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REVIEW ARTICLE

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Workplace violence and risk factors for PTSD among psychiatric nurses: Systematic review and directions for future research and practice

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Accessible Summary

What is known on the subject?

- Trauma among psychiatric nurses and other healthcare workers is related to workplace violence, but other risk factors may also contribute, including those occurring before, during or after workplace violence.

What does this paper add to existing knowledge?

- Most previously identified PTSD risk factors were not tested or supported in research with psychiatric nurses, although there is promising evidence for risk factors including severe or injurious assault, cumulative exposure, burnout, and other worker characteristics.
- We identify directions for research needed to improve knowledge, including collecting data before nurses experience workplace violence, defining workplace risk factors consistently and conducting and reporting qualitative analysis.

What are the implications for practice?

- Provide training in risk assessment and violence prevention to psychiatric nurses.
- Offer mental health support to those exposed to violence, especially with cumulative exposure.

Abstract

Introduction: Psychiatric nurses are at risk of workplace violence and post-traumatic stress disorder (PTSD). There is limited understanding of pre-trauma and post-trauma risk factors.

Aim: Our aim was to review factors associated with workplace PTSD in psychiatric nurses.

Method: We searched quantitative and qualitative studies from 1980 to 2019 in 23 databases plus abstracts for studies on psychiatric hospital nursing staff, potentially traumatic workplace events, workplace factors and PTSD. Following duplicate abstract (n = 10,064) and full-text (n = 199) screening, data were extracted in duplicate from 19 studies. Using best-fit framework synthesis, we identified workplace violence, pre-trauma and post-trauma risk factors.

Results: Six variables yielded evidence in at least two empirical studies scoring at least 6/8 on a quality measure, or one such study plus more than one other study

("promising": severe/injurious assault, cumulative exposure, burnout, poor mental health, low compassion satisfaction, neuroticism). Four were supported by at least one better quality study or at least two others ("suggestive": gender, poor training, any physical aggression exposure, compassion fatigue).

Discussion: Pre-trauma measures, consistent definitions of workplace exposures and thorough reporting of quantitative results are needed to improve research.

Implications for Practice: Violence prevention and mental health care for exposed nurses appear the most promising targets for PTSD prevention. Therefore, it is particularly important to understand workplace violence and mental health among nurses working in psychiatric hospitals.

KEYWORDS
aggression, assault, psychiatric nurses, PTSD, trauma, workplace violence

1 | INTRODUCTION

An estimated 24% of healthcare staff are exposed to physical violence in the workplace in a year (Liu et al., 2019). In their meta-analysis of 78 studies from six continents, Liu and colleagues reported significantly higher rates of violence among nurses than other healthcare workers, and a significant increase in workplace violence since the 1990s. Mento et al. (2020) systematically reviewed studies published since 2014 and identified higher rates of violence in psychiatric units than other healthcare settings (as did Liu et al., 2019). Nurses and other workers in acute psychiatric settings describe experiencing physical violence and threats but not reporting them out of concern that their experiences will not be taken seriously (e.g. Hilton et al., 2021; Niu et al., 2019; Rodrigues et al., 2021). Yet when surveyed, two thirds of staff at three psychiatric hospitals had been directly exposed to workplace violence, such as by being assaulted, threatened with death or serious harm to themselves or their family members, or injured while restraining an individual (Hilton et al., 2020), illustrating the scope of this problem and the need to understand its effects.

Across occupational groups, studies of workplace violence consistently show associations of violence exposure and mental health problems such as depression, anxiety, burnout and psychological distress (e.g. Rudkjoebing et al., 2020). In a survey of over 750 psychiatric hospital staff, 16% of participants met a screening cut-off for PTSD on a self-report scale, and PTSD symptoms were related to violence exposure (Hilton et al., 2020). In psychiatric settings, most aggression against staff is perpetrated by the individuals receiving care (e.g. Niu et al., 2019). Psychiatric hospitalizations may last for days, weeks or longer, and the ongoing caregiving relationship may prolong the psychological consequences of aggression for staff. Therefore, it is particularly important to understand workplace violence and mental health among nurses working in psychiatric hospitals.

A recent literature review of PTSD among nurses identified a variety of risk factors, falling into themes ranging from critical events to the workplace environment and individual strengths such as coping, personality and resilience (e.g. Schuster & Dwyer, 2020). In psychiatric settings specifically, chronic workplace stressors, workload and working on a forensic unit were additional predictors of PTSD (Hilton et al., 2020; Rodrigues et al., 2020). These findings indicate that preventing workplace PTSD requires an understanding of not only exposure to workplace violence but also characteristics of the violence, the workplace and the individuals exposed to violence. Such characteristics could be evident before, during or after a traumatic event. Knowledge of pre-trauma, peri-trauma and post-trauma risk factors would inform multi-faceted efforts to prevent workplace PTSD.

The basis for identifying risk factors at the pre-, peri- and post-trauma stages emerges from Brewin et al. (2000) meta-analysis of studies of adults exposed to trauma through combat, crime, accident, disaster or other types of event. They reported that peri-traumatic factors, such as trauma severity, and post-traumatic factors, such as lack of social support, had somewhat stronger effects than pre-trauma factors, such as gender, education or psychiatric history. A subsequent meta-analysis that focused on aspects of the traumatic event, psychological functioning and processing of the event, in the broad literature of adults exposed to events in a wide range of contexts, reached a similar conclusion (Ozer et al., 2003), confirming the importance of categorizing risk factors as pre-, peri- and post-traumatic. The Veterans Affairs and Department of Defense (VA/DoD) adapted this work in their theoretical framework for assessing risk factors for work-related PTSD (Management of Post-Traumatic Stress Working Group, 2010). In this framework, pre-traumatic risk factors include ongoing life stress, lack of social support, young age at time of trauma, pre-existing psychiatric disorders or substance misuse, history of traumatic events, history of PTSD and other factors (gender, socioeconomic status, education, intelligence, race, childhood abuse, other previous traumatization, other adverse childhood factors, family history of psychiatric disorders, and poor training or preparation for the traumatic event). Peri-traumatic risk factors include severe trauma, physical injury to self or other, type of trauma (e.g. combat, torture, rape, or assault convey high risk of PTSD), high

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perceived threat to life of self or others, community (mass) trauma and other factors (history of peri-traumatic dissociation and interpersonal trauma). Post-traumatic risk factors are as follows: ongoing life stress, lack of positive social support, bereavement or traumatic grief, major loss of resources, negative social support (shaming or blaming), poor coping skills and other factors (children at home, distressed spouse). We used this as our theoretical framework for building a model of risk factors for workplace-related PTSD among psychiatric nurses from the synthesized literature.

2 | CURRENT STUDY

Current research on factors related to PTSD among psychiatric workers is predominantly atheoretical, uses diverse methodological approaches including qualitative as well as quantitative studies, and appears across medical, occupational health and other professional literatures. We conducted the present mixed methods systematic review to address these gaps. We examined variables measured at the pre-, peri- and post-traumatic stage in a mixed methods systematic literature review. We asked, "What workplace factors (organizational, environmental, employee) predict, or are associated with, the prevalence of PTSD in psychiatric nurses?".

3 | METHOD

We pre-registered the review protocol in PROSPERO with the identification number CRD42019124825 (https://www.crd.york.ac.uk/prospero/) and in the Joanna Briggs Database of Systematic Reviews with the title "A systematic review of workplace factors associated with PTSD among nurses in psychiatric in-patient settings" (https://joannabriggs.org)." We used the Joanna Briggs Institute (JBI) SUMARI software to organize our search strategy and results (https://www.jbisumari.org/).

3.1 | Search strategy

We searched both published and unpublished literature from 23 online international databases: MEDLINE, Embase, CENTRAL, SCOPUS, CINAHL, PsycINFO, OTSeeker, ProQuest Diss/PQDT, OpenGrey, DissOnline, Proceedings First/Papers First, PILOT PTSD, LILACS, PASCAL, KoreaMed, IMSEAR, Panteleimon.org, WPRIM and Clinicaltrials.gov. We also searched relevant conference abstracts, including the European Congress on Violence in Clinical Psychiatry, European Society for Traumatic Stress Studies, International Conference on Violence in the Health Care Sector and the International Traumatic Stress Society. Search terms are listed in Table 1.

3.2 | Inclusion criteria

We searched for studies from 1980 onwards, consistent with the first inclusion of PTSD in the *Diagnostic and Statistical Manual of Mental Disorders* (now in its 5th edition, DSM-5; American Psychiatric Association, 2013). However, we did not require studies to make

TABLE 1 Inclusion criteria and corresponding search terms and keywords

Criterion	Subject terms	Keywords
Population: Sample	Nurses; Licenced practical nurses; Nursing, practical; Nursing staff, hospital; Nursing assistants; Nurses' aides; Psychiatric aides; Psychiatric nursing	Nursing; Registered nurse(s); RN(s); Registered practical Nurse(s); RPN(s); Licenced practical nurse(s); Psychiatric nurse(s); Personal support worker(s); PSW(s); Care worker(s); Nursing aide(s); Psychiatric hospital worker(s); Mental health worker(s); Mental health care worker(s); Mental healthcare worker(s)
Population: Setting	Emergency service, hospital; Emergency services, psychiatric; Hospitals, psychiatric; Hospitals, community; Hospitals, private; Hospitals, public; Hospitals, rural; Hospitals, urban; Tertiary care centres	Psychiatric emergency room(s); Psychiatric ER(s); Emergency room(s); ER(s); Intensive care; Psychiatric intensive care unit(s); Psychiatric ICU(s); Workplace(s); Organization(s); Institution(s); Hospital(s); Ward(s); Unit(s); Wing(s); Environment(s); Facility(ies); Program(s); Inpatient(s); Critical care; Acute care; Worker in a psychiatric hospital; Workers in the mental health sector
Exposure	Mental health services, organization and administration; Mental health services, standards; Hospitals, organization and administration; Hospitals, standards; Policy, organizational policy; Health policy; Guideline; Practice guideline; Workplace violence, prevention and control	Characteristic(s); Feature(s); Factor(s); Quality(ies); Setting(s); Policy(ies); Rule(s); Practice(s); Procedure(s); Operation(s); Action(s); Activity(ies); Workplace violence; Ward atmosphere(s), Psychosocial factor(s); Workplace factor(s); Causal attribution(s); Psychiatric hospital design(s); Trauma(s)
Outcomes	Stress disorders, traumatic; Stress disorders, post-traumatic; Stress disorders, traumatic, acute; psychological trauma	Post-traumatic stress disorder; Post traumatic stress disorder; Posttraumatic stress disorder; PTSD; Post traumatic stress; Posttraumatic stress; Acute stress disorder; Trauma symptom(s); symptoms of trauma; symptoms of stress and trauma

Note: Subject terms followed medical subject headings (MeSH) format.

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strict use of the DSM as many used self-report assessments with varying relation to the diagnostic criteria. We searched studies in all languages and then limited inclusion to full-text records in English, French, German or Portuguese according to the language abilities of our research team (no Portuguese texts met the remaining inclusion criteria). The review included qualitative and quantitative study designs. The initial search was conducted from January to April 2019, and the final search was conducted in August 2019. We also conducted a backwards and forwards reference search of studies that passed full-text inclusion, and communication with PTSD field experts to identify further relevant studies.

Study eligibility was based on the population, exposure, comparator and outcome (PECO). The population included nurses, auxiliary nurses and other nursing-related employees working in a hospital setting. In a previous exploratory review, we had found few studies among nurses working in psychiatric hospitals, so we initially included multiple hospital departments in our search; however, we eventually screened out all but psychiatric hospital settings (Figure 1). Exposures included workplace violence or other workplace factors whose association with PTSD was tested. We defined workplace factors broadly, including organizational, environmental or employee characteristics. We did not require a comparator sample or exposure. Outcome was limited to PTSD diagnosis or symptoms measured by an interview or a self-report instrument used in studies that informed the American Psychological Association's (2017) clinical practice guidelines for the treatment of PTSD. Studies using PTSD measures that were not listed by APA but whose validity was supported in at least one published study were also included. We excluded systematic reviews but examined their reference lists for additional studies. Retractions in, or of, studies were also searched, including fraudulent studies and errors in included studies.

3.3 | Procedure

Mixed method synthesis is an integrated approach in which findings from both quantitative and qualitative studies are assimilated according to the research questions posed, after converting data to comparable formats, such as transforming quantitative data into narrative themes so that they can be analysed using qualitative methods along with other qualitative data ("qualitizing" data; Sandelowski et al., 2006, p. 35). The data can then inform a theoretical model, by following a method such as the best-fit framework synthesis. This method is designed for the synthesis of findings from both quantitative and qualitative studies using a "common scaffold for integrating findings across different types of evidence" (Higgins et al., 2019, p. 538).

The second author and a graduate research student independently screened titles and abstracts from the database results. Studies with irrelevant abstracts and titles were excluded, and duplicate full-text inclusion screening was completed on the remaining studies. Prior to each screening phase, inter-rater reliability between the duplicate screeners was tested, and the screening tool refined as needed to achieve at least 95% agreement. The same two personnel then independently evaluated the included studies for risk of bias and quality using the JBI Critical Appraisal tools (Moola et al., 2017; https://joannabriggs.org/critical-appraisal-tools) with assistance from other team members as needed for non-English language sources. JBI offers eight checklists, each suited to a different type of qualitative or quantitative study design: cross-sectional, case–control, case report, case series, cohort, experimental, prevalence and qualitative research. Checklists range from eight to ten questions (e.g. Were confounding factors identified? Were the study subjects and the setting described in detail?). Each question is checked *yes*, *no*, *unclear* or *not applicable*. We computed a quality score by adding the number of items checked *yes* on the applicable checklist. Disagreements between reviewers at the screening and quality evaluation stages were resolved by consensus, or by the first author with reference to the inclusion criteria. Following the quality review of studies meeting our PECO inclusion criteria, we did not reject any studies; rather, each included study's quality rating contributed to the weight given to its finding when evaluating the evidence for each variable.

3.4 | Data extraction and analysis

We created a data extraction form with fields corresponding to all the PTSD risk factors in the existing framework, categorized into pre-, peri- and post-traumatic factors. The form was accompanied by a coding manual that defined each variable. In addition to the risk factors, we extracted study characteristics including study design, sample size, participation response rate, per cent of participants who were nursing staff, the nature of the exposures studied, whether exposures met DSM-5 PTSD diagnostic Criterion A (pertaining to the type of event and manner of exposure), percentage of participants exposed, and PTSD measures. A test of inter-rater reliability between two research team members on five studies yielded 99% agreement across all study characteristics and risk factors. Data extraction was completed in duplicate by the first and second authors. Discrepancies were resolved by consensus between the two and with the third author as needed.

Synthesis of the mixed methods studies included in the review was undertaken using the best-fit framework synthesis method (e.g. Booth & Carroll, 2015), as recommended in the *Cochrane Handbook for Systematic Reviews of Interventions*, *Version 6.0* (Higgins et al., 2019), following a procedure illustrated by Carroll et al. (2011). We treated each reported finding as textual, qualitative data, organized separately for each concept in the Management of Post-Traumatic Stress Working Group (2010) framework. We also extracted findings for variables that were studied but not part of the existing framework, refining their definition and relation to the framework over the course of iterative thematic analysis in order to refine new concepts specific to psychiatric nurses. We coded whether the variable was reported as increasing, decreasing or having no clear association with PTSD symptoms. This process was conducted by the first and

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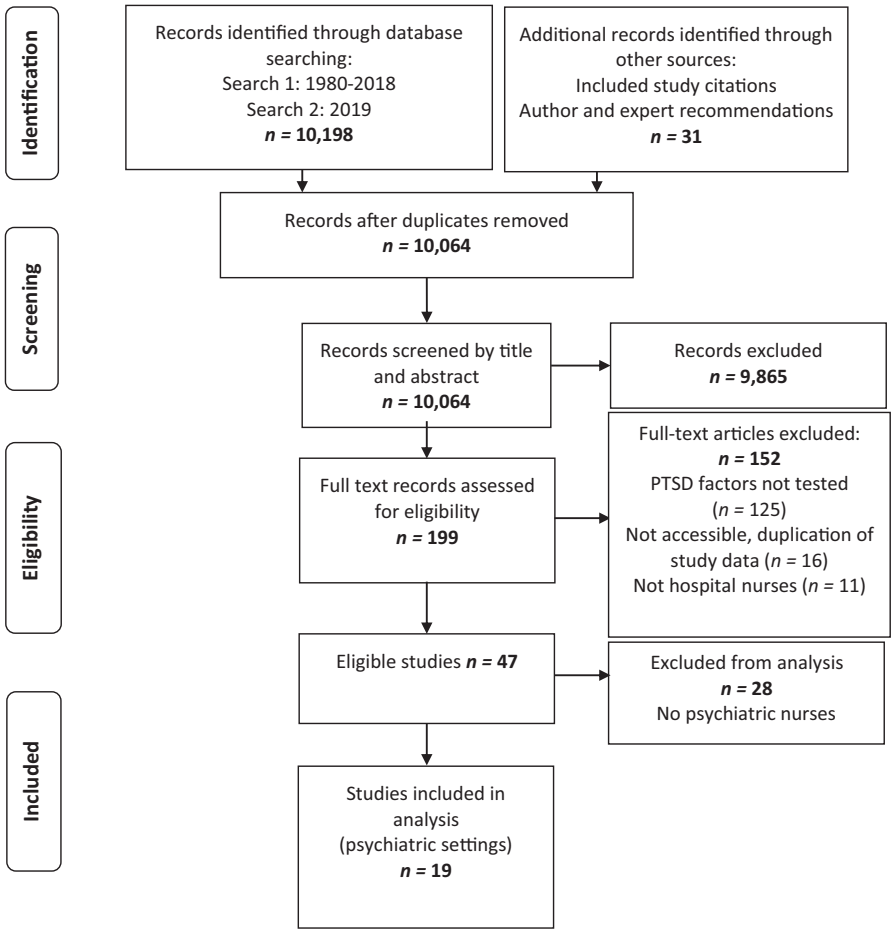


FIGURE 1 Flow chart of study inclusion

second authors and reviewed by the third author. Where researchers differed, consensus was achieved through discussion and re-examination of the studies.

Existing framework risk factors, new variables and their categorization as pre-, peri- or post-trauma factors were then modified into a revised suggested framework. The time frame of data collection determined some framework revisions; for example, life stress measured only after exposure to a potentially traumatic event was considered only as a post-traumatic factor. Study quality also informed our revisions and, in particular, our characterization of the strength of evidence. Given the variability in how the populations and exposures were defined, and how outcomes were measured, we did not find strong evidence for any single variable.

4 | RESULTS

Study screening and selection are summarized in Figure 1. Study characteristics are shown in detail in Table 2. The 19 included studies were conducted across five continents and comprised a total sample size of 2,448 (average $N = 144$, range = 1 to 285). Publication dates (or release dates of the five unpublished reports and presentations) spanned 21 years from 1998 to 2019. Of the 19 studies, 18 used analytical cross-sectional designs, describing variables associated with PTSD or its symptoms based on self-report data collected after exposure had occurred. One of these 18 studies also included a comparison group of nurses who were not assaulted (Wykes & Whittington, 1998), another reported on a case series analysis for a sub-sample (Richter & Berger, 2006), and a third conducted two cross-sectional surveys of overlapping samples before and after a critical event on the unit (Lee et al., 2015). The remaining source was a published case report (Graham, 2017). Prevalence rates of PTSD diagnosis or screening cut-off were reported in 13 studies with $N > 1$, and ranged from 0% to 83% of participants, with a mean of 25%.

4.1 | Quality

Quality ratings were based on the 8-item JBI checklists for cross-sectional studies and for case reports (Moola et al., 2017). No study achieved a perfect score, and our highest rating was 6 out of 8. The most common weaknesses were insufficient detail in the description of participant characteristics and exposures (e.g. assuming that working on a psychiatric unit was sufficient for a potentially traumatic exposure to have occurred). Other weaknesses included lack of validated measurement of the exposure, and absence (or insufficient reporting of) statistical analysis in cross-sectional studies, much of which relied on bivariate associations between each variable of interest and the outcome, rather than multivariate methods to control for potentially confounding variables.

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TABLE 2 Characteristics of analysed studies

		Methods		Population			Exposure		Outcome	
Source	Location	Design (% response rate)	Quality score	Setting	Sample size (% nurses)	Female (%)	Description (% exposed)	DSM-5 Criterion A[a]	PTSD measure	Risk factors studied
Peer-reviewed publications										
Cramer et al. (2019)	United Kingdom	Cross-sectional (89%)	5/8	Psychiatric hospital, forensic units	170 (89%)	45	Lost a patient to suicide (23%)	Yes	PCL	Younger age; female; poor training for traumatic event; years of experience on unit; exposure to suicide or near-fatal attempt; poor coping skills; health coping skills; avoidance of affect
Graham (2017)	United States	Case study (N/A)	6/8	Psychiatric hospital	1 (100%)	100	Severely physically assaulted by patient (100%)	Yes	Clinical diagnosis	Ongoing life stress; lack of social support; previous trauma; female; other adverse childhood factors; physical assault/injury; high perceived threat to life of self or other; negative staff support; lack of social support; shame
Hilton et al. (2017)	Canada	Cross-sectional (30%)	5/8	Psychiatric hospital	219 (54%)	-	"Experienced" violence (82%) and other disturbing behaviour by patients	Unclear	PCL	Forensic unit; nursing position; exposure to physical aggression; frequency of exposure
Inoue et al. (2006)	Japan	Cross-sectional (53%)	5/8	Hospitals, psychiatry wards	141 (100%)	80	"Exposed to" verbal abuse or violence (100%)	Unclear	IES-R	Younger age; female; years of experience on unit; neuroticism; extroversion; psychoticism; spouse/married status; lack of social support; time since exposure

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TABLE 2 (Continued)

Source	Location	Methods		Population			Exposure		Outcome	Risk factors studied
		Design (% response rate)	Quality score	Setting	Sample size (% nurses)	Female (%)	Description (% exposed)	DSM-5 Criterion A[a]	PTSD measure	
Jacobowitz et al. (2015)	United States	Cross-sectional (69%)	5/8	Psychiatric hospital	172 (73%)	67	"Exposed to" severe physical attack, physical attack, verbal threat, or verbal assault (–)	Yes	PCL	Younger age; lower education level; Race; physical assault/injury; exposure to verbal aggression; exposure to physical aggression; frequency of exposure; resilience; compassion satisfaction; burnout; confidence in managing patient aggression
Lauvrud et al. (2009)	Norway	Cross-sectional (70%)	4/8	Psychiatric hospital	70 (100%)	-	"Exposed to" serious physical violence or threats containing serious physical violence, witnessed others exposed to serious physical violence (96%)	Yes	PCL	Forensic unit; years of experience on unit; compassion satisfaction; burnout; compassion fatigue
Lee, Daffern, et al. (2015)	Australia	Cross-sectional (58%–65%)	6/8	Psychiatric wards in general hospitals, and forensic unit in psychiatric hospital	196 (100%)	64	"Confronted or witnessed" 16 types of aggressive behaviour using the Perception of Prevalence of Aggression scale (–)	Yes	PCL	Younger age; previous trauma; poor training for traumatic event; forensic unit; years of experience on unit; frequency of exposure; work stress

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TABLE 2 (Continued)

		Methods		Population			Exposure		Outcome	
Source	Location	Design (% response rate)	Quality score	Setting	Sample size (% nurses)	Female (%)	Description (% exposed)	DSM-5 Criterion A[a]	PTSD measure	Risk factors studied
Lee, Ogloff, et al. (2015)	Australia	Cross-sectional at two time points (–)	6/8	Forensic unit in psychiatric hospital	97 (before event), 107 (after event, 100%)	Time 1: 62; Time 2: 63	Double-homicide by patient on unit (100% after event)	Yes	PCL	Working on the unit where homicide occurred
Olashore et al. (2018)	Botswana	Cross-sectional (96%)	5/8	Psychiatric hospital	201 (79%)	61	"Exposure to" physical assault causing pain or injury (39% past 12 months, 73% lifetime)	Yes	PCL	Younger age; pre-existing psychiatric disorder; female; years of experience on unit; nursing position; neuroticism; physical assault/injury; exposure to physical aggression; lack of social support
Richter and Berger (2001)[b]	Germany	Cross-sectional (50%)	6/8	Psychiatric hospitals	85 (91%)	-	Physically assaulted with actual or threatened serious injury (100%)	Yes	PTSD-Interview[e]	Younger age; female
Richter and Berger (2006)[b]	Germany	Cross-sectional (100%) with case series follow-up (76%);	5/8	Psychiatric hospitals	46 (70%)	50	Physically assaulted or severely assaulted (100%)	Yes	IES-R, PCL	Female; physical assault/injury; frequency of exposure
Tirgari et al. (2019)	Iran	Cross-sectional (–)	4/8	General hospitals, rehab centre	160 (100%)	76	"Experience managing traumatic events" (70% moderate or high)	Unclear	PCL	Younger age; female; years of experience on unit; frequency of exposure; compassion satisfaction; burnout; compassion fatigue; low interest in work

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TABLE 2 (Continued)

Source	Location	Methods		Population			Exposure		Outcome	Risk factors studied
		Design (% response rate)	Quality score	Setting	Sample size (% nurses)	Female (%)	Description (% exposed)	DSM-5 Criterion A[a]	PTSD measure	
Wykes and Whittington (1998)[c]	United Kingdom	Cross-sectional with a case-control element (–)	5/8	Hospitals, psychiatry wards	39 (100%)	62	Physically assaulted, minor injury or no injury (100%)	Unclear	IES, PSS	Physical assault/injury; frequency of exposure; ongoing life stress
Zerach and Shalev (2015)	Israel	Cross-sectional (–)	5/8	Psychiatric hospitals[d]	90 (100%)	71	"Exposure to" physical and verbal aggression (–)	Unclear	PTSD Inventory	Female; lower education level; years of experience on unit; nursing position; spouse/married status; ongoing life stress; illness attribution to chance; illness attribution to powerful others
Dissertations and Unpublished Reports										
Abderhalden et al. (2008)	Switzerland	Cross-sectional (71%)	6/8	Psychiatric hospitals	285 (100%)	62	Received or witnessed actual or threatened serious injury (100%)	Yes	PTSD-Interview[e]	Female; low psychiatric health; physical assault/injury
Baroni (2018)	United States	Cross-sectional (69%)	5/8	Psychiatric hospitals	70 (14%)	80	Participated in or observed restraints (100%)	Unclear	IES-R, PCL–5	Frequency of exposure; exposure to restraints; staff support
Gingi (2012)	South Africa	Cross-sectional (–)	6/8	Psychiatric hospital	127 (100%)	87	"Victim" of violence in past 2 weeks (86%) or witnessed patient violence to staff in past year (99%)	Unclear	IES-R	Resilience

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Source	Location	Methods		Population			Exposure		Outcome	Risk factors studied
		Design (% response rate)	Quality score	Setting	Sample size (% nurses)	Female (%)	Description (% exposed)	DSM-5 Criterion A[a]	PTSD measure	
Needham et al. (2010)	Germany, Switzerland	Cross-sectional (–)	4/8	Psychiatric and forensic hospitals	203 (100%)	-	Verbal and physical aggression and hostage taking (49%)	Yes	IES-R	Forensic unit; physical assault/injury; exposure to physical aggression
Registered Psychiatric Nurses Association of Saskatchewan (2016)	Canada	Cross-sectional (–)	4/8	–	212 (100%)	82	Workplace traumatic event (47%)	Unclear	DTS	Female; forensic unit; neuroticism; work environment (culture); staff support; low psychiatric health

Note: See text for details of quality assessment score.

Abbreviations: –, not reported; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, 5th ed. (American Psychiatric Association, 2013); DTS, Davidson Trauma Scale; IES-R, Impact of Event Scale - Revised; N/A, not applicable; PCL, Posttraumatic Stress Disorder Checklist; PCL-5, Posttraumatic Stress Disorder Checklist for DSM-5; PSS, PTSD Symptom Scale; PTSD, Post-traumatic Stress Disorder.

[a]Yes indicates at least some participants may have experienced an exposure meeting the DSM-5 PTSD diagnostic criterion A.

[b]Funding source cited: Public Occupational Insurances.

[c]Funding source cited: Bethlem and Maudsley Research Fund.

[d]Results for 106 community clinic nurses not reported here.

[e]"Interview" questions were administered by anonymous questionnaire.

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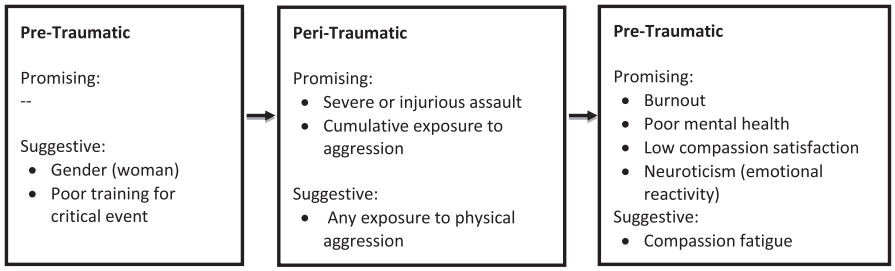


FIGURE 2 Model of PTSD risk factors for psychiatric nurses. PTSD, Post-traumatic stress disorder

Included studies often relied on self-report data gathered after exposure, so they can provide little information on pre-traumatic factors and the findings for peri-traumatic variables may be subject to recall biases. Furthermore, across the studies, there were inconsistent definitions of workplace exposures, and in nearly half the studies, it was unclear whether exposures met the DSM-5 PTSD diagnostic Criterion A for potentially traumatic events.

4.2 | Population

Nurses or auxiliary nursing staff comprised the entire sample in 12 studies, and 14% to 91% of the remaining studies (88% on average). All but one report clearly identified the setting as including a psychiatric unit or hospital; the exception was the Registered Psychiatric Nurses Association of Saskatchewan (RPNAS, 2016) that surveyed psychiatric nurses in "a broad range of treatment settings" (no page number). We retained this study because 52 (25%) of the 212 participants reported working on psychiatric wards or in acute in-patient care. Additional sample characteristics include an average age of 39 years (range 29 to 48) among 14 sources reporting the mean or median age, and an average of 75% of participants (range 45% to 100%) identified as women among 15 studies reporting gender.

4.3 | Exposure

Workplace exposures to various forms of aggression were studied, including verbal abuse, threats, physical violence, severe assaults and patient suicide (Table 2). Exposures included direct experience (e.g. being assaulted) or indirect experience (e.g. witnessing), and in some cases, the nature of the exposure was unclear, with seven reports stating that participants were "exposed to" or "reported" the exposure. In 11 studies, the aggression was sufficiently well defined in the report, or examples were provided, that it could be determined that DSM-5 PTSD diagnostic Criterion A for exposure may have been met for at least some participants. In four sources, the exposure clearly involved participants being directly physically assaulted, and all participants were exposed, including the one case study. In addition to workplace exposures, three studies surveyed participants' exposure to potentially traumatic events unrelated to the workplace, such as car accidents.

4.4 | Outcome

All but one study used mean scores or cut-offs on self-report screening measures, and the remaining study reported a clinical diagnosis. The most common such measure, used in 10 studies, was a civilian version of the Posttraumatic Stress Disorder Checklist (PCL; Blanchard et al., 1996) or the more recently published Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins et al., 2015). Six studies used the Impact of Event Scale (IES; e.g. Horowitz et al., 1979) or the Impact of Event Scale – Revised (IES-R; e.g. Weiss, 2004), including three that also used either a version of the PCL or the PTSD Symptom Scale (PSS; e.g. Foa et al., 1993). Other PTSD assessment scales are noted in Table 2.

4.5 | Evaluation of evidence for PTSD risk factors

After data were extracted, we set a standard for evaluating the strength of evidence for each variable. Given the limited quality ratings in the literature we located on risk factors for workplace-related PTSD among psychiatric nurses, and our intention for this review to inform a model of PTSD risk factors from this literature, we did not identify any source as "strong" and selected a cautious standard for evaluating the evidence. We sought evidence from at least two empirical studies with quality ratings of at least 6 on an 8-item checklist (our highest obtained rating), or one such study plus more than one other study with a similar result, to consider the finding promising. A finding with at least one empirical study with a quality rating of at least 6, or more than one other empirical study, was considered suggestive. Results of this process are organized below according to concepts (variables) either drawn from the chosen theoretical framework or generated from our thematic analysis. The final model of PTSD risk factors for psychiatric nurses is summarized in Figure 2.

4.5.1 | A priori framework factors

Among the 17 major factors plus categories of "other" factors in the a priori framework, only three remained in the framework specific to psychiatric nurses. Other a priori factors either were not measured in the reviewed literature or yielded only null or unclear results.

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Pre-traumatic phase

We retained only two pre-traumatic factors from the a priori framework, largely because other variables were only measured after exposure. The two retained variables were both from the large category of "other" pre-traumatic risk factors. Gender showed a suggestive association with PTSD symptoms. Evidence that women experience PTSD to a greater extent than men was derived from one higher quality and one lower quality empirical study (Abderhalden et al., 2008; Richter & Berger, 2006). However, one higher quality and six lower quality studies reported no significant association between gender and PTSD symptoms (Cramer et al., 2019; Inoue et al., 2006; Olashore et al., 2018; RPNAS, 2016; Richter & Berger, 2001; Tirgari et al., 2019; Zerach & Shalev, 2015).

Poor training for traumatic workplace events was the second retained pre-traumatic factor and was considered suggestive. In a higher quality study, the recency of aggression management training and the number of courses taken in their career were inversely associated with hyperarousal symptoms of PTSD among mental health nurses (Lee et al., 2015). However, in a lower quality study, hours of suicide prevention training was not related to mental health outcomes among forensic psychiatric staff (Cramer et al., 2019).

Remaining pre-traumatic factors from the framework were not retained. Age was not associated with PTSD symptoms in the two relevant higher quality studies (Lee, Daffern, et al., 2015; Richter & Berger, 2001), and the five lower quality studies were split between a positive association (Inoue et al., 2006; Jacobowitz et al., 2015), a negative association (Tirgari et al., 2019) and no association (Cramer et al., 2019; Olashore et al., 2018). Other variables yielded only null or unclear findings in the empirical studies, including pre-existing psychiatric disorders (i.e. mood disorder; Olashore et al., 2018), previous traumatic events (Lee, Daffern, et al., 2015; also considered by Graham, 2017) and two variables from the "other" category: education level (Jacobowitz et al., 2015; Zerach & Shalev, 2015) and race (Jacobowitz et al., 2015). Pre-traumatic life stress and lack of social support, and the "other" factor of adverse childhood experiences, were considered only in the case study (Graham, 2017).

Peri-traumatic phase

The a priori framework posited that severe trauma, physical trauma to self or others and high PTSD trauma type (e.g. combat, torture, assault) represented three separate risk factors for PTSD. In the reviewed literature, assault was the most common physical aggression, whereas combat, torture and rape were not studied, and several studies measured severe trauma in terms of assault resulting in injury to the participant. As a result, these three variables could not be evaluated independently so we evaluated them as a single peri-traumatic factor represented by exposure to severe trauma, including physical assault with injury. Severe trauma was thus the only factor retained from the a priori framework; it showed a promising association with PTSD symptoms. Four lower quality cross-sectional studies found a positive association between severe assault and PTSD symptoms (Jacobowitz et al., 2015; Olashore et al., 2018; Richter & Berger, 2006; Wykes & Whittington, 1998), and an association was inferred in the case report (Graham, 2017). However, a higher and a lower quality study reported that participants who were physically injured did not have higher PTSD symptom scores than others (Abderhalden et al., 2008; Needham et al., 2010). In a lower quality study of nurses who reported experiencing physical or verbal aggression, those who experienced injury or use of a weapon did not have significantly higher scores (Needham et al., 2010).

Remaining peri-traumatic factors from the framework (perceived threat to a person's life, community or mass trauma, and "other" factors) were not retained. These variables were not tested in the reviewed studies, although perceived threat was considered a contributing factor in the case study (Graham, 2017).

Post-traumatic phase

No a priori post-traumatic risk factor showed a promising or suggestive association with PTSD among psychiatric nurses. Five variables were studied. Ongoing life stress measured after exposure was reported as unrelated to PTSD outcomes in two lower quality studies (Wykes & Whittington, 1998; Zerach & Shalev, 2015). Lack of social support was positively associated with PTSD symptoms in one lower quality study (Inoue et al., 2006) but had no effect in another (Olashore et al., 2018). Coping skills were not associated with PTSD or other mental health outcomes in the one relevant lower quality study (Cramer et al., 2019). Only the case report considered post-traumatic life stress and social support, and the "other" factor of having children (Graham, 2017). Remaining factors (bereavement, loss of resources) were not addressed in any of the reviewed studies.

4.5.2 | New factors

The reviewed studies included 29 distinct variables that did not fit the a priori risk factors. More than half were examined as post-traumatic factors. We retained only seven of these variables in the new model based on promising or suggestive evidence.

Pre-traumatic phase

No new variables measured before exposure emerged as promising or suggestive. The most frequently studied variable was length of experience working in mental health. In one higher quality study, years of experience as a mental health nurse did not significantly predict hyperarousal, re-experiencing, or avoidance and numbing symptoms of PTSD (Lee, Daffern, et al., 2015). Five lower quality studies yielded a similar result (Cramer et al., 2019; Inoue et al., 2006; Olashore et al., 2018; Tirgari et al., 2019; Zerach & Shalev, 2015), whereas one reported that the presence of any PTSD symptoms was increased with the length of psychiatric nursing experience (Lauvrud et al., 2009). Similarly, working on a forensic unit did not predict PTSD symptom scores in one higher quality study and two lower quality studies (Hilton et al., 2017; Lee, Daffern, et al., 2015; Needham et al., 2010), and one reported that psychiatric nurses in correctional services had the highest scores (RPNAS, 2016).

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Peri-traumatic phase

We added two new peri-traumatic variables. Cumulative exposure to aggression had a promising association. In a higher quality study, frequency of aggression was a significant contributor to a multivariate model of hyperarousal symptoms of PTSD (Lee, Daffern, et al., 2015). Similar results were reported in five lower quality studies of cumulative exposure to severe assault (Jacobowitz et al., 2015), physical restraints (Baroni, 2018), managing "traumatic events" (Tirgari et al., 2019), a second assault at follow-up (Richter & Berger, 2006) or a variety of disturbing behaviours in the psychiatric unit (Hilton et al., 2017). A seventh study that surveyed assaulted psychiatric nurses at two time periods reported that those who had experienced additional assaults by time two were more likely to be experiencing extremely high or low PTSD symptoms at follow-up than those who were assaulted only once (Wykes & Whittington, 1998). In contrast, a longer time interval since exposure to verbal abuse or violence was associated with lower PTSD symptom scores (Inoue et al., 2006).

There was suggestive evidence that exposure to any physical aggression—regardless of severity or frequency—was associated with PTSD symptoms. Two lower quality studies reported an association, including a correlation between any experience of physical violence by a patient and PTSD symptom scores (Hilton et al., 2017) and higher scores among staff with any experience of assault leading to pain or injury in the last 12 months (Olashore et al., 2018). However, in another lower quality study, only a cumulative measure of severe assaults, rather than simple "physical attack" or other exposures combined, was positively associated with PTSD symptom scores (Jacobowitz et al., 2015). We also considered a finding from a higher quality study conducted before and after a homicide occurred in the hospital, in which the unit where the homicide occurred saw an increase in nurses meeting the PTSD cut-off (Lee, Ogloff, et al., 2015).

Other peri-traumatic variables were studied in only one source each. In the case study, lack of staff assistance and support during the critical event was thought to contribute to PTSD (Graham, 2017). In one lower quality study, losing a patient to suicide was related to a combined measure of PTSD and other mental health symptoms (Cramer et al., 2019), and another reported no effect of exposure to verbal aggression or threats (Jacobowitz et al., 2015).

Post-traumatic phase

We added five new variables based on constructs measured after exposure. Evidence was promising for an association of burnout with PTSD symptoms. Two lower quality studies reported significant positive correlations between self-report PTSD symptom scores and burnout scale scores (Jacobowitz et al., 2015; Tirgari et al., 2019). A third reported an association with having any symptoms of PTSD, although burnout was not a significant contributor to a regression model that included compassion satisfaction and years of psychiatric nursing experience (Lauvrud et al., 2009).

Evidence was also promising for poor mental health. PTSD symptoms were associated with poorer self-reported psychiatric health and psychosomatic symptoms in a higher quality study (Abderhalden et al., 2008), and a lower quality study reported that psychiatric nurses who met the PTSD scale cut-off score had higher scores on a depression self-assessment than other nurses (RPNAS, 2016). We did not consider psychological resilience as a mental health measure. One higher quality study and one lower quality study measured self-reported resilience, and both reported a non-significant correlation with PTSD symptoms (Gingi, 2012; Jacobowitz et al., 2015).

Promising evidence of an association between measures of neuroticism and PTSD symptoms was obtained through three lower quality studies. Two reported a positive correlation (Inoue et al., 2006; Olashore et al., 2018), and a third reported that neuroticism scale scores were higher among participants who reported PTSD symptoms (RPNAS, 2016).

Low compassion satisfaction also had a promising association. Three lower quality studies reported an inverse correlation between scores on a compassion satisfaction measure and PTSD symptom scores (Jacobowitz et al., 2015; Lauvrud et al., 2009; Tirgari et al., 2019), although it was not a significant contributor in a regression model of having any PTSD symptoms (Lauvrud et al., 2009).

There was suggestive evidence for compassion fatigue. It was measured in two lower quality studies, both reporting a positive association with PTSD symptoms (Lauvrud et al., 2009; Tirgari et al., 2019) although it was not significant in regression analysis (Lauvrud et al., 2009).

Other aspects of stress and dissatisfaction in the workplace were measured in various ways after trauma exposure, and the results were mixed. In two lower quality studies, nurses who reported lower satisfaction and enjoyment in their workplace, or a low level of interest in their work, were more likely to have PTSD symptoms (RPNAS, 2016; Tirgari et al., 2019). However, a higher quality study used a measure of work stress comprising patient demands, organizational problems, staffing difficulties, job insecurity and job satisfaction (Lee, Daffern, et al., 2015); in regression analysis, only organizational and staffing issues were associated with PTSD outcomes, and only with hyperarousal symptoms.

5 | DISCUSSION

In this mixed methods review of studies on risk factors for PTSD among psychiatric nurses, we identified 19 relevant studies in published and grey literature. Most studies used a cross-sectional design and employed self-report survey methods, achieving scores of four to six on eight-point quality assessment measures. A total of 58 variables were studied for their association with PTSD symptom scores or diagnoses, with half represented in the Management of Post-Traumatic Stress Working Group framework and the other half newly identified in our review. We considered 10 to have promising or suggestive evidence supporting their potential as PTSD risk factors among psychiatric nurses. Our final model for PTSD risk factors among psychiatric nurses included two pre-traumatic factors (gender, poor training), three peri-traumatic factors (severe or injurious

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assault, cumulative exposure to aggression, any exposure to physical aggression) and five post-traumatic factors (burnout, poor mental health, low compassion satisfaction, neuroticism, compassion fatigue).

5.1 | Directions for future research

Pre-traumatic risk factors for PTSD among psychiatric nurses included being a woman (promising) and poor training for critical events (suggestive). In other occupational groups, women are more likely to meet diagnostic criteria for PTSD (e.g. Carleton et al., 2018) despite men having a greater risk of workplace violence (e.g. Guay et al., 2015). A recent cross-sectional survey study of psychiatric workers found that gender did not predict PTSD after controlling for critical events and other workplace exposures (Hilton et al., 2020). Further research is needed to clarify the role of gender in PTSD among psychiatric nurses and, in particular, the extent and nature of violence exposure and chronic stressors experienced by men and women, and how any differences in the characteristics of these exposures may contribute to gender differences in PTSD outcomes. Longitudinal designs are needed to examine how men and women develop (and recover from) workplace-related PTSD over time. Qualitative research methods may be useful to explore gender differences in attributions and outcomes of workplace exposures, and, in quantitative studies, multivariate analyses are needed to test interactions and identify independent predictors.

Training to equip psychiatric staff to respond to critical events is now commonplace in healthcare settings, as a result of increased occupational health and safety legislation (e.g. Arbury et al., 2017). In the present review, however, the two relevant studies concerned training for different events (suicide prevention vs. aggression management) and measured them in different ways (training hours vs. recency and number of courses; Cramer et al., 2019; Lee, Daffern, et al., 2015). Future research could develop reliable measures of training and identify which aspects are most strongly related to prevention of PTSD. Evaluations of manualized workplace training programmes could incorporate measures of PTSD symptoms.

Peri-traumatic risk factors for PTSD among psychiatric nurses included severe physical assault (promising), cumulative exposure (promising) and any exposure to physical aggression (suggestive). The DSM-5 PTSD exposure criteria include actual or threatened death, serious injury, or sexual violence (American Psychiatric Association, 2013). The diagnostic criteria do not reflect cumulative exposure, except in the context of repeated or extreme exposure to aversive details of traumatic events; however, we located six studies that reported associations between PTSD symptoms and the frequency or recurrence of potentially traumatic events. Furthermore, in Hilton et al. (2020), the number of critical events experienced by psychiatric workers was a significant contributor to PTSD symptoms, controlling for chronic stressors, gender and discipline. Future research is needed to more closely examine the importance of cumulative exposure relative to a single, severe event, including whether cumulative exposures have an additive or interactive effect on PTSD among psychiatric workers.

Evidence regarding the effect of having any exposure to physical aggression was based on lower quality studies that had unclear definitions of exposure and aggression or that defined aggression to include both physical and verbal acts. Peri-traumatic variables are among the most important risk factors for PTSD (e.g. Brewin et al., 2000; Ozer et al., 2003); therefore, rigorous and consistent definitions of aggression exposure would help advance understanding of workplace-related PTSD among psychiatric nurses. The use of valid measures of physical aggression is an important next step for research, which can draw from the existing literature evaluating such measures in psychiatric populations (e.g. Harris et al., 2013). Researchers could also develop and test valid, reliable ways to operationalize the DSM-5 PTSD exposure criteria for future survey and interview studies. Data collection at or close to the time of the exposure would minimize the problem of recall bias inherent to retrospective self-report designs.

Most PTSD risk factors identified among psychiatric nurses fell into the post-traumatic phase. This is largely an artefact of research designs involving cross-sectional surveys and retrospective reports of workplace exposures. Furthermore, these studies largely depended on participants reporting their personal strengths and weaknesses and their personality characteristics. Thus, evidence was considered promising for an association between PTSD symptoms and poor mental health, burnout, low compassion satisfaction and emotional reactivity (referred to in the literature as neuroticism). Evidence was considered suggestive for compassion fatigue. The finding for poor mental health is consistent with a broader literature illustrating psychiatric comorbidity of PTSD, depression and anxiety, including among nurses (e.g. Stelnicki & Carleton, 2020). It is not possible to tell from the current body of research whether poor mental health predisposes psychiatric nurses to PTSD following critical event exposure, or whether PTSD, depression and other mental health problems are all sequelae of exposure. Further, most studies did not control for lifetime traumatic exposures, so symptoms could have been precipitated or exacerbated by non-workplace exposures. Similarly, burnout, compassion fatigue and traumatic stress may be different ways of defining, measuring or experiencing conceptually similar symptoms distinguished primarily by differences in the presence, nature and chronicity of precipitating exposures (e.g. Branson, 2019; Pirelli et al., 2020). Longitudinal studies are needed to distinguish such relationships among psychiatric nurses. Consistent definitions and valid measures of each concept are essential for clearer conclusions to be drawn about what workplace factors are actually risk factors for PTSD.

Neuroticism is one of the "Big Five" factors in personality psychology and represents a predisposition to negative emotionality such as anxiety, depression, withdrawal, emotional volatility and vulnerability to stress (e.g. Anglim & O'Connor, 2018). Personality traits are considered stable individual characteristics; however, they can change with intervention, and emotionality appears especially malleable (e.g. Roberts et al., 2017). The three studies that tested the

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association of neuroticism and PTSD symptoms all used retrospective designs, making it impossible to tell whether psychiatric nurses with high neuroticism are at greater risk of PTSD should they experience a traumatic exposure (a pre-traumatic risk factor) or whether traumatic exposure triggers emotional reactivity among some individuals, increasing the post-traumatic risk of PTSD. Longitudinal research, especially studies that collect personality measures before exposures occur, is still needed to determine the nature of the relation between PTSD and personality traits such as neuroticism among psychiatric nurses.

5.2 | Strengths and limitations of this review

This study is the first to take a systematic approach to identifying all available research and the most promising risk factors for PTSD among psychiatric nurses. We followed previously published standards for literature reviews (e.g. Higgins et al., 2019), and published a clear and precise methodological protocol, permitting reproducibility of our search strategy and review steps. We conducted the first and second searches, as well as screening steps, in duplicate. Interpretation of study data for the new risk factors was completed multiple times by three reviewers prior to reaching consensus.

Biases affecting systematic reviews may include publication and time lag biases whereby studies with significant results tend to be published more often or more quickly than those with null results (e.g. Higgins et al., 2019). However, a strength of our review is that we included grey literature, reducing the effect of these reporting biases. We also searched international databases and included studies in not only English but also three other languages of which our team had a working knowledge, minimizing location and language bias (e.g. Higgins et al., 2019). We identified and removed any sources where authors appeared to publish results from the same data set in multiple reports, minimizing duplicate publication bias. We included citation searches in our review, which can introduce citation bias; however, only one study was added as a result of this step.

It is possible that, when we conceptualized new PTSD risk factors during the best-fit process, bias may have occurred as we categorized these factors as pre-, peri- and post-traumatic, and selected risk factors for the final framework. We limited categorization bias by only including in the pre-trauma phase either demographic factors or variables actually measured prior to the traumatic event exposure. Bias may also have occurred when we categorized evidence as "promising" based on support from at least one higher quality study plus replication in any other study, and categorized evidence as "suggestive" if one or the other of these criteria were met. We limited this bias by applying the rule consistently and stating our conclusion that there is no evidence that we considered to be strong for any PTSD risk factor.

We deviated from the registered protocol by using the JBI critical appraisal tools instead of the Mixed Methods Appraisal Tool (MMAT) which has five sets of criteria, including criteria for mixed methods studies, and an algorithm to help choose which criteria to use (in the revised version; Hong et al., 2019). We made this change because the MMAT was undergoing revision when we began our review; also, we registered our protocol through JBI and chose to use their software, which included appraisal tools.

6 | IMPLICATIONS FOR PRACTICE

We found no strong evidence for any risk factors for PTSD for nurses working in psychiatric hospitals. Promising and suggestive evidence was found for three aspects of violence exposure, including any exposure, cumulative exposure and severity or injury. Currently, therefore, prevention of violence exposure is a primary target for reduction in workplace-related PTSD among psychiatric nurses. A key first step is violence risk assessment, which can be used as part of efforts to effectively minimize violence and protect workers (e.g. Gaynes et al., 2017). In their review of commercial workplace violence prevention training programmes, Arbury et al. (2017) note that most do not include training in hospital-based risk assessment and policies. Several violence risk assessment tools have shown validity in predicting violence in psychiatric settings (e.g. O'Shea et al., 2013). Some tools are designed to identify individuals at risk for whom individualized therapeutic interventions can then be used to prevent violence before it occurs, and others are designed for frequent assessment in order to increase security or other prevention measures when needed. Adequate training to prepare psychiatric staff for critical events may also be important for preventing PTSD, and aggression management training programmes should include post-incident monitoring and after-care for workers (Arbury et al., 2017).

Our findings regarding post-traumatic burnout, poor mental health, compassion fatigue and low compassion satisfaction suggest that evidence-based mental health services, and monitoring by a mental health professional of staff's coping and wellbeing following critical event exposure, may be valuable for preventing PTSD among psychiatric nurses. We found no evidence for an association between individual resilience and PTSD. There may, however, be grounds for providing early therapeutic interventions for individuals who exhibit heightened emotional reactivity (perhaps assessing levels of worry, rumination, avoidance and other maladaptive coping responses), or who self-identify has having personality characteristics of neuroticism.

7 | CONCLUSION

The present mixed methods systematic review identified 58 variables examined in studies of PTSD among psychiatric nurses, retaining 10 for the revised framework of PTSD risk factors: severe or injurious assault, cumulative exposure, burnout, poor mental health, low compassion satisfaction, neuroticism (emotional reactivity), identifying as a woman, poor training, exposure to any physical aggression and compassion fatigue. Evidence for these

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risk factors was considered promising or suggestive, and no evidence was considered strong. Therefore, there is not yet a strong evidence base for identifying targets for PTSD prevention in this occupational group, beyond prevention of violence exposure. This review identified directions for strengthening the methodology and reporting of research studies and may provide momentum for improvements. Measuring workplace factors and worker characteristics before traumatic exposures, using valid definitions of workplace exposures and consistent reporting of empirical results, is a needed next step.

8 | RELEVANCE STATEMENT

Nurses are especially at risk of workplace violence in psychiatric settings, and recent research reveals concerning rates of PTSD among psychiatric nurses. Risk factors for PTSD may include not only exposure to workplace violence but also characteristics of the violence, the workplace and the individuals exposed to violence. This paper systematically reviews studies of factors associated with PTSD symptoms in psychiatric hospital nurses, and identifies future research needs and clinical responses supported by existing research. Knowledge of pre-trauma, peri-trauma and post-trauma risk factors can inform multi-faceted efforts to prevent workplace PTSD.

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CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

N. Z. Hilton involved in conceptualization, formal analysis, funding acquisition, interpretation, investigation, methodology, review and editing, and supervision. S. Addison involved in conceptualization, data curation, formal analysis, interpretation, investigation, methodology, original draft, project administration, and review and editing. E. Ham involved in funding acquisition, formal analysis, interpretation, project administration, and review and editing. N. C. Rodrigues and M. C. Seto involved in funding acquisition, interpretation, and review and editing.

DATA AVAILABILITY STATEMENT

The protocol for this review was registered in PROSPERO (CRD42019124825) and in the Johanna Briggs Database of Systematic Reviews with the title "A systematic review of workplace factors associated with PTSD among nurses in psychiatric in-patient settings." Data sharing is not applicable to this paper as no new data were created or analysed in this study.

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