship (see Table 1 and Supplementary Table 2). The median sample sizes were 307 for clinical nurses and 254 for nursing students. Among these studies, 151 were conducted in China. A total of 188 studies (95.9%) focused on clinical nurses, while 8 studies (4.1%) centered on nursing students during the internship (see Table 1). Convenience sampling methods were employed in 161 studies, including 153 involving clinical nurses and 8 involving nursing students. Research on clinical nurses spanned various hospital wards and clinical areas, with 78 studies involving nurses from multiple ward types. Studies on nursing students predominantly included participants with Associate degrees, undertaking internships ranging from 3 to 12 months. For measuring burnout and secondary traumatic stress, 176 studies utilized the ProQOL-5 scale, while 20 studies employed the CFSS scale.

Critical appraisal results

The overall quality of the included studies varied, with a majority of them (108 studies, 55.1%) presenting high-quality data, while the remainder (88 studies, 44.8%) were of moderate quality. As shown in Fig. 2, most studies clearly defined or addressed issues such as the source of information (100%); the description of inclusion and exclusion criteria (95.4%), and the time period used for patient identification (88.3%). Additionally, 88.8% included consecutive participants, 72.0% employed blinding of outcome assessors; 86.2% conducted quality assurance assessments, 62.8% dealt with confounding; and 91.3% reported patient response rates and data completeness. However, only 54.6% of the included studies clarified how missing data were handled in the analysis; and a mere 13.8% justified patient exclusions from the analysis. Furthermore, none of the studies reported details about participant follow-up. More information is available in Supplementary Table 3.

Levels of compassion fatigue and its dimensions

Registered nurses. A total of 156 studies (involving 63,254 nurse staff) reported mean scores for burnout, and secondary traumatic stress using the ProQOL-5 (see Supplementary Table 4). The pooled mean score was 26.81 (95% CI 26.28 to 27.35, I^2=99.5%, $p<0.001$) for burnout (Fig. S1), and 25.88 (95% CI 25.39 to 26.37, I^2=99.4%, $p<0.001$) for secondary traumatic stress (Fig. S2), indicating moderate levels of compassion fatigue in registered nurses. Additionally, 18 studies (5,007 participants) reported CFSS scores for compassion fatigue

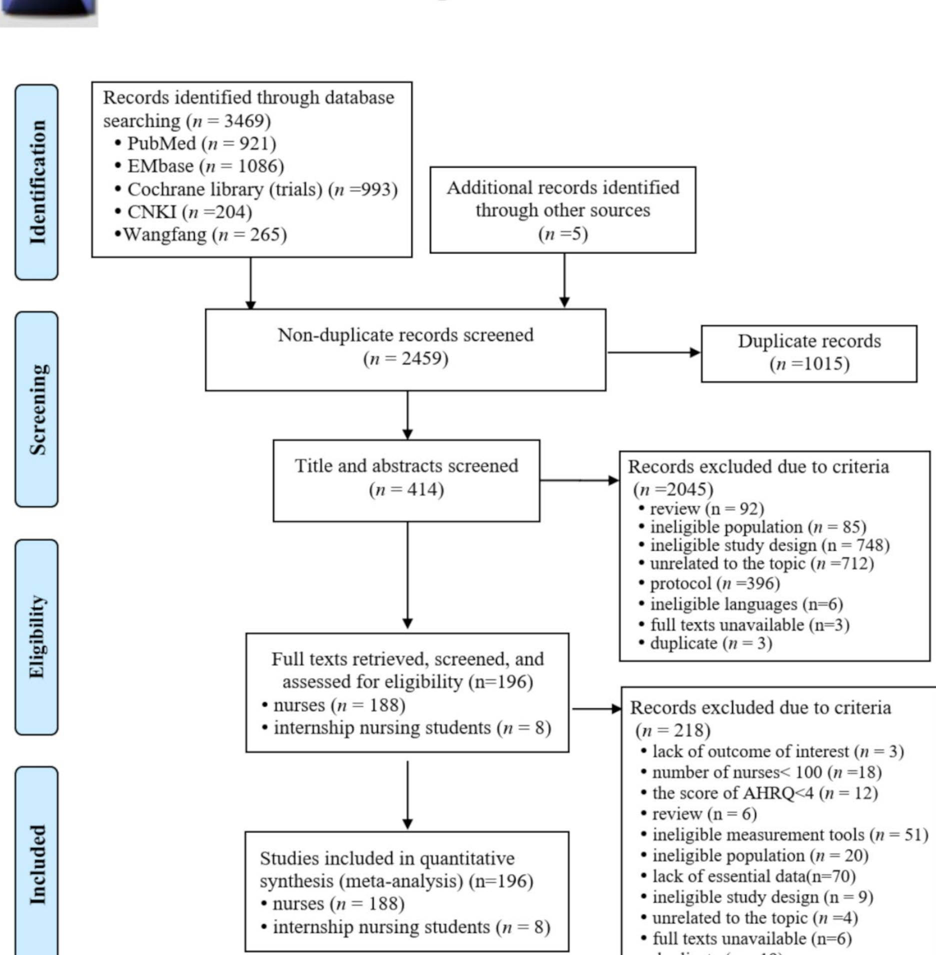

Fig. 1 PRISMA flow diagram of retrieval and selection of studies

among nurse staff, with a pooled mean score of 53.78 (95% CI 47.07 to 60.49, $I^2=99.5\%$, $p<0.001$) (see Fig. S11 and Supplementary Table 7).

37 studies classified burnout and secondary traumatic stress scores into low, moderate, and high levels using ProQOL-5 raw scores (see Supplementary Table 5). Our pooling suggested that 71% (95% CI 66.2–75.5%, $I^2=97.73\%$, $p<0.001$) of nurse staffs were at a moderate level of burnout (see Fig. S3), while 3.2% (95% CI 1.6–5.3%, $I^2=97.81\%$, $p<0.001$) were at a high level (see Fig. S4). For secondary traumatic stress, 63.5% (95% CI 58.8–68.1%, $I^2=97.45\%$, $p<0.001$) were at a moderate level (see Fig. S5), while 4.3% (95% CI 2.2–7%, $I^2=98.29\%$, $p<0.001$) were at a high level (see Fig. S6). Additionally, 32 studies used ProQOL-5 standardized scores to classify burnout and secondary traumatic stress, showing some variations (see Figs. S7 to S10 and Supplementary Table 6).

Nursing students during the internship. Four studies reported mean scores of burnout, and secondary traumatic stress in nursing students during internships ($n=1{,}691$) using ProQOL-5 (see Supplementary Table 4). Pooled mean scores were 29.16 (95% CI 26.95 to 31.37, $I^2=98.8\%$, $p<0.0001$) for burnout, and 25.64 (95% CI 20.95 to 30.34, $I^2=99.6\%$, $p<0.0001$) for secondary

Table 1 Summary characteristics of the included studies

Items	Summary results of studies in nurses (188 studies)	Summary results of studies in nurse interns (8 studies)
Publication year		
Before the COVID-19 pandemic	83 studies	3 studies
After the COVID-19 pandemic	105 studies	5 studies
Sample sizes	Median 307 (range 100 to 4913)	Median 254 (range 96 to 2256)
Average age (years)	Median 31.24 years, range 22.45 to 44 years among 91 studies	Median 21.52 years, range 21.17 to 22.00 years among 3 studies
Numbers of male/ female	7319/ 59,043(162 studies)	385/ 3952 (6 studies)
Use of convenience sampling methods	153/188 studies (81.48%)	8/8 studies (100%)
Numbers of studies by countries		
China	144 (76.72%)	7 (87.5%)
United States	11 (6.88%)	1 (12.5%)
Iran	8 (4.23%)	NA
Saudi Arabia	7 (3.70%)	NA
Korea	6 (3.17%)	NA
Other countries including: Portugal, Australia, Jordan, Spain, Japan, Turkey, Uganda	12 (5.82%)	NA
Hospital ward types (188 studies)		
Various wards	78 (41.26%)	NA
ICU and/or Emergency	42 (22.70%)	NA
Oncology	21(11.11%)	NA
Psychiatry	11 (5.81%)	NA
Pediatrics	11 (5.81%)	NA
Operating room	7 (3.70%)	NA
Others	18 (9.52%)	NA
Measurement tools used	ProQOL-5 (170 studies) • mean scores of BO, STS and CS/fatigue by ProQOL-5: 156 studies (82.99%) • prevalence rates defined using raw scores: 35 studies (18.61%) • prevalence rates defined using standardized scores: 32 studies (17.02%) CFSS • mean scores: 18 (9.57%)	ProQOL-5 (6 studies) • mean scores of BO, STS and CS/fatigue: 4 studies (50%) • prevalence rates defined using raw scores: 2 studies (25%) • prevalence rates defined using standardized scores: 2 studies (25%) CFSS • mean scores: 2 (25%)
Numbers of studies involving multi centers	151/188 (80.32%)	3/8 (37.5%)
Interns with Associate/ Bachelor degree	Not relevant	2933/1522
Duration of internship	Not relevant	Range 3 to 12 months

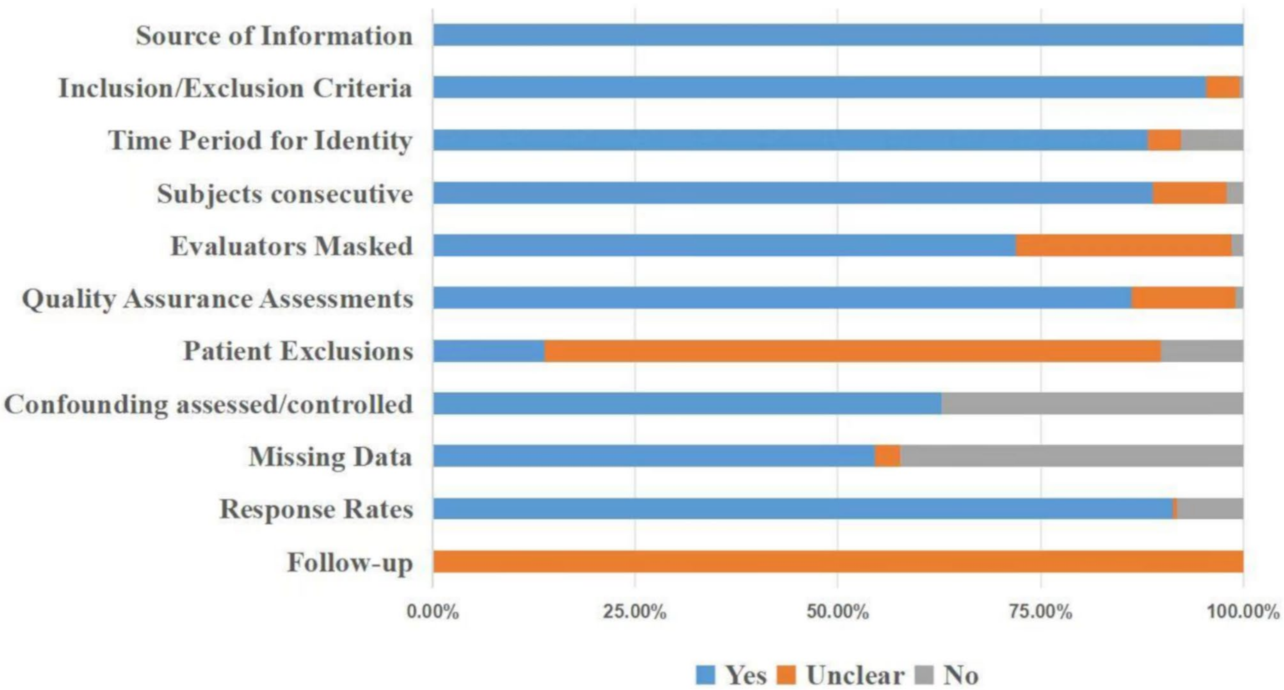

Fig. 2 Summary results of critical appraisal using the Agency for Healthcare Research and Quality tool

traumatic stress, respectively (see Figs. S1 to 2). Two studies (with 2,563 interns) reported CFSS scores with a pooled mean score of 52.74 (95% CI 37.44 to 68.05, $I^2=99.1\%$, $p<0.001$) (see Fig. S11 and Supplementary Table 7).

Two studies reported data by low, moderate, and high levels for burnout and secondary traumatic stress in nursing students during internships using ProQOL-5 raw scores (see Supplementary Table 5). Our pooling suggested that more than 90% of nursing students reported moderate burnout (see Fig. S3), and only 0.7% reported high burnout (see Fig. S4). We found that 59.4% of nursing students reported a moderate level of secondary traumatic stress (see Fig. S5), and 1.5% was at the high level of secondary traumatic stress (see Fig. S6). Additionally, 2 studies used ProQOL-5 standardized scores to classify burnout and secondary traumatic stress, with results showing some variations (see Figs. S7 to S10 and Supplementary Table 6).

Subgroup analysis. Our analyses showed that nurses exhibited higher compassion fatigue in studies published after the COVID-19 pandemic. Nurses from the ICU, emergency, and psychiatry departments showed higher levels of secondary traumatic stress and burnout than those in other departments. The results of subgroup analyses are presented in Supplementary Table 8.

In the above analyses, we did not perform the pre-planned funnel plots to explore publication bias.

Factors related to compassion fatigue and its dimensions

We identified 107 studies that evaluated factors related to compassion fatigue and its dimensions (burnout and secondary traumatic stress) (see Table 2 and Supplementary Tables 9 and 10). Among these, 102 studies focused on nurses (92 on burnout and secondary traumatic stress, and 10 on compassion fatigue), while 5 studies focused on nursing students during internships (3 on burnout and secondary traumatic stress, and 2 on compassion fatigue).

For nurses, the evidence indicates that psychosocial factors and certain work-related factors may influence the development and progression of burnout and secondary traumatic stress. Specifically, a poor work environment, lower social support, lower job satisfaction, heavier workload stress, and lower psychological capital are associated with higher burnout and secondary traumatic stress scores (moderate or low-certainty evidence; see Table 2). However, this study did not find significant effects of demographic characteristics and some work-related factors on compassion fatigue, burnout, and secondary traumatic stress.

For nursing students during the internship, the evidence is sparse. Moderate or low-certainty evidence suggests that more night shifts, lower psychological capital, or less enjoyment of the nursing profession may lead to higher burnout. Students with higher psychological capital may have lower secondary traumatic stress scores (moderate or low-certainty evidence; see Table 2). Additionally, students with lower social support, lower

Table 2 The evidence of factors influencing compassion fatigue and its dimensions

Items	Related factors in registered nurses	Related factors in internship nursing students
Burnout	Moderate or low-certainty evidence suggests that: • a poor work environment is likely to contribute to increased levels of burnout. • the higher frequency of workplace violence likely resulted in increased levels of burnout. • higher social support may result in a lower burnout score. • the lower the job satisfaction, the higher the burnout. • nurses with a higher psychological resilience may have lower burnout levels. • the heavier workload stress, the higher burnout scores. • the higher psychological capital, the lower burnout scores. Moderate or low-certainty evidence suggests no relationship between burnout and the following factors: • age as reported in 73.8% (48/65) studies with data available for this factor; • education levels as reported in 80% (52/65) of the studies with data available for this factor; • marital status as reported in 77.2% (44/57) of the studies with data available for this factor; • gender as reported in 88.7% (47/53) studies with data available for this factor; • income as reported in 81.5% (22/27) studies with data available for this factor; • the situation of nurses' children as reported in 94.7% (18/19) studies with data available for this factor; • religion as reported in 81.8% (9/11) studies with data available for this factor; • years of working experience as reported in 87.1% (54/62) studies with data available for this factor; • professional title as reported in 84.5% (38/45) of the studies with data available for this factor; • type of employment as reported in 82.1% (32/39) of the studies with data available for this factor; • department types as reported in 75% (27/36) studies with data available for this factor; • official position in terms of leadership roles as reported in 80% (20/25) studies with data available for this factor; • night shift frequencies as reported in 70.6% (12/17) studies with data available for this factor; • daily or weekly working hours as reported in 94.4% (17/18) studies with data available for this factor; • shift work/ shift predominantly as reported in 100% (10/10) studies with data available for this factor; • income satisfaction as reported in 62.5% (5/8) studies with data available for this factor. Uncertain evidence on the relationship between burnout and the following factors: • health status • hospital type such as tertiary hospitals • the willingness to re-choose the nursing career • personality traits	Moderate or low-certainty evidence suggests that: • the more night shifts, the higher burnout scores • the higher psychological resilience, the lower burnout scores • the more enjoyment of the nursing profession, the lower burnout Moderate or low-certainty evidence suggests no relationship between burnout and the following factors: • gender • being the only child of a family • age • current internship department • hospital types • social support

Table 2 (continued)

Items	Related factors in registered nurses	Related factors in internship nursing students
Secondary Traumatic Stress	Moderate or low-certainty evidence suggests: • worse health status could lead to higher levels of secondary traumatic stress. • a poor work environment is related to increased levels of secondary traumatic stress. • higher social support may result in a lower secondary traumatic stress score. • the lower the willingness to re-choose the nursing career, the lower secondary traumatic stress scores. • the lower the job satisfaction, the higher the secondary traumatic stress scores. • the heavier workload stress, the higher secondary traumatic stress scores. • the higher psychological capital, the lower secondary traumatic stress scores. Moderate or low-certainty evidence suggests no relationship between secondary traumatic stress with the following factors: • age as reported in 82.8% (53/64) studies with data available for this factor; • education levels as reported in 81.5% (53/65) of the studies with data available for this factor; • marital status as reported in 91.4% (53/58) of the studies with data available for this factor; • gender as reported in 92.7% (51/55) studies with data available for this factor; • income as reported in 76% (22/29) studies with data available for this factor; • the situation of nurses' children as reported in 94.4% (17/18) studies with data available for this factor; • religion as reported in 81.8% (9/11) studies with data available for this factor; • years of working experience as reported in 88.1% (52/59) studies with data available for this factor; • professional title as reported in 87.0% (40/46) of the studies with data available for this factor; • type of employment as reported in 91.9% (34/37) of the studies with data available for this factor; • department types as reported in 65% (24/37) studies with data available for this factor; • official position in terms of leadership roles as reported in 88% (22/25) studies with data available for this factor; • night shift frequencies as reported in 76.5% (14/17) studies with data available for this factor; • daily or weekly working hours as reported in 77.8% (14/18) studies with data available for this factor; • shift work/ shift predominantly as reported in 90% (9/10) studies with data available for this factor; • income satisfaction as reported in 100% (7/7) studies with data available for this factor. Uncertain evidence on the following factors: • hospital type such as tertiary hospitals • workplace violence • psychological resilience • personality traits	Moderate or low-certainty evidence suggests that: • the higher psychological resilience, the lower secondary traumatic stress scores。 Moderate or low-certainty evidence suggests no relationship between burnout and the following factors: • gender • age • current internship department • night shift frequencies • hospital types • social support • enjoyment of the nursing profession Uncertain evidence on the following factors: • being the only child of a family

Table 2 (continued)

Items	Related factors in registered nurses	Related factors in internship nursing students
Compassion Fatigue	Moderate or low-certainty evidence suggests no relationship between burnout and the following factors: • age as reported in 75% (6/8) studies with data available for this factor; • marital status as reported in 100% (7/7) studies with data available for this factor; • gender as reported in 100% (5/5) studies with data available for this factor; • years of working experience as reported in 100% (8/8) studies with data available for this factor; • professional title as reported in 100% (6/6) studies with data available for this factor; • type of employment as reported in 100% (6/6) studies with data available for this factor;	Moderate or low-certainty evidence suggests that: • Internship nursing students who worked more night shifts had higher compassion fatigue scores • internship nursing students in secondary hospitals exhibited higher levels of compassion fatigue compared to those in tertiary hospitals. • internship nursing students intending to leave the profession had significantly higher compassion fatigue levels compared to those who wished to stay. • The higher social support, the lower levels of compassion fatigue. • The higher psychological resilience, the lower compassion fatigue or higher compassion satisfaction. Moderate or low-certainty evidence suggests no relationship between compassion fatigue and the following factors: • gender • being the only child of a family

psychological capital, or less enjoyment of the nursing profession may experience higher levels of compassion fatigue (moderate or low-certainty evidence; see Table 2). However, this study did not find significant effects of demographic characteristics and some work-related factors on compassion fatigue, burnout, and secondary traumatic stress.

Discussion

Main findings

In this review, which includes 196 international, high-quality studies, we found that both registered nurses and nursing students during their internships had moderate levels of burnout and secondary traumatic stress, as measured by the ProQOL-5 scale. Both groups exhibited similar rates of moderate to high levels of secondary traumatic stress, also measured by the ProQOL-5 scale. Using data from the CFSS, we found that both registered nurses and nursing students showed moderate levels of compassion fatigue. The included studies explored the relationship between compassion fatigue, its dimensions (secondary traumatic stress and burnout), and various factors. Five factors were identified as being associated with secondary traumatic stress and burnout in nurses: a poor work environment, lower social support, lower job satisfaction, heavier workload stress, and lower psychological capital, with the evidence being of moderate or low certainty. Nonetheless, most reported factors did not show statistically significant relationships. Evidence for internship nursing students is sparse. However, where available, lower psychological capital was also found to be related to secondary traumatic stress and burnout (moderate or low-certainty evidence). Less enjoyment of the nursing profession is related to higher levels of burnout and compassion fatigue.

The Conservation of Resources theory posits that stress arises from actual resource loss, the threat of resource loss, or the lack of resource gain, and that protecting and optimizing resources can help individuals more effectively manage stress [43]. Therefore, policymakers should establish and enforce strict standards to ensure that healthcare facilities provide safe and comfortable working environments with adequate resources and equipment. Hospital management should implement these standards by fostering a supportive and cooperative work atmosphere. Furthermore, nursing educators should emphasize the role of psychological capital in their curricula to help students maintain a positive mental state throughout their careers. Hospitals should also offer psychological counseling services to help nurses and nursing students maintain a positive mental state when facing work-related stress. Social Support Theory suggests that social support can provide emotional, informational, and practical assistance, reducing individual stress and enhancing coping abilities [44]. Consequently, policymakers should promote the establishment of effective support networks, including psychological counseling services and peer support programs. Hospital management should establish both formal and informal support networks, such as mentorship programs and peer support groups, to provide nurses with emotional support and professional guidance. The Job Demand-Control Model posits that work stress arises from the imbalance between job demands and personal control [45]. High-demand and low-control work environments increase stress, but reasonable workload distribution and adequate support can effectively mitigate this stress [45]. Thus, policymakers should set reasonable workload standards to ensure that nurses' work burdens remain manageable. Hospital management should allocate workloads fairly and provide fair compensation and ongoing professional development opportunities to improve nurses' job satisfaction. Through these comprehensive measures, it is possible to effectively enhance the work environment, social support, job satisfaction, workload distribution, and psychological capital, thereby alleviating compassion fatigue among nurses.

To our best knowledge, existing reviews have primarily focused on compassion fatigue, burnout, and secondary traumatic stress among registered nurses, with a notable lack of evidence targeting at nursing students during the internship. The present review filled this gap by including data on nursing students during the internship, revealing that compassion fatigue at work is prevalent (and at a moderate level) among them. In terms of the nurse-related data, this review is generally consistent with previous systematic reviews [29, 46, 47], all suggesting prevalent compassion fatigue at work among registered nurses. Our review indicates that key factors relating to secondary traumatic stress and burnout in registered nurses are associated with work and psychosocial domains. Previously published systematic reviews only included studies with analyzable data for pooling to explore the factors related to compassion fatigue at work [32, 35, 46–52]. In this present review, we found that it is challenging to perform a quantitative synthesis as factor variables were measured differently in the included studies, and the results were not always completely presented in included studies [31, 32, 35, 47, 49–54]. To generate better evidence, we followed Cochrane review approaches, incorporating study quality into evidence synthesis by only including good-quality studies [55]. To our knowledge, previous reviews have not considered this approach; nonetheless, our review still identified the largest number of studies compared with others.

In this study, we conducted a narrative synthesis of the evidence on factors related to compassion fatigue. The majority of the evidence was rated as moderate or low

certainty, primarily due to substantial heterogeneity and indirectness. The heterogeneity may stem from differences in questionnaire design, sample characteristics, or the methods of questionnaire administration across studies. Indirectness could be related to variations in study contexts, such as the types of clinical departments (e.g., general vs. specialized departments) where nurses were employed, or the different tools used to measure compassion fatigue among nursing students. Although we initially planned to assess publication bias in the single-arm meta-analysis using a funnel plot, we ultimately decided against it due to the limitations of this method, which is consistent with common practices in prevalence-specific systematic reviews [56]. To minimize the potential for publication bias in this study, we conducted a comprehensive search of multiple English and Chinese databases, ensuring the thoroughness and comprehensiveness of the included studies. Given the lack of a quality assessment tool specifically designed for prevalence studies, we opted to use the AHRQ tool. While we applied this tool rigorously and included only studies of moderate to high quality, potential biases related to study design or data reporting may still exist, as the AHRQ tool is not tailored to the specific nuances of prevalence research. Therefore, these factors should be carefully considered when interpreting the quality of the evidence in this study.

Implications

Our review findings have several implications. Firstly, since both registered nurses and nursing students during the internship present moderate levels of compassion fatigue at work, it becomes crucial to support nursing students in addressing compassion fatigue experienced during their internship. The development of compassion fatigue is closely related to the complexity and diversity of compassion in nursing practice. While compassion is regarded as a core professional value according to the Code of Ethics for Nurses [57], nurses' understanding of compassion often varies depending on their cultural background and personal beliefs. Some nurses may perceive compassion as a negative emotion, akin to pity or a sense of religious duty [58]. This narrow interpretation of compassion can impose significant emotional burdens on nurses, leading to feelings of powerlessness and emotional exhaustion, ultimately resulting in compassion fatigue [3, 58]. To address this issue, Joan Halifax's heuristic model suggests that compassion cannot be directly taught as a fixed trait but is rather a complex phenomenon generated through processes such as attentional balance and emotional regulation [59]. Mindfulness meditation and equanimity training have been demonstrated as effective methods for supporting these processes, helping nurses maintain emotional stability in high-stress environments and reducing the risk of compassion fatigue [60, 61]. Secondly, as it is noted above that psychosocial domains-related factors play an important role in compassion fatigue and its two dimensions, we recommend providing targeted psychological health education and training for nursing students before their internships. This could enhance their awareness of compassion fatigue and related psychological issues. Intervention strategies for nursing students during the internship could consider cultivating and strengthening their psychological capital. Such measures are crucial for enhancing their psychological adaptability to internship challenges, thereby reducing the risk of compassion fatigue and laying a solid foundation for their future professional career. Also, continuous monitoring of interns' psychological health is advisable to detect early signs of compassion fatigue. Thirdly, this present review highlights the dominance of literature in registered nurses in this area. Whilst research targeting at intern nurses remain limited, thus more research is urgently needed. Fourthly, we found uncertain evidence regarding demographic characteristics as factors related to compassion fatigue, burnout, and secondary traumatic stress in both nurses and nursing students during the internship, indicating a need for high-quality data about these factors.

Strengths and limitations

Our review has several strengths. We adhered to the standard Cochrane review methodologies throughout this review. A comprehensive literature search was performed in both English and Chinese databases, identifying 196 studies for inclusion. In comparison with other reviews [29, 62], our review included the largest amount of study data. In selecting studies, we focused exclusively on moderate- and high-quality studies, acknowledging the large volume of research literature in this area and aiming to generate high-quality evidence in this review [55]. Furthermore, we followed the principles of the GRADE methodology to assess the certainty of evidence in this review, a practice that is rarely conducted in previous reviews.

This review has limitations. Firstly, there are only 8 studies focusing on internship nursing students, which limits the ability to make comparisons between the outcomes of internship nursing students and registered nurses. Secondly, the included studies reported diverse types of data on factors relating to compassion fatigue and its two dimensions at work, preventing the performance of a meta-analysis by factors. Alternatively, we employed narrative synthesis approaches for summarizing factor evidence. Thirdly, no specific GRADE method was developed for assessing the certainty of prevalence evidence. We followed generic GRADE principles for assessing the certainty of the evidence in this review. The methods for synthesizing prevalence data are still under

development. To guide future reviews, we advocate for empirical evaluations of relevant publication bias assessment approaches in this area and further development of specific GRADE methodologies.

Conclusion

Both registered nurses and nursing students during the internship exhibit moderate level of compassion fatigue. In registered nurses, burnout and secondary traumatic stress are closely associated with poor work environment, low social support, low job satisfaction, heavy workload stress, and low psychological capital. Similarly, low psychological capital significantly contributes to both burnout and secondary traumatic stress in nursing students. This study represents the first systematic review to examine these factors among nursing students, underscoring the importance of improving work environment, enhancing social support, and strengthening psychological capital in clinical practice to mitigate compassion fatigue. Future research should focus on the nursing student population, conducting large-scale longitudinal studies to deepen understanding and develop tailored intervention strategies for this group.

Supplementary Information

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Supplementary Material 1

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Author contributions
YLJ, LY and MFJH conceived and designed the study. YLJ, HSW, and TX contributed to the acquisition, analysis, and interpretation of data. YLJ, LMQ, CL, LY, and MFJH were involved in data extraction, quality assessment, and statistical analysis. NR drafted the manuscript. MFJH and TX revised subsequent drafts. All authors reviewed and approved the final manuscript.

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Data availability
Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate
As this study is a systematic review, all data are derived from publicly available published literature. Therefore, this study does not involve any individual participants, and informed consent is not required.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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